

Milwaukee Estuary Area of Concern

Proceedings from the Stakeholder Input Group Meeting

Kinnickinnic River Section



Report Date: 8 September 2011

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* Note that in the meeting this was called the “Culture” group, but social uses is a better description of the issues that this group focused on, and for future purposes, this is the term that will be used.

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Introduction

The United States and Canada established The Great Lakes Water Quality Agreement in 1978, which expresses the commitment of each country to restore and maintain the chemical, physical, and biological integrity of the Great Lakes Basin Ecosystem. As part of a 1987 amendment to the Agreement, the U.S. and Canada designated Areas of Concern (AOCs) to focus efforts on cleaning up toxic pollutants in specific Great Lakes tributaries and harbors that suffered from severe pollution. The United States Environmental Protection Agency (U.S. EPA) works in partnership with state agencies (specifically the Department of Natural Resources in Wisconsin) to implement the AOC program.

The AOC program is intended to guide the first steps toward a restored Great Lakes ecosystem; it is not meant to serve as a framework for full restoration. It is also very geographically focused; therefore, lakewide issues (such as mercury pollution from atmospheric deposition) are beyond its scope. The 1987 amendment to the Agreement established a separate program, the Lakewide Management Plan (LaMP) program, to address whole-lake issues. Other programs, such as the state Impaired Waters Program that implements the Clean Water Act, are working in comprehensive ways to restore the health of Great Lakes water bodies.

The Wisconsin DNR and U.S. EPA regard public participation as a critical part of the process to address toxic pollutants in the AOCs. Those who live and work within AOC communities have local knowledge that is important for implementing the program in ways that align with the needs and values of those communities. Facilitated by UW-Extension, the WDNR brought together a Stakeholder Input Group (SIG) for the Milwaukee Estuary AOC to provide an avenue for collecting input from local stakeholders and for sharing information about AOC-related activities. The proceedings are a means of documenting input from the July 27, 2011, stakeholder meeting and responding to specific comments offered by participants. The WDNR is committed to listening to stakeholders and integrating input when possible (recognizing the limitations of the AOC program).

The purpose of the meeting proceedings is to summarize and synthesize the comments received at the July 29, 2011 meeting, and communicate the degree to which the comments and input can be considered for the purposes of the AOC program. The proceedings are organized by beneficial use impairment (BUI). For each BUI, a goal statement is provided. The goal statements were based on the goals suggested by the International Joint Commission, as presented in the document *Delisting Targets for the Milwaukee Estuary Area of Concern: Final Report* (developed through a separate process and submitted to U.S. EPA in 2008). The targets that are referred to in this document are also from the *Delisting Targets* report. During the meeting, verbal comments were captured by a facilitator for each of the three small breakout groups (See Appendix A for a sample of what was used). Some stakeholders provided written comments via a survey derived from a data table that was distributed prior to the meeting (See Appendix B). The summary of stakeholder comments on the goal is followed by a response from the Milwaukee Estuary AOC Coordinator. The same format is followed for the more detailed delisting targets. For each

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BUI, there is also a list of recommendations, priorities, and follow-up items. When applicable, there may also additional resources listed for those who would like to know more about topics related to that beneficial use impairment.

Thanks to all who have participated and given input into the stakeholder meetings. Certainly, there has been a great deal of improvement in the AOC since the '80s, and that's in large part because of the hard work of stakeholders and interested parties. Thank you for the good work you do, and let's continue to work together to make improvements in the Milwaukee Estuary.

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1. RESTRICTIONS ON FISH AND WILDLIFE CONSUMPTION

Goal: Waterbody-specific consumption advisories are not in effect for human consumption of fish and waterfowl.

Stakeholder comments about the goal: Overall, comments were supportive of the goal statement for this BUI.

Response to the stakeholders' comments about the goal: The proposed broad goal is something that is in keeping with the spirit of the AOC program.

2008

Target: Removing of this BUI may be determined by the following steps and targets:

1. All known man-made sources of PCBs, mercury, dioxins and furans within the AOC and tributary watersheds have been controlled or eliminated
2. Fish tissue concentrations do not exceed 0.05 ppm for PCBs
3. Waters within the AOC are not listed as impaired due to fish consumption advisories in the most recent Wisconsin Impaired Waters list (provided every even-numbered year to the U.S. EPA)
4. Waters within the AOC do not have special fish consumption advisories due to mercury in the *Healthy Guide for Eating Fish in Wisconsin* for two document cycles. (*Delisting Targets for the Milwaukee Estuary Area of Concern: Final Report*, pp. 31-32)

Stakeholder comments about the target: The group indicated that they wanted to ensure the protection of public health. In particular, there was a concern about whether fish consumption advice would be truly protective of public health for ethnic groups with higher rates of fish consumption.

There were also questions about how long it takes for fish tissue concentrations to decrease after contaminated sediment removal.

Additionally, another respondent indicated that consumption advisories should be the same as that of store-bought food.

Comments from the group indicated that they were also concerned about contaminants of emerging concern.

Response to the stakeholders' comments about the target: With regard to protecting public health, the goal of issuing fish consumption advisories is to protect public health. Fish consumption advice is intended to allow people to receive the health benefits of eating fish while reducing unwanted contaminants (for more information, please see [Choose Wisely: A health guide for eating fish in Wisconsin](#)). Note also that the document has been translated into Spanish and Hmong). DNR issues waterbody specific consumption advice where such advice is necessary to ensure that public health can be protected for those who harvest fish in waters of the state. The advice is protective of all people because it advises how much should be eaten; that is, DNR advises people how much fish is safe to eat. The point at issue for the stakeholders, it seems, is reaching and convincing people to follow fish consumption advice. Even if the advice were made more stringent, some people won't know about the advice and some will choose not to follow it. DNR has worked with the state Department of Health to develop outreach campaigns that reach segments of the

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population whose English-speaking and reading abilities may be limited. Additionally, local health agencies and DNR are working to help reach subsistence anglers.

With regard to the rate of decline of contaminants in fish tissue, fish PCB concentrations will respond as soon as clean forage is available. The rate of response will vary: sooner for fast growing fish and longer for long-lived fatty fish. It is worth noting that even in large fish, tissue concentrations will decrease because fish are still growing and taking in food that is cleaner. The other issue is if all accessible habitat has been cleaned up, the rate of response will reflect how much the fish are still exposed to any remaining PCB deposits. For example, if a clean up occurs in one specific site, but fish still have access to other contaminated areas, the decreases in tissue concentrations may not be as great as would be otherwise expected.

In terms of how fish consumption advice compares to advice for store-bought fish, the FDA sets tolerance levels for contaminants and regulates the interstate sale of fish. The state's advice is more detailed for which fish species and which contaminants are of concern in specific water bodies within the state. According to the FDA, concerns related to industrial chemicals, including heavy metals and pesticides, primarily focus on fish harvested from aquaculture ponds, freshwater bodies, estuaries, and near-shore coastal waters (i.e., areas subject to shore side contaminant discharges), rather than from the open ocean (See Chapter 9 of FDA's *Fish and Fishery Products Hazards and Controls Guidance*). DNR also has assembled guidelines for popular commercial fish that are based on FDA regulations, for which mercury is the primary concern. For more information, please see p. 6 in [Choose Wisely: A health guide for eating fish in Wisconsin](#), or contact Candy Schrank, DNR Fish Toxicologist.

DNR and the Department of Health Services have also assembled fact sheets for fish consumption advisories in each of the five Areas of Concern in Wisconsin. This fact sheet is referenced below and included in this document as Appendix C. In the Milwaukee Estuary AOC, special fish consumption advisories have only been issued for PCBs; the state-wide mercury advisories pertain to fish caught from all waters of the state (see p. 9 in [Choose Wisely: A health guide for eating fish in Wisconsin](#)).

Contaminants of emerging concern are an important lakewide issue and are best addressed by programs other than the Area of Concern program. They are the focus of research supported by U.S. EPA's Great Lakes National Program Office under other Great Lakes programs. The U.S. Fish and Wildlife Service is carrying out an "Early Warning Program for Emerging Contaminants" project to evaluate the presence and effects of such contaminants. UW-Extension received funding for a "Contaminants of Emerging Concern: Pharmaceutical Waste" project to implement a comprehensive pharmaceutical waste collection, awareness, and education program. U.S. EPA has funded both projects under the Great Lakes Restoration Initiative.

Recommendations, Priorities, and Follow-Up Actions:

1. The DNR AOC Coordinator will explore working with the state Department of Health Services and the City of Milwaukee Health Department on outreach related to fish consumption advice for subsistence anglers.
2. In the late 1980s a waterfowl consumption advisory was issued for the Milwaukee Estuary. This consumption advisory has not been assessed since that time. A data assessment should occur in order to determine whether or not there should be a waterfowl consumption advisory for the Milwaukee Estuary.

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3. Although this meeting focused on the KK River, additional actions on Milwaukee Estuary tributaries are a high priority to address this impairment. The following is a tentative list of sites needing sediment assessment and/or remediation:
 - a. Lincoln Creek-Assessment completed through Great Lakes Legacy Act; Phase 1 is underway, Phase 2 still necessary (PBCs)
 - b. Menomonee River-Assessment needed from downstream from confluence with Little Menomonee River to the estuary
 - c. Solvay Coke Superfund Alternative Site-Remediation and some assessment of adjacent areas necessary (PAHs and metals)
 - d. Cedar Creek-Remediation necessary (PCBs)

Additional Resources:

FDA. *Fish and Fishery Products Hazards and Controls Guidance, Fourth Edition*. April 2011.

<http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/Seafood/FishandFisheriesProductsHazardsandControlsGuide/ucm256690.htm>

Wisconsin DNR. *Fish Consumption Advice for the Milwaukee Estuary Area of Concern*. Spring 2011.

Information about the U.S. Fish and Wildlife Service Contaminants of Emerging Concern project:

<http://www.fws.gov/glri/ToxicEarlyWarning.htm>

Information about the UW-Extension Pharmaceutical Waste project:

<http://fyi.uwex.edu/pharma/>

Emerging Contaminant Threats and the Great Lakes: Existing science, estimating relative risk, and determining policies," a report issued by the Alliance for the Great Lakes in August 2011:

<http://www.greatlakes.org/emerging>

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2. DEGRADED FISH AND WILDLIFE POPULATIONS

Goal: Healthy, self-sustaining communities of desired fish.

Stakeholder comments about the goal: Stakeholders commented that they would like to change the wording of this goal to be “healthy and native communities of fish and wildlife.” They also stated that “self-sustaining” seemed too vague.

Response to the stakeholders’ comments about the goal: For the next meeting, we will modify the proposed goal. The term self-sustaining was used in order to capture the desire to see native fish populations that no longer need to be stocked. According to DNR fisheries experts, sturgeon have been stocked on the Milwaukee River since 2006. In 1999, stocking of small-mouth bass and northern pike ceased because natural reproduction was good and previous stocking had bolstered their populations. With regard to this impairment, DNR biologists and the stakeholders present at the meeting have identified an important connection between fish populations and the amount of suitable spawning habitat available in order to sustain and support such populations. It is for this reason that DNR would like to keep “self sustaining” in the goal statement.

In terms of the wildlife component of this goal, at the time that the RAP documents were written, there was essentially no data about wildlife populations. In the first RAP document written in 1991, the wildlife component was not considered to be part of the impairment for the Milwaukee Estuary AOC. The RAP revision in 1994 stated that declines in wildlife populations were likely attributable to degraded water quality and loss of habitat, especially the loss of wetlands (*Milwaukee Estuary RAP*, 1994, p. 2-17). The RAP also said that contaminants present in the AOC are known to affect wildlife reproduction and growth, and so the use should be considered impaired (p. 2-18).

DNR is currently working with its wildlife experts and reviewing scientific literature to determine if relationships between contaminants and wildlife populations have been better characterized within the last 15 years.

2008

Target: This BUI will be considered eligible for delisting when the following have occurred:

1. A local fish and wildlife management and restoration plan has been developed for the entire AOC that:
 - 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 restoration 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 responsible for all fish and wildlife population restoration activities needed within the AOC.
2. The programs necessary to accomplish the recommendations of the fish and wildlife plan are implemented.
3. Populations for native indicator fish species are statistically similar to populations in reference sites with similar habitat but little to no contamination.

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Stakeholder comments about the target: Stakeholders suggested that a target of Fair-Good IBI as an achievable target for fish.

They also stated that they would like to see measures such as improvements in spawning success or reproduction in the target.

Stakeholders also indicated that they would like to see continued improvements in metals in whole fish in order to move towards accomplishing having fishing advice with no limits on fish consumption, presumably for these metals.

Last, some stakeholders also stated that they were concerned about what was an attainable goal for the KK River, especially if monies could be better spent in the development of spawning habitats in the Menomonee or Milwaukee River portions of the AOC.

Response to the stakeholders' comments about the target: With regard to the first, third, and fourth stakeholder comments, given that the portion of the KK River that falls within the boundaries of the AOC is not concrete lined and the proposed work that MMSD has on the KK to do streambank improvements (specifically, MMSD has plans to remove vast amounts of concrete from the KK), and the potentially restorable wetland at the Grand Trunk site, we think that a target of Fair-Good IBIs for fish in the KK River portion of the AOC is an interim target that should be given further consideration. Because of the highly altered state of the portions of the KK that lie upstream of the boundaries of the AOC, and the unrealized potential that some of the portions of the KK within the AOC have, there is good reason to think that by implementing some key projects there could be significant improvements for fish populations in the KK.

In terms of seeing improvements in metals, the concentrations that were presented for metals in fish tissue for this impairment do not apply to fish consumption. The primary contaminants of concern in Wisconsin for fish consumption advice are PCBs and mercury. There are some state criteria for toxicity of metals in fish tissue (primarily in administrative code NR 105), which was why data on metals concentrations in fish was presented. This data and its comparison to relevant standards will be clarified for future meetings.

Recommendations, Priorities, and Follow-Up Actions:

1. DNR recommends using an interim goal of healthy and native communities of self-sustaining fish and wildlife, while also evaluating the wildlife component of the goal.
2. DNR supports the MMSD's continued streambank/flood control projects on the KK River upstream of the AOC boundary. This work could help increase potential spawning habitat on the KK.
3. DNR strongly supports the rehabilitation of the Grand Trunk wetland site. This site is the only remaining wetland in the estuary itself. Improvement at that site would provide important habitat for fish and wildlife.
4. DNR also supports a project that would help improve in-stream habitat for fish in the portion of the KK River that goes from Chase Ave. to Becher St. This area has naturalized streambanks, but a great deal of the channel itself has been filled in with sediment. If this site were improved, it may be able to provide spawning habitat in the more naturalized portion of the KK River.

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3. FISH TUMORS OR OTHER DEFORMITIES

Goal: The incidence of contaminant-related fish tumors and other deformities in the AOC is similar to other minimally impacted sites.

Stakeholder comments about the goal: Some stakeholders agreed with this goal. Others did not, and said that there wasn't very much data for this impairment and that tumor data itself may not provide a good or sensitive indicator of potential problems. This group suggested that embryological studies and survival rates are better indicators, presumably, of fish health.

One other respondent wondered if the Office of the Great Lakes proposed guidelines related to addressing the fish tumors impairment would have statistical significance.

Yet another respondent stated that the goal was insufficient because other causes of tumors and deformities need to be investigated and eliminated.

Response to the stakeholders' comments about the goal: The only data that has been collected for the incidence of fish tumors in Milwaukee was taken by the U.S. Fish and Wildlife Service in the spring of 2011 for a study on contaminants of emerging concern in the Great Lakes. The analysis for this study should be available later this year from the histopathology lab to determine the causes of irregularities in tissues. Although this study collected a small sample size (N=20 for white suckers and N=20 for small mouth bass), this data can be used as a screening-level study in order to determine if a larger-scale study would be likely to conclude that incidence rates in the Milwaukee Estuary AOC are similar to minimally impacted sites. If the small-scale study shows that a larger number of fish have contaminant-related deformities/tumors, then further clean up actions will be necessary before a larger-scale fish tumor study should be done.

Furthermore, incidence rates of tumors at minimally impacted sites have been documented, and DNR's Office of the Great Lakes has used these incidence rates and performed rigorous statistical analyses to help guide its approach to assessing the fish tumor impairment. The sampling design suggests a relatively large data collection effort in an attempt to achieve an acceptably high and known degree of confidence in the study results. For more detailed information about DNR's sampling strategy for this BUI, please contact Andy Fayram, Great Lakes Monitoring Coordinator.

While embryological studies and survival rates may have value for understanding fish health, the International Joint Commission has chosen specific criteria for assessing the impairment. The original criteria in 1991 was:

“When the incidence rates of fish tumors or other deformities exceed rates at unimpacted control sites or when survey data confirm the presence of neoplastic or preneoplastic liver tumors in bullheads or suckers.”

At the time, it was known that harmful chemicals, particularly polycyclic aromatic hydrocarbons (PAHs), were highly correlated with higher incidence rates of certain types of tumors. Since 1991, PAH-related tumors are better understood, and while pre-neoplastic and neoplastic liver tumors can be caused by chronic exposure to PAHs, other types of lesions can also be caused by exposure to PAHs. There are also other types of tumors and deformities that can be caused by things other than PAH exposure, such as certain types of pathogens (please refer to Blazer et al. 2006, Hard 1988, and Rafferty et al. 2010). Because things other than contaminants can cause tumors and deformities, choosing to focus on contaminant-related (i.e, liver) tumors addresses the intent of the listing criteria and also creates greater efficiency.

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2008

Target:

Delisting may occur if:

- 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 an incidence rate of less than 5 percent.

Stakeholder comments about the target: The group addressing this particular issue did not provide specific comments on either the 2008 target or the DNR Office of the Great Lakes proposed guidelines. Rather, this group suggested that creel censuses and social networking sites should be used to enhance reporting.

Another respondent stated that we should wait for the 2011 data before evaluating whether to move ahead towards delisting this impairment.

The group also suggested that shifts in the sex of fishes and other reproductive problems should be included in this impairment.

Response to the stakeholders' comments about the target: Creel census data and social networking venues may be valuable for assessing the "healthy fish communities" goal discussed under the "Degraded Fish and Wildlife Populations" BUI; however, they would not be appropriate for assessing this impairment. Since this impairment is focused on contaminant-related tumors that are found in fish livers, laboratory analysis (known as histopathology) is necessary to assess the status.

At this point, DNR is awaiting the results of the sampling that occurred in 2011 before deciding whether to move forward on a larger-scale study to determine if fish tumors exist at higher rates in the AOC.

The results from the U.S. Fish and Wildlife Service study will help determine if reproductive issues among fishes are a concern in the Great Lakes.

Recommendations, Priorities, and Follow-Up Actions:

1. DNR will await 2011 results for the Milwaukee Estuary.
2. If the results from 2011 show that there are relatively few contaminant-related tumors among the smaller sample sizes, DNR will move forward with pursuing a larger fish tumor study.
3. If the results from 2011 show that there are higher levels of contaminant-related tumors, then sources of contaminants that may be contributing to the problem will have to be re-examined and controlled or eliminated before another sampling event occurs.
4. The Solvay Coke Superfund site, which contains elevated amounts of PAHs (and metals), should be remediated.

Additional Resources:

V.S. Blazer, J.W. Fournie, J.C. Wolf, M.J. Wolfe. "Diagnostic criteria for proliferative hepatic lesions in brown bullhead *Ameiurus nebulosus*." *Diseases of Aquatic Organisms*. Vol. 72: 19–30, 2006.

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G.C. Hard. "Fish tumors and ecological surveillance: a cautionary example from Port Phillip Bay." *Journal of the American Water Resources Association*. Vol. 24, (5): 975-980, 1988.

S.D. Rafferty, V.S. Blazer, A.E. Pinkney, J.L. Grazio. E.C. Obert, L. Boughton. "A historical perspective on the 'fish tumors or other deformities' beneficial use impairment at Great Lakes Areas of Concern." *Journal of Great Lakes Research*. Vol. 35(4): 496-506. 2009

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4. BIRD OR ANIMAL DEFORMITIES OR REPRODUCTIVE PROBLEMS

Goal: The incidence of bird or animal deformities or reproduction problems in the AOC is similar to that of other minimally impacted sites.

Stakeholder comments about the goal: Stakeholders generally seemed to think that a study to determine whether this impairment existed would be necessary before a decision about removing the impairment from the AOC should be made.

The comments from the meetings toxics group were similar to their comments for the fish tumors and other deformities impairment.

Response to the stakeholders' comments about the goal: This impairment is suspected for the Milwaukee Estuary AOC since contaminant levels that were observed in the AOC were similar to other AOCs where reproductive problems and deformities occurred.

DNR staff have been looking into whether relationships between contaminants and deformities/reproduction problems have been better characterized since the mid-1990s.

Pending further information, the specific metrics and statistical evaluation of any potential data that would be collected should be better characterized for future meetings.

2008

Target: This BUI may be delisted if:

- Studies conducted in the AOC indicate that the beneficial use should not be considered impaired, or
- If studies conducted in the AOC determine that this use is impaired, then two approaches can be considered for delisting: (see pp. 36-37 in the document *Delisting Targets for the Milwaukee Estuary AOC*.)

Stakeholder comments about the target: Toxics group commented that social networking sites should be used to enhance reporting.

Response to the stakeholders' comments about the target: Although a good source of anecdotal information, such sites would not meet DNR or EPA quality assurance or quality control requirements for data, and therefore cannot be used in determining the status of an impairment.

Recommendations, Priorities, and Follow-Up Actions:

1. DNR or other partners should work with wildlife experts to determine if the relationship between bird and animal deformities/reproductive problems has been better characterized.
2. DNR will also consider developing a study design to determine whether or not this use is impaired.

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5. DEGRADATION OF BENTHOS

Goal: Healthy, self-sustaining communities of desired benthic organisms.

Stakeholder comments about the goal: Stakeholders suggested changing “desired” to “native” and eliminating the term “self sustaining.”

Response to the stakeholders’ comments about the goal: This change seems sensible, and we will propose the modification at the next stakeholder meeting on the Menomonee River.

2008

Target: Delisting may occur if:

1. Known contaminant sources contributing to sediment contamination and degraded benthos have been identified and control measures implemented, and
2. All remediation actions for contaminated sediments are completed and monitored according to the approved plan with consideration to using consensus based sediment quality guidelines and equilibrium partitioning sediment benchmarks; or
3. The benthic community within the site being evaluated is statistically similar to a reference site with similar habitat and minimal sediment contamination.

Stakeholder comments about the target: At the meeting, it was proposed to include a HBI component into the target. The proposed level was for a HBI rating of “Fair-Good.” The Fish and Wildlife group did not agree with using this as a target because although they agreed that this is an element that should be included in the targets, they also thought incidence of toxicity should be included. It was unclear whether they disagreed with the target because there were other components that they thought should be included besides the HBI value, or whether they disagreed altogether with the rating of “Fair-Good.” They stated that the HBI only assesses organic pollution and not toxicity, which should also be included in an assessment.

Furthermore, they said that the riverine HBI values should only be used for the upper portion of the river (above Chase Ave) because downstream areas are more similar to estuary- or lake-types of conditions.

They also stated that improvements for benthos may continue since the 2009 remediation project on the KK River.

One individual stated that they did not agree with an HBI rating of “Fair-Good” because he/she wanted to see ratings of “Excellent” that would be commensurate with pre-degradation levels, with improvements paid for by polluters.

Response to the stakeholders’ comments about the target: With regard to the first and second points, those can and will be taken into consideration for any subsequent revisions of targets related to this impairment. It should also be noted that for assessment for the state impaired waters program, macroinvertebrate indices of biotic integrity are the preferred metric for assessing macroinvertebrate communities, rather than the Hilsenhoff Biotic Index (HBI).

Although “Excellent” HBI values may be ideal, they also may not be practical. Even if there are no point sources of pollution, nonpoint source pollution continues to be the largest source of organic

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pollution in the watershed. This is further compounded by the fact that the entire KK River is an urban stream, and restoring the river to pre-settlement conditions is not achievable.

Recommendations, Priorities, and Follow-Up Actions:

1. DNR will propose changing the goal to “healthy native communities of benthic organisms.”
2. The U.S. Geological Survey will also be collecting benthos samples to compare populations in Wisconsin’s Lake Michigan Areas of Concern with similar areas that are not AOCs. This data collection will take place in 2012, and more information about the study design can be found in Appendix D.
3. DNR will also work with the Water Evaluation team to determine how issues of organic pollution and toxicity can be captured in targets for this impairment.

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6. RESTRICTIONS ON DREDGING ACTIVITIES

Goal: Sediment quality is such that additional disposal restrictions (and associated costs) are not imposed for dredging activities.

Stakeholder comments about the goal: The toxics group at the meeting did not agree with the goal as stated. They stated that this was a “legacy” goal and that there is a need to look at uses other than dredging, e.g., ecological and toxicological aspects, of contaminated sediments. They stated that bioassays would provide a more reliable indicator.

They stated that this concern is wider than simply the boundaries of the AOC with upstream effects of contamination feeding into the AOC.

Another individual commented that ongoing monitoring was necessary until surface runoff is clean and legacy sources of contamination identified and removed.

Response to the stakeholders’ comments about the goal: Examining the ecological and toxicological aspects of contaminated sediments is better matched to addressing the fish and wildlife impairments, the fish tumors/deformities impairment, the benthos impairment, and the wildlife reproductive problems and deformities impairment.

DNR recognizes the fact that upstream sources of pollution pose a challenge to making progress in the AOC. To that end, DNR modified the boundaries of the AOC in order to ensure that legacy pollution in the watershed, which would end up ultimately in the Milwaukee Estuary and eventually out into Lake Michigan, would have the opportunity to be addressed through the Great Lakes Legacy Act. Great Lakes Legacy Act provides opportunities to clean up legacy contamination in U.S. Areas of Concern. Although the Milwaukee and Menomonee River portions of the AOC were expanded in order to tap into this funding, the KK River, however, did not require an expansion of its boundaries.

In terms of the actions still needed on the KK River, at this time DNR would like to see continued green infrastructure projects in the KK River watershed to minimize the amount of storm water runoff that makes its way into the river. In 2009, the DNR and EPA completed a project to remove legacy contamination from a portion of the KK River that contained sediments contaminated with high levels of PCBs. As far as other known sources of contamination in the KK River, there may be additional contamination underneath the concrete-lined portions of the KK River that are upstream from the AOC boundary, but this contamination is currently not bioavailable, and once the concrete is removed, the sediments will be analyzed and disposed of in accordance with state administrative rules, in particular NR 347, so that the contamination will not be released. The Solvay Coke Superfund site is another remedial action that should be completed in order to address this impairment in the KK River portion of the AOC.

2008

Target:

Delisting of this BUI can occur when:

1. Contaminated sediment hot spots within and upstream from the AOC have been identified.
2. 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 delisting is possible.

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3. There are no restrictions on routine navigational dredging done by the U.S. Army Corps of Engineers and/or private dredging companies due to contamination originating from controllable sources within the AOC.

Stakeholder comments about the target: The toxics group stated that they didn't agree with the target. They cited that issues related to toxic contamination are wider than simply the boundaries of the AOC with upstream effects of contamination feeding into the AOC.

Response to the stakeholders' comments about the target: The first and second components of the target itself identifies that contaminated sediment hotspots within and upstream of the AOC have been identified and controlled before delisting is even possible, so the concerns of the group are encompassed in the current target.

Recommendations, Priorities, and Follow-Up Actions:

1. Await post-remediation data in order to determine the full success of the 2009 Great Lakes Legacy Act project on the KK River.
2. Continue to support green infrastructure projects or other projects that will help reduce toxic substance inputs associated with nonpoint source pollution into the KK River.
3. Additional sediment assessment and remediation of contaminated sites and, such as the Solvay Coke Superfund Alternative Site, should occur in order for this impairment to be removed.

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7. EUTROPHICATION OR UNDESIRABLE ALGAE

Goal: Water quality has improved sufficient to meet state water quality standards.

Stakeholder comments about the goal: Most of the stakeholders agreed with the goal, including the group that looked at social uses for the AOC. They had the following questions and comments related to this goal:

- A. Is water quality in any harbor area (especially the KK segment) ever going to meet state standards?
- B. What are the variations among the Great Lakes states of standards for water quality?
- C. Data sets on the rivers: H2Oinfo.com
- D. The data was presented in a confusing way (some standards you want to be high and others low).
- E. Are we interested in delisting or restoration?

Response to the stakeholders' comments about the goal: Respective responses to each of the concerns above follow.

- A. This is a valid question, and one that is hard to answer. Right now, the KK River has a variance standard for dissolved oxygen. By virtue of the fact that a variance standard has been established for this river, the river is not meeting water quality standards for fish and aquatic life, which is one of its designated uses. What we had hoped was apparent in the data that were presented was that since the late '70s, dissolved oxygen (DO) has improved in that the river used to, at times, have no dissolved oxygen. Although more recent data weren't included in the table, the data from the late '90s and early 2000s shows that the lowest DO levels are much closer to the fish and aquatic life DO standard, which is 5 mg/L, than what they used to be, and are already regularly above the 2 mg/L variance standard for the KK River. For the next set of meetings, we will try to gather more recent data where it is available.
- B. While it might be interesting to see how WI standards compare to those of other Great Lakes states, they would not influence the goals or targets in Wisconsin. DNR is not able to set a target (the more quantitative part of the goal) that is more stringent than what the state standard is.
- C. As mentioned earlier with the third BUI, outside data sets are not always easy to include in analyses since data used by DNR must meet basic quality assurance and quality control measures. DNR does have its own database for water quality, and this is the data that is used in other programs, like the state impaired waters program, which is the implementation of the Clean Water Act.
- D. In terms of the data presentation (see data table in Appendix B), the goal was to use color to signal where improvements had been made across time. For example, the historic conditions (third column) for toxic substances in sediments went from being **severe** to **slight** (as shown in the fifth column). For future meetings, we will try to make sure that this

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is clearer, but we also encourage questions so that we can provide clarification and improve efficiency where ever possible.

- E. For the purposes of the AOC program, we are interested in removing impairments where we can in order to celebrate success, and our ultimate goal is delisting of the AOC. However, we are also interested in seeing genuine improvement in a quantitative and scientifically defensible fashion. By demonstrating success with BUI removal, the partners working to improve our watersheds will be strongly positioned to seek funding for additional AOC delisting projects, as well as funding from a variety of non-AOC-related sources for watershed restoration projects.

2008

Target: Delisting of this BUI can occur when:

1. Total phosphorus (TP) concentrations within the AOC rivers do not exceed 0.05 mg/L OR in-river TP concentrations meet Wisconsin criteria when promulgated.
2. TP concentrations in the inner and outer harbor areas do not exceed 0.02 mg/L OR TP concentrations meet WI criteria when promulgated.
3. TP concentrations in near shore waters do not exceed 0.02 mg/L OR TP concentrations meet WI criteria when promulgated.
4. There are no exceedances of the minimum dissolved oxygen (DO) concentrations established in Chapter NR 102, due to excessive sediment deposition or algae growth.
5. Chlorophyll-a concentrations within the AOC lake and impoundment areas do not exceed 4.0 µg/L.
6. 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.
7. There are no beach closures in the AOC due to excessive nuisance algae growth.

Stakeholder comments about the target: The social uses group at the meeting had the following comments:

- A. Nonpoint source pollution should be the main focus as it has expanded a lot with recent urbanization.
- B. Only including phosphorous for nutrients may not be sufficient. Since nutrients interact, maybe we should include nitrogen in this analysis.
- C. Do the standards in PR 37 and TR 39 need to be incorporated into state standards?
- D. This group indicated that total phosphorus levels were still too high on the KK River.

Response to the stakeholders' comments about the target: Across the board, there seemed to be consensus by many that water quality had improved, but that there was still a ways to go in terms of addressing phosphorus levels, in particular.

- A. Nonpoint source pollution continues to be an obstacle toward achieving water quality criteria. Addressing nonpoint source pollution and examining the role of non-contact cooling water should be a priority on the KK.

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- B. In this part of the state, phosphorus tends to be more of a limiting nutrient than nitrogen. More information on this can be found below under the Additional Resources section of this BUI.
- C. With regard to incorporating SEWRPC's recommended planning standards for phosphorus into the state standards, it should be noted that the state criteria for total phosphorus are more stringent than the SEWRPC recommended planning standard.
- D. Although improvements have been made towards reducing total phosphorus (TP), levels do regularly exceed the proposed state standard for TP on the KK River and several other tributaries to the Estuary. The Milwaukee Metropolitan Sewerage District has secured funding to conduct a total maximum daily loading study in order to determine what might be done in order to reach the standard.

Recommendations, Priorities, and Follow-Up Actions:

1. Information about the Total Maximum Daily Load study that is being done for total suspended solids, phosphorous, and bacteria should be included in the data summary for the next meeting.
2. Addressing nonpoint source pollution is a priority issue for continuing to make progress on the KK River. Green infrastructure projects and implementation of other stormwater best management practice projects should be a priority to address this impairment, as well as several other impairments that unequivocally still exist on the KK River segment of the AOC.

Additional Resources:

D.M. Robertson, D.J. Graczyk, P.J. Garrison, L. Wang, G. LaLiberte, R. Bannerman. "Nutrient concentrations and their relations to the biotic integrity of wadeable streams in Wisconsin." U.S. Geological Survey Professional Paper 1722. <http://pubs.usgs.gov/pp/pp1722/#N10034>.

D. M. Robertson, B.M. Weigel, D.J. Graczyk. "Nutrient concentrations and their relations to the biotic integrity of nonwadeable rivers in Wisconsin." U.S. Geological Survey Professional Paper 1754. <http://pubs.usgs.gov/pp/1754/>.

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8. BEACH CLOSINGS AND BODY CONTACT RESTRICTIONS

Goal: Water quality has improved sufficient to meet state full body contact standards.

Stakeholder comments about the goal: The social uses group did not state whether or not they agreed with the goal.

A comment received from an individual indicated that this goal was not sufficient because water quality on the KK should be the same as a trout stream or inland lake with 200-foot riparian setbacks required.

Response to the stakeholders' comments about the goal: Although 200-foot setbacks in the riparian corridor might help improve water quality, this cannot be a requirement since this is not in accordance with provisions of state law. It is advised that where feasible, buffer strips could be implemented to improve water quality.

2008

Target: This BUI will be considered restored when:

1. 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
2. No sanitary sewer overflows or un-permitted combined sewer overflows have occurred within the AOC during the previous five year period as a result of a less than 25-year precipitation event or snow/ice melt conditions; and
3. All municipalities within the AOC have adopted and are implementing storm water reduction programs including an illicit discharge elimination program; and
4. 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 which is submitted to U.S. EPA every two years; and
5. 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.

Stakeholder comments about the target: The social uses group did have some questions and comments regarding this impairment. They are:

- ✓ Is the variance standard for fecal coliform bacteria?
- ✓ Add testing for storm water outfalls as sources for fecal bacteria
- ✓ Source analysis (human or animal) of the bacteria would be helpful to determine whether the problem is something that can be linked more directly to humans and failing infrastructure rather than caused by wildlife
- ✓ Should there be signs posted if full body contact isn't advisable (even if the site isn't a beach area) to protect human health?

Response to the stakeholders' comments about the target: Responses to the issues cited above are addressed below.

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The variance standard that was indicated on the data table was for fecal coliform on the KK River. As is the case for dissolved oxygen, the fact that a variance standard has been established for this river, the river is not meeting water quality standards for recreational uses (i.e., body contact), which is one of its designated uses.

With regard to the second and third items, source analysis for fecal coliform is helpful in determining what the source of the bacteria is. Such information also provides guidance about whether or not the problem is something that poses a more serious risk to human health, and also whether there is something that can be done to eliminate the source. To this end, DNR has provided \$10,500, with a \$3,000 contribution from Milwaukee Riverkeeper, in 2011 for bacterial source identification of stormwater outfalls in the AOC (specifically, in the Menomonee and Kinnickinnic Rivers). This is important information, and once results come back from the 2011 analysis this data should help in identifying “find and fix” opportunities. Source analysis testing (“find”) helps in the efficient allocation of municipalities financial resources by identifying whether the bacteria is attributable to human waste, and if it is, additional diagnostic testing (dye or smoke testing) can be used and infrastructure can be repaired (“fix”).

Since riverine environments are generally more transient than lakes where the water doesn't flow as fast through the system, it probably is not feasible to have signs since conditions could change fairly rapidly on the river. Additionally, it is currently not possible to do real-time bacteria testing. Typically test results to determine if bacteria are present at unsafe levels take 24 hours to receive, and then advisories are issued after the results are received. These limitations mean that posting signs would probably not provide people with truly accurate information about whether or not bacteria in the river pose a health risk.

Recommendations, Priorities, and Follow-Up Actions:

1. Bacterial source data results will be analyzed to determine which areas should be priority for “find and fix” actions.
2. DNR recommends financial support for targeted “find and fix” actions and green infrastructure to address bacteria loading issues. Although sewer overflow events have decreased, aging and failing infrastructure presents a substantial obstacle to making progress towards removing this impairment. While other water quality parameters have improved over the last decade or two, bacterial loads have increased, presenting a substantial obstacle towards removing this BUI.
3. The TMDL for the KK River should also help provide some insight into what the primary sources of bacterial loading are. Those results of the TMDL modeling are expected in 2013.

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9. DEGRADATION OF AESTHETICS

- Goal:** Improved aesthetics
- Trash and debris inputs controlled
 - Limited number of road crossings.

Stakeholder comments about the goal: The social uses group commented that this BUI should also consider the appearance and smell of water. They also stated that there were concerns about the fact that the flow of the river in the estuary portions was hard to measure since it can change.

Another stakeholder commented that visual surveys should be used to assess this impairment.

Yet another stakeholder commented that the goal should be to make the AOC as attractive as the best harbor in Lake Michigan.

Response to the stakeholders' comments about the goal: Appearance and smell of the water are things to consider for this particular impairment, but finding an appropriate baseline for these may make them difficult to use as metrics. The second statement about the river flow seems to be implicating an effect called the seiche, which is when water levels on either side of a large lake can change because of differentials in atmospheric pressure. This change can be observed in the Milwaukee Estuary and the lower portions of its tributaries. The connection between the seiche and this particular impairment was not clear.

Visual surveys are being tested in other AOCs in Wisconsin, in particular the Green Bay/Lower Fox River AOC. Results from this should be available within the year and may provide additional insight into addressing this impairment.

While making the AOC the most attractive harbor on Lake Michigan may be desirable, it is a very high bar, and beyond the scope of the AOC program. This goal may be more appropriate for local long-range development plans.

2008

- Target:** This delisting target is consistent with Chapter NR 102, Water Quality Standards for Surface Waters. Delisting shall occur when monitoring data within the AOC and/or surveys for any five-year period indicates that water bodies in the AOC do not exhibit unacceptable levels of the following properties in quantities that interfere with the Water Quality Standards for Surface Waters:
1. 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.
 2. 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.
 3. 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.
 4. The following target will also be met to determine when restoration has occurred:
 - Corrective action plans are in-place and being implemented for all known sources of materials contributing to the degradation of aesthetics within the AOC.

Milwaukee Estuary Area of Concern Stakeholder Input Group Meeting: Kinnickinnic River Section

Stakeholder comments about the target: The social uses group submitted no comments in relation to the target.

There were no specific comments submitted by anyone about the target for this impairment, but the comment reviewer was left with the impression that many stakeholders thought that continued progress needed to be made for the KK with regard to this impairment.

Response to the stakeholders' comments about the target: An important next step is to determine if measurable progress has been made toward reducing the inputs of trash into the waters of the KK. DNR plans to try to gather information to see if records kept by MMSD, who operates the trash skimmer in the Estuary, indicate that the amount of trash removed has decreased over time. Milwaukee Riverkeeper also does an annual river clean up in the spring of each year, and there may be information kept about the amount of trash collected from each of the rivers. Both of these would help in determining whether the primary reason behind listing this impairment, i.e., trash, has been reduced since the time that the area was first designated as an AOC.

Recommendations, Priorities, and Follow-Up Actions:

1. Work with MMSD, Milwaukee Riverkeeper, and other organizations to determine if trends in the amounts of trash can be ascertained.
2. If trends can be surmised, then those data should be summarized and presented to the group.
3. DNR will work with partners on revising the goal statement as well as work on the targets in order to make them address concerns that both the DNR and the stakeholders currently have with both.
4. The AOC Coordinator will check on the outcomes of the Lower Green Bay & Lower Fox River aesthetics monitoring project to determine if the approach could be adapted for the Milwaukee Estuary AOC.

Milwaukee Estuary Area of Concern Stakeholder Input Group Meeting: Kinnickinnic River Section

10. DEGRADATION OF PHYTOPLANKTON AND ZOOPLANKTON POPULATIONS

Goal: Improved phytoplankton and zooplankton populations.

Stakeholder comments about the goal: The fish and wildlife group at the meeting agreed with the proposed goal.

One individual stated that he/she did not agree with the proposed goal and stated the goal should be to provide conditions that allow healthy reproduction of aquatic species.

Response to the stakeholders' comments about the goal: Generally, most agreed with the goal.

In the case of the one objection that was received, there is a close linkage between populations and reproduction. Given the fact that this impairment applies primarily to the estuary portion of the AOC, and given the physical limitations in the estuary that are necessary to support the shipping industry (sheet piling, dredging, etc.), it may not be feasible to see extremely healthy and diverse populations of these particular organisms.

2008

Target: A stepped approach is needed for delisting for this impairment:

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.
 - a) Ambient water chemistry sampling should be conducted to determine if nutrient enrichment is the main contributor.
 - b) If nutrients are the main contributor, sources causing nutrient enrichment to the outer harbor and nearshore waters are identified and controlled. If nutrient enrichment is not considered the cause of the impairment, conduct bioassays to determine if ambient water toxicity is causing impairment.

Stakeholder comments about the target: The fish and wildlife group did not agree with the target as proposed. They stated that it might be more prudent to tie this dimension of the aquatic community into the invertebrate- and fisheries-related sampling that is occurring since recent research shows strong relationships between these dimensions.

Another stakeholder commented that conditions should be provided that allow healthy reproduction of aquatic species, and suggested that adding habitat would be one way of achieving this.

Response to the stakeholders' comments about the target: The suggestion is noted, and DNR will look into ways to tie this impairment to other impairments. Examining linkages and relationships builds efficiency into the AOC program.

It should also be noted that there are plans for U.S. Geological Survey to conduct a survey on benthic and planktonic organisms in the AOC. The project is scheduled to occur in the spring of 2012. The project proposal, which has been funded, is available in Appendix D. At any rate, there should be more specific information available soon regarding this particular impairment.

**Milwaukee Estuary Area of Concern Stakeholder Input Group Meeting:
Kinnickinnic River Section**

Recommendations, Priorities, and Follow-Up Actions:

1. DNR will share the results of the survey once they are available.
2. DNR will also consider if there is another way to look at this impairment by examining invertebrate and fisheries sampling.

Milwaukee Estuary Area of Concern Stakeholder Input Group Meeting: Kinnickinnic River Section

11. LOSS OF FISH AND WILDLIFE HABITAT

Goal: Improvement of fish and wildlife habitat by improving the riparian corridor, removing concrete channels, and restoring wetlands.

Stakeholder comments about the goal: The fish and wildlife group did not agree with the proposed goal. They suggested the goal of improved fish and wildlife habitat.

Response to the stakeholders' comments about the goal: More specific feedback about this goal will be solicited in future meetings.

2008

Target: This BUI will be considered eligible for delisting when the following have occurred:

1. A local fish and wildlife habitat management and restoration/rehabilitation plan has been developed for the entire AOC that:
 - a) Defines the causes of all habitat impairments within the AOC;
 - b) Establishes site-specific habitat and population targets for fish and wildlife species within the AOC;
 - c) Identifies all fish and wildlife habitat restoration programs and activities within the AOC and establishes a mechanism to assure coordination among the programs/activities including identification of lead agencies;
 - d) Establishes a timetable, funding mechanism, and lead agency responsible for all fish and wildlife restoration activities within the AOC.
2. The programs and actions necessary to accomplish the recommendations identified in the fish and wildlife plan are implemented, and modified to ensure continual improvement.

Stakeholder comments about the target: The fish and wildlife group also did not agree with the target, which seems to relate to their suggestion for the revised goal. They stated that it wasn't appropriate for the targets for this impairment to be nearly the same as for the degraded fish and wildlife populations impairment. They stated that the target should be more directly tied to physical improvements in water and areas adjacent of the water, not measure of populations. Furthermore, the group asserted, the targets should be more closely tied to improvements in the estuary (i.e., spawning habitat) and upstream of the estuary (i.e., concrete removed, stream re-meandered, floodplain reconnected, wetland established, etc.). Unless the areas upstream of the estuary are improved, there will likely not be any improvements within the estuary itself.

Response to the stakeholders' comments about the target: Along with the stakeholders, DNR does not agree with the 2008 target. It should be noted, however, that there was a mistake in the target that appeared in the meeting handouts and that for the target listed above, the word "habitat" was replaced by the word "populations." This mistake probably accounts for some of the comments that were made by the group. Beyond that though, tying this target more specifically to physical improvements in the estuary is something that the DNR can support. DNR has plans to try to develop some interim benchmarks related to the improvements that the stakeholders suggested in order to have some measurable components of the target. This would also serve as an informal plan of which actions should occur before progress made on the impairment is re-examined.

Recommendations, Priorities, and Follow-Up Actions:

1. DNR will ensure that the mistake in the documents for this last meeting are corrected.

**Milwaukee Estuary Area of Concern Stakeholder Input Group Meeting:
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2. DNR will also work with local fisheries experts to try to develop some draft interim benchmarks that could help improve habitat.

Appendix A

Final Version of Survey Used at the July 27, 2011 Meeting

This is the survey that was used by each of the three groups at the meeting. The fish and wildlife group answered survey questions for BUIs 2, 5, 10, 11; the toxics group answered survey questions for BUIs 1, 3, 4, 6; and the culture group, referred to in this document as the social uses group, responded to survey questions for BUIs 7, 8, 9.

MILWAUKEE ESTUARY AREA OF CONCERN STAKEHOLDER INPUT GROUP MEETING:
KINNICKINNIC RIVER LOBE

Input Worksheet – Group 1 Fish & Wildlife

Please use this worksheet to record your answers to the questions in the last column of the Questionnaire Table.

2. DEGRADED FISH AND WILDLIFE POPULATIONS

Goal: Healthy, self-sustaining communities of desired fish.

Do you agree with the goal stated above? (circle one) YES NO

Do you agree with the 2011 recommendation as stated in column two of the questionnaire?

(circle one) YES NO

If NO, please explain.

Do you believe the goal stated in the first column has been achieved based upon the information?

(circle one) YES NO DON'T KNOW

If NO, what further actions do you think are required to achieve the target or your desired alternative? If DON'T KNOW, what further information do you think is necessary in making a determination?

Based on this information, do you agree that the abundance and diversity of the fishery in the Kinnickinnic River portion of the Area of Concern (AOC) has improved since it was listed as a concern?

Rank 1 (strongly agree) through 5 (strongly disagree)

1.....2.....3.....4.....5.....No Opinion

MILWAUKEE ESTUARY AREA OF CONCERN STAKEHOLDER INPUT GROUP MEETING:
KINNICKINNIC RIVER LOBE

Input Worksheet – Group 1 Fish & Wildlife

Please use this worksheet to record your answers to the questions in the last column of the Questionnaire Table.

5. DEGRADATION OF BENTHOS

GOAL: Healthy, self-sustaining communities of desired benthic organisms.

Do you agree with the goal stated above? (circle one) YES NO

Do you agree with the target and recommendation as stated?

(circle one)	(optional) Target:	YES	NO
	Recommendation:	YES	NO

If NO for either, please explain.

Would you agree with a target Benthic Community HBI-Rating of “Fair – Good” (with “good” being fully supportive of all uses)?

(circle one) YES NO

Do you believe this target has been achieved based upon the information? (circle one) YES NO

If NO, what further actions do you think are required to achieve the target or your desired alternative?

Based on this information, do you agree that the abundance and diversity of the benthic organisms in the Kinnickinnic River portion of the Area of Concern (AOC) have improved since it was listed as a concern?

Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion
Not enough data to make a decision on this...

Based on this information, do you agree that the level of toxicity in the benthic organisms in the Kinnickinnic River portion of the Area of Concern (AOC) has diminished since it was listed as a concern?

(5 Benthos Continued)

**MILWAUKEE ESTUARY AREA OF CONCERN STAKEHOLDER INPUT GROUP MEETING:
KINNICKINNIC RIVER LOBE**

Input Worksheet – Group 1 Fish & Wildlife

Please use this worksheet to record your answers to the questions in the last column of the Questionnaire Table.

Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion

Based on the information supplied in the Questionnaire Table, do you agree that the level of toxicity in the benthic organisms in the Kinnickinnic River portion of the Area of Concern (AOC) has diminished since it was listed as a concern?

Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion

**MILWAUKEE ESTUARY AREA OF CONCERN STAKEHOLDER INPUT GROUP MEETING:
KINNICKINNIC RIVER LOBE**

Input Worksheet – Group 1 Fish & Wildlife

Please use this worksheet to record your answers to the questions in the last column of the Questionnaire Table.

10. DEGRADATION OF PHYTOPLANKTON AND ZOOPLANKTON POPULATIONS

Goal: Improved phytoplankton and zooplankton populations.

Do you agree with the goal stated above? (circle one) YES NO

(optional) Do you agree with the 2008 target as stated on the questionnaire? (circle one) YES NO

If NO, please suggest an alternative goal/target.

Because degraded zooplankton and phytoplankton populations were presumed but not documented at the time of listing, and because there are no present data to assess this impairment, would you agree that this impairment be removed from the list of concerns within the Kinnickinnic River portion of the Area of Concern (AOC)?

(circle one) YES NO

If NO, how would you suggest that this impairment be documented in order to determine whether or not the remedial actions have addressed this concern (i.e. what criteria should we use to address this target/ how do we determine success)?

We did not have to specifically address this question.

What further actions do you think are required to achieve the target, or your desired alternative?

**MILWAUKEE ESTUARY AREA OF CONCERN STAKEHOLDER INPUT GROUP MEETING:
KINNICKINNIC RIVER LOBE**

Input Worksheet – Group 1 Fish & Wildlife

Please use this worksheet to record your answers to the questions in the last column of the Questionnaire Table.

11 . LOSS OF FISH AND WILDLIFE HABITAT

Goal: Improvement of fish and wildlife habitat by improving the riparian corridor, removing concrete channels, and restoring wetlands.

Do you agree with the goal stated above? (circle one) YES NO

(optional) Do you agree with the 2008 target as stated on the questionnaire? (circle one) YES NO

If NO, please suggest an alternative goal and/or target.

Based on the information supplied in the Questionnaire Table, do you agree that fish and wildlife habitat within the Kinnickinnic River portion of the Area of Concern (AOC) has improved since it was listed as an area of concern?

Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion

Based on the information supplied in the Questionnaire Table, do you agree that fish and wildlife habitat upstream of the Kinnickinnic River portion of the Area of Concern (AOC) has improved since it was listed as an area of concern?

Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....

Based on the information supplied in the Questionnaire Table, do you agree that fish and wildlife habitat areas throughout the Kinnickinnic River watershed have improved since it was listed as an area of concern?

Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion

What further actions do you think are required to achieve the target, or your desired alternative?

MILWAUKEE ESTUARY AREA OF CONCERN STAKEHOLDER INPUT GROUP MEETING:
KINNICKINNIC RIVER LOBE

Input Worksheet – Group 2 Toxics

Please use this worksheet to record your answers to the questions in the last column of the Questionnaire Table.

Submitted by (individual) _____ or Group _____

1. RESTRICTIONS ON FISH AND WILDLIFE CONSUMPTION

Goal: Water body-specific consumption advisories are not in effect for human consumption of fish and waterfowl.

Do you agree with the goal stated above? (circle one) YES NO

(optional) Do you agree with the target as stated in the questionnaire? (circle one) YES NO

Would you agree with a target of 0.05 µg PCBs/l or less—which would mean unrestricted consumption?

(circle one) YES NO

If NO, please suggest an alternative target.

Do you think a target of 0.05 µg PCBs/l or less is achievable? (circle one) YES NO DON'T KNOW

If NO, please suggest an alternative target.

Do you believe this target has been achieved based upon the information? (circle one) YES NO

If NO, what further actions do you think are required to achieve the target or your desired alternative?

Based on this information, do you agree that the ability to consume fish from the Kinnickinnic River portion of the Area of Concern (AOC) has improved since it was listed as a concern?

Rank 1 (strongly agree) through 5 (strongly disagree)

1.....2.....3.....4.....5.....No Opinion

MILWAUKEE ESTUARY AREA OF CONCERN STAKEHOLDER INPUT GROUP MEETING:
KINNICKINNIC RIVER LOBE

Input Worksheet – Group 2 Toxics

Please use this worksheet to record your answers to the questions in the last column of the Questionnaire Table.

Submitted by (individual) _____ or Group _____

3. FISH TUMORS OR OTHER DEFORMITIES

Goal: The incidence of contaminant-related fish tumors and other deformities in the AOC is similar to other minimally impacted sites.

Do you agree with the goal stated above? (circle one) YES NO

(optional) Do you agree with the target as stated in the questionnaire? (circle one) YES NO

If NO, please suggest an alternative goal/target.

Because these deformities were presumed, but not documented, at the time of listing, and because there are no past or present data to assess this impairment, would you agree that this impairment removed from the list of concerns within the Kinnickinnic River portion of the Area of Concern (AOC)?

(circle one) YES NO

If NO, how would you suggest that this impairment be documented in order to determine whether or not the remedial actions have addressed this concern (i.e. what criteria should we use to address this target/ how do we determine success)?

MILWAUKEE ESTUARY AREA OF CONCERN STAKEHOLDER INPUT GROUP MEETING:
KINNICKINNIC RIVER LOBE

Input Worksheet – Group 2 Toxics

Please use this worksheet to record your answers to the questions in the last column of the Questionnaire Table.

Submitted by (individual) _____ or Group _____

4. BIRD OR ANIMAL DEFORMITIES OR REPRODUCTIVE PROBLEMS

Goal: The incidence of bird or animal deformities of reproduction problems in the AOC is similar to that of other minimally impacted sites.

Do you agree with the goal stated above? (circle one) **YES** **NO**

Do you agree with the target as stated in the questionnaire? (circle one) YES NO

If NO, please suggest an alternative goal/target.

Because these deformities were presumed, but not documented, at the time of listing, and because there are no past or present data to assess this impairment, do you think that this impairment should be removed from the list of concerns within the Kinnickinnic River portion of the Area of Concern (AOC)?

(Circle one) YES NO

If NO, how would you suggest that this impairment be documented in order to determine whether or not the remedial actions have addressed this concern (i.e., what criteria should we use to address this target/ how do we determine success)?

MILWAUKEE ESTUARY AREA OF CONCERN STAKEHOLDER INPUT GROUP MEETING:
KINNICKINNIC RIVER LOBE

Input Worksheet – Group 2 Toxics

Please use this worksheet to record your answers to the questions in the last column of the Questionnaire Table.

Submitted by (individual) _____ or Group _____

6. RESTRICTIONS ON DREDGING ACTIVITIES

Goal: Sediment quality is such that additional disposal restrictions (and associated costs) are not imposed for dredging activities.

Do you agree with the goal stated above? (circle one) **YES** **NO**

(optional) Do you agree with the 2008 target as stated? (circle one) YES NO

If NO, please suggest an alternative goal/target.

If YES, do you believe this target has been achieved based upon the information? (circle one) YES NO

If NO, what further actions do you think are required to achieve the target or your desired alternative?

Based on this information, do you agree that we've made progress on this particular BUI for the Kinnickinnic River portion of the Area of Concern (AOC)?

Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion

Based on this information, do you agree that the volume of contaminated sediments in the Kinnickinnic River portion of the Area of Concern (AOC) has been reduced since it was listed as a concern?

Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion

MILWAUKEE ESTUARY AREA OF CONCERN STAKEHOLDER INPUT GROUP MEETING:
KINNICKINNIC RIVER LOBE

Input Worksheet – Group 3 Culture

Please use this worksheet to record your answers to the questions in the last column of the Questionnaire Table.

Submitted by (individual) _____ or Group _____

7. EUTROPHICATION OR UNDESIRABLE ALGAE

Goal: Water quality has improved sufficient to meet state water quality standards.

Do you agree with the goal stated above? (circle one) YES NO

(optional) Would you agree with a target **dissolved oxygen** concentration of 5 mg/l to fully meet the **standard for fish and aquatic life** on the KK River?

YES NO

(opt.) Do you believe this target has been achieved based upon **ammonia** concentrations?

Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion

(opt.) Do you believe this target has been achieved based upon **total phosphorus** (Total P) concentrations?

Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion

(opt) Based on **concentrations**, do you agree that water quality in the Kinnickinnic River portion of the Area of Concern (AOC) has improved since it was listed as a concern? (circle one)

YES NO

If NO, what further actions do you think are required to achieve the target or your desired alternative?

Based on the **severity of water resource problems**, do you agree that water quality in the Kinnickinnic River portion of the Area of Concern (AOC) has improved since it was listed as a concern?

Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion

MILWAUKEE ESTUARY AREA OF CONCERN STAKEHOLDER INPUT GROUP MEETING:
KINNICKINNIC RIVER LOBE

Input Worksheet – Group 3 Culture

Please use this worksheet to record your answers to the questions in the last column of the Questionnaire Table.

Submitted by (individual) _____ or Group _____

(7 Eutrophication Cont'd)

Based on the **comparison of upstream and downstream conditions**, do you agree that water quality in the Kinnickinnic River portion of the Area of Concern (AOC) has improved compared to the upstream river conditions since it was listed as a concern?

Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion

MILWAUKEE ESTUARY AREA OF CONCERN STAKEHOLDER INPUT GROUP MEETING:
KINNICKINNIC RIVER LOBE

Input Worksheet – Group 3 Culture

Please use this worksheet to record your answers to the questions in the last column of the Questionnaire Table.

Submitted by (individual) _____ or Group _____

8. BEACH CLOSINGS AND BODY CONTACT RESTRICTIONS

Goal: Water quality has improved sufficient to meet state full body contact standards.

Do you agree with the goal stated above? (circle one) YES NO

(opt.) Do you agree with the 2008 target as stated on the questionnaire? (circle one) YES NO

If NO, please suggest an alternative target.

(opt.) Do you believe this target has been achieved based upon Fecal Coliform concentrations?

Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion

(opt.) Based on this information, do you agree that the ability to engage in full body contact recreation in the Kinnickinnic River portion of the Area of Concern (AOC) has improved since it was listed as a concern?

YES NO

Based on this information, do you agree that the bacterial water quality in the Kinnickinnic River portion of the Area of Concern (AOC) has improved since it was listed as a concern?

(circle one) YES NO

If NO, what further actions do you think are required to achieve the goal and/or target, or your desired alternative?

Based on this information, do you agree that pollution in the Kinnickinnic River **watershed** has decreased since it was listed as a concern?

Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion

MILWAUKEE ESTUARY AREA OF CONCERN STAKEHOLDER INPUT GROUP MEETING:
KINNICKINNIC RIVER LOBE

Input Worksheet – Group 3 Culture

Please use this worksheet to record your answers to the questions in the last column of the Questionnaire Table.

Submitted by (individual) _____ or Group _____

9. DEGRADATION OF AESTHETICS

Goal: Improved aesthetics

- Trash and debris inputs controlled
- Limited number of road crossings

Do you agree with the goal stated above? (circle one) YES NO

(optional) Do you agree with the 2008 target as stated on the questionnaire? (circle one) YES NO

If NO, please suggest an alternative goal/ target.

Do you believe this target has been achieved based upon your knowledge of the aesthetic conditions in the Kinnickinnic River portion of the Area of Concern (AOC)?

Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion

Based on this information, do you agree that the aesthetic conditions in the Kinnickinnic River portion of the Area of Concern (AOC) have improved since it was listed as a concern?

(circle one) YES NO

If NO, what further actions do you think are required to achieve the target, or your desired alternative?

OTHER COMMENTS/QUESTIONS:

Appendix B

Data Table/Questionnaire Used Prior to the July 27, 2011 Meeting

This is the final version of the data table that was used for the July 27th meeting. Some questions that were later included in the group surveys used at the meeting were not included in this version, although the data table itself did not change. The surveys that were sent out ahead of the meeting were based on the questions in the final column for the data table.

MILWAUKEE ESTUARY AREA OF CONCERN STAKEHOLDER INPUT GROUP MEETING: KINNICKINNIC RIVER LOBE

PREAMBLE

Dear Participant,

Thank you for attending today's workshop on the current status of the Milwaukee Estuary Area of Concern (AOC). We are seeking your thoughts and ideas regarding our progress to date in addressing the specific issues of concern facing the Kinnickinnic River Lobe of the AOC.

BACKGROUND

The Kinnickinnic Lobe of the Milwaukee Estuary AOC is one part of the Greater Milwaukee River watersheds, specifically the portion of the drainage system located at the point of confluence between the River system and Lake Michigan. The Kinnickinnic Lobe is formed by the **watershed of the Kinnickinnic River from the Inner Harbor upstream to Chase Avenue**, or the downstream-most portion of the Kinnickinnic River, in the City of Milwaukee. The Milwaukee Estuary was identified as an AOC in 1987. It is one of 43 "hot spots" identified within the Great Lakes Basin by the International Joint Commission (IJC) that were determined to require priority action to clean-up toxic contamination, and restore identified beneficial uses by improving severely degraded water quality "in ports, harbors, and river mouths that empty into the Great Lakes." These actions were to supplement ongoing actions being undertaken by State, County, and local governments in addressing these priority issues of concern or beneficial use impairments (BUIs).

Eleven BUIs were identified as specific concerns within the Kinnickinnic Lobe of the Milwaukee Estuary AOC; namely, 1) restrictions on fish and wildlife consumption, 2) degradation of fish and wildlife populations, 3) fish tumors and other deformities, 4) bird or animal deformities or reproduction problems, 5) degradation of benthos, 6) restrictions on dredging, 7) eutrophication or undesirable algae, 8) beach closings and recreational restrictions, 9) degraded aesthetics, 10) degraded phytoplankton and zooplankton populations, and 11) loss of fish and wildlife habitat.

The following table summarizes these BUIs in terms of commonly used scientific "indicators" or measures by which impairments can be quantitatively assessed. To the extent practicable, these indicators are measures of the likely causes of the BUIs that were identified in the *Milwaukee Estuary Remedial Action Plan: A Plan to Clean Up Milwaukee's Rivers and Harbors*. Similarly, to the extent practicable, the table presents information on the conditions of the Kinnickinnic Lobe of the Milwaukee Estuary AOC at the time of its designation as an AOC and current information.

YOUR RESPONSE IS REQUESTED

Based on the information presented, and **your knowledge of the Kinnickinnic Lobe** of the Milwaukee Estuary AOC, please provide your responses to the questions included in the last column of the table. Your responses will assist the Wisconsin Department of Natural Resources staff in determining the degree to which the actions completed since 1987 have resolved or addressed the specific priority issues of concern or BUIs associated with the Kinnickinnic Lobe of the Milwaukee Estuary AOC.

Please note that your responses should focus on the conditions within the Kinnickinnic Lobe of the Milwaukee Estuary AOC and the specific BUIs that have been identified in the *Milwaukee Estuary Remedial Action Plan*. Opportunities are presented throughout the questionnaire for you to draw our attention to other issues affecting the Kinnickinnic Lobe of the Milwaukee Estuary AOC, including emerging issues and issues of concern outside or upstream of the Kinnickinnic Lobe of the Milwaukee Estuary AOC. By sharing these additional concerns with us, we will be better able to focus state, county, and local programs and resources within the Kinnickinnic River watershed as a whole.

AN ONGOING PROCESS OF MANAGEMENT

Finally, we want you to be aware that the process and practice of water resources management is an ongoing effort, with new challenges constantly evolving, and a continuing need for future management efforts by State, County, and local agencies.

Thank you for your participation!

(NOTE: Please see the last page for a list of abbreviations and symbols used.)

BENEFICIAL USE IMPAIRMENT (BUI)/Target	Applicable standards/guidelines	Historic Conditions in Kinnickinnic River Lobe of AOC at time of Listing	Actions Taken/Needed to Address Historic Conditions in Kinnickinnic River Lobe	Current Conditions in Kinnickinnic River Lobe of AOC	Achievement of Goal
<p>1. RESTRICTIONS ON FISH AND WILDLIFE CONSUMPTION</p> <p>Goal: Water body-specific consumption advisories are not in effect for human consumption of fish and waterfowl.</p> <p>2008 Target (pp. 31-32):</p> <ol style="list-style-type: none"> All known man-made sources of PCBs, mercury, dioxins and furans within the AOC and tributary watersheds have been controlled or eliminated Fish tissue concentrations do not exceed 0.05 ppm for PCBs Waters within the AOC are not listed as impaired due to fish consumption advisories in the most recent Wisconsin Impaired Waters list (provided every even-numbered year to the U.S. EPA) Waters within the AOC do not have special fish consumption advisories due to mercury in the <i>Healthy Guide for Eating Fish in Wisconsin</i> for two document cycles. 	<p>303(d) List Guidelines for PCBs</p> <p>Whole fish tissue samples: Do Not Eat: > 2.0 µg/l 6 meals/year: 1.1-1.9 µg/l 12 meals/year: 0.21-1.0 µg/l 52 meals/year: 0.06-0.20 µg/l</p>	<p>PCBs in whole fish tissue samples 1975-1986 2 - 25 µg/g</p> <p>The April 1985 health advisory suggested that pregnant women, nursing mothers, women who wish to bear children, and children:</p> <p><u>Do not Eat</u> <i>Redhorse,</i> <i>Rock Bass, and</i> <i>Smallmouth Bass Less than 13"</i> <i>Carp</i> <i>Northern Pike</i></p> <p><i>Perch posed the lowest health risk.</i></p>	<p>Kinnickinnic River Sediment Remediation-KK Ave to Becher St.</p> <p>Kinnickinnic River Streambank Improvement-Becher St. to Chase Ave.</p> <p>Kinnickinnic River Corridor Neighborhood Plan</p> <p>Solvay Coke Superfund Alternative Site</p> <p>Green Roof Initiative</p> <p>S 15th Street Residential Stormwater Project</p> <p>Key Riparian Buffer Improvement Opportunities</p> <p>WisDOT Villa Mann Stream and Corridor Restoration</p> <p>MMSD Channel Maintenance</p>	<p>Fish consumption advisory for PCBs on the Milwaukee River from Estabrook Falls downstream to the estuary including Menomonee River, Kinnickinnic River and Lincoln Creek:</p> <p><u>Do not Eat</u> <i>Carp All sizes</i></p> <p><u>6 meals/year</u> <i>Black Crappie All sizes</i> <i>Northern Pike All sizes</i> <i>Redhorse All sizes</i> <i>White Sucker All sizes</i></p> <p><u>12 meals/year</u> <i>Bluegill All sizes</i> <i>Channel Catfish All sizes</i> <i>Rock Bass All sizes</i> <i>Smallmouth Bass All sizes</i> <i>Walleye All sizes</i></p> <p><u>52 meals/year</u> <i>Yellow Perch All sizes</i></p>	<p>Do you agree with this target as stated? (circle one)</p> <p>YES NO</p> <p>Would you agree with a target of 0.05 µg PCBs/l or less—which would mean unrestricted consumption? (circle one)</p> <p>YES NO</p> <p>If NO, please suggest an alternative target.</p> <p>_____</p> <p>_____</p> <p>Do you think a target of 0.05 µg PCBs/l or less is achievable? (circle one)</p> <p>YES NO DON'T KNOW</p> <p>If NO, please suggest an alternative target.</p> <p>_____</p> <p>_____</p> <p>Do you believe this target has been achieved based upon the information? (circle one)</p> <p>YES NO</p> <p>If NO, what further actions do you think are required to achieve the target or your desired alternative?</p> <p>_____</p> <p>_____</p> <p>Based on this information, do you agree that the ability to consume fish from the Kinnickinnic River portion of the Area of Concern (AOC) has improved since it was listed as a concern?</p> <p>Rank 1 (strongly agree) through 5 (strongly disagree)</p> <p>1.....2.....3.....4.....5.....No Opinion</p>

BENEFICIAL USE IMPAIRMENT (BUI)/Target	Applicable standards/guidelines	Historic Conditions in Kinnickinnic River Lobe of AOC at time of Listing	Actions Taken/Needed to Address Historic Conditions in Kinnickinnic River Lobe	Current Conditions in Kinnickinnic River Lobe of AOC	Achievement of Goal
<p>2. DEGRADED FISH AND WILDLIFE POPULATIONS</p> <p>Goal: Healthy, self-sustaining communities of desired fish.</p> <p>2008 Target (pp. 33-34): This BUI will be considered eligible for delisting when the following have occurred:</p> <ol style="list-style-type: none"> A local fish and wildlife management and restoration plan has been developed for the entire AOC 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 restoration 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 responsible for all fish and wildlife population restoration activities needed within the AOC. The programs necessary to accomplish the recommendations of the fish and wildlife 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>2011 Recommendation:</p> <p>Develop site-specific metric/target in consultation with area fish experts to meet goal of health, self-sustaining communities of desired fish.</p> <p>Acute Toxicity Criteria Chronic Toxicity Criteria in whole fish (Alkalinity = 250 mg/l)</p> <p><u>Cu</u> 36 µg/L 50 µg/l</p> <p><u>Pb</u> 259 µg/L 677 µg/L</p> <p><u>Zn</u> 268 µg/L 268 µg/L</p>	<p><u>Fish species</u> 1975-1986 within the Kinnickinnic Lobe of the AOC Total number native species-11 Total number stocked gamefish spp-5 Total number non native spp-4 Total number intolerant spp-2 Total number intermediate spp-8 Total number tolerant spp-2</p> <p><u>Fish Community IBI-rating</u> Very Poor</p> <p>Fish species-1902-1999 Conditions upstream of the Kinnickinnic Lobe of AOC Total number native species-9 Total number stocked gamefish spp-0 Total number non native spp-1 Total number intolerant spp-0 Total number intermediate spp-5 Total number tolerant spp-4</p> <p>Metals in whole fish 1975-1986 <u>Cu</u> 1-169 µg/L Md = 5 µg/L</p> <p><u>Pb</u> 0 – 580 µg/L Md = 30 µg/L</p> <p><u>Zn</u> 1 - 305 µg/L Md = 20 µg/L</p>	<p><u>Kinnickinnic River Sediment Remediation-KK Ave to Becher St.</u></p> <p><u>Kinnickinnic River Streambank Improvement-Becher St. to Chase Ave.</u></p> <p><u>Gateway to Improved Long-term Spawning</u></p> <p><u>Grand Trunk Wetland Restoration and Public Access</u></p> <p><u>Kinnickinnic River Corridor Neighborhood Plan</u></p> <p><u>Solvay Coke Superfund Alternative Site</u></p> <p><u>Key Riparian Buffer Improvement Opportunities</u></p> <p><u>WisDOT Villa Mann Stream and Corridor Restoration</u></p> <p><u>MMSD Channel Maintenance</u></p>	<p><u>Fish species</u>-1994-1997 within the Kinnickinnic Lobe of the AOC Total number native species-10 Total number stocked gamefish spp-4 Total number non native spp-2 Total number intolerant spp-2 Total number intermediate spp-5 Total number tolerant spp-3</p> <p><u>Fish Community IBI-rating</u> Poor-Very Poor</p> <p>Fish species-2000-2009 Conditions upstream of the Kinnickinnic Lobe of AOC Total number native species-2 Total number stocked gamefish spp-0 Total number non native spp-1 Total number intolerant spp-0 Total number intermediate spp-1 Total number tolerant spp-2</p> <p>Metals in whole fish-1994-1997 <u>Cu</u> 5 - 45 µg/L Md = 5 µg/L</p> <p><u>Pb</u> 0 - 20 µg/L Md = <10 µg/L</p> <p><u>Zn</u> 0 - 150 µg/L Md = 10 µg/L</p>	<p>Do you agree with the 2011 recommendation as stated? (circle one) YES NO If NO, please explain. _____ _____</p> <p>Do you believe the goal stated in the first column has been achieved based upon the information? (circle one) YES NO DON'T KNOW If NO, what further actions do you think are required to achieve the target or your desired alternative? If DON'T KNOW, what further information do you think is necessary in making a determination? _____ _____</p> <p>Based on this information, do you agree that the abundance and diversity of the fishery in the Kinnickinnic River portion of the Area of Concern (AOC) has improved since it was listed as a concern? Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion</p>

BENEFICIAL USE IMPAIRMENT (BUI)/Target	Applicable standards/guidelines	Historic Conditions in Kinnickinnic River Lobe of AOC at time of Listing	Actions Taken/Needed to Address Historic Conditions in Kinnickinnic River Lobe	Current Conditions in Kinnickinnic River Lobe of AOC	Achievement of Goal
<p>3. FISH TUMORS OR OTHER DEFORMITIES</p> <p>Goal: The incidence of contaminant-related fish tumors and other deformities in the AOC is similar to other minimally impacted sites.</p> <p>2008 Target (p. 35): Delisting may occur if:</p> <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 an incidence rate of less than 5 percent. 	<p>DNR Office of the Great Lakes proposed guideline (to be implemented when appropriate): Sampling target is 200 fish. If the 200 fish sample yields below 5% within the 95% confidence interval (i.e., 5 or fewer tumors out of 200) we will consider the site for delisting with regard to the fish tumor BUI. Similarly, if fewer fish are captured, we will consider the AOC for delisting relative to the fish tumor BUI if the 95% confidence interval of the tumor incidence rate is less than or equal to 5%. Although a background tumor incidence rate of approximately 2% may be more appropriate (Baumann 2010), the most likely point estimate of 5 or fewer fish out of 200 is 2.5%. As such, given our conservative approach, we feel that a point estimate of 2.5% with a 95% confidence interval that does not include 5% is sufficient to consider delisting.</p>	<p>From the 1994 Milwaukee Estuary Remedial Action Plan (p. 2-18): Detailed studies of possible deformities in Milwaukee Estuary AOC fish populations have not been conducted. Concentrations of fluoroanthene, pyrene, benzo(a)anthracene, and benzo(a)pyrene found in AOC sediments are similar to concentrations found at sites where fish have high cancer rates (Baumann, 1990). Because these concentrations correspond to dose/response tables provided by Baumann, fish tumors are considered and impaired use in the AOC. No studies have been conducted to determine the incidence of liver tumors in AOC fish. An assessment of resident fish in the rivers within and near the AOC should be conducted to document the appearance of tumors and/or other deformities.</p>	<p>Kinnickinnic River Sediment Remediation-KK Ave to Becher St.</p> <p>Kinnickinnic River Streambank Improvement-Becher St. to Chase Ave.</p> <p>Solvay Coke Superfund Alternative Site</p>	<p>In May 2011, U.S. Fish and Wildlife Service collected 20 white suckers and 20 small mouth bass in the Milwaukee River to analyze these fish for contaminants of emerging concern. Included in this work will be an analysis of tumors and lesions that are contaminant-related. Results from the histopathology work (which will determine whether there are tumors or lesions and the likely cause of them) will be available later in 2011.</p>	<p>Do you agree with this target as stated? (circle one) YES NO If NO, please suggest an alternative target. _____ _____</p> <p>Because these deformities were presumed, but not documented, at the time of listing, and because there are no past or present data to assess this impairment, would you agree that this impairment removed from the list of concerns within the Kinnickinnic River portion of the Area of Concern (AOC)? YES NO If NO, how would you suggest that this impairment be documented in order to determine whether or not the remedial actions have addressed this concern (i.e. what criteria should we use to address this target/ how do we determine success)? _____ _____</p>
<p>4. BIRD OR ANIMAL DEFORMITIES OR REPRODUCTIVE PROBLEMS</p> <p>Goal: The incidence of bird or animal deformities of reproduction problems in the AOC is similar to that of other minimally impacted sites.</p> <p>2008 Target (pp. 36-37): This BUI can be delisted if:</p> <ul style="list-style-type: none"> •Studies conducted in the AOC indicate that the beneficial use should not be considered impaired, or •If studies conducted in the AOC determine that this use is impaired, then two approaches can be considered for delisting: (see pp. 36-37 in the Delisting Targets for the Milwaukee Estuary AOC document.) 		<p>From the 1994 Milwaukee Estuary Remedial Action Plan (p. 2-18): Insufficient data are available to show whether contaminants are causing these problems in the AOC. The Stage I document considered this use unimpaired because of lack of information. Since organochlorine contaminants (e.g., PCBs, dieldrin, DDT) and metals (e.g., cadmium, mercury, and lead) impair reproduction and development in wildlife elsewhere (King and Krysnitsky, 1986; Scheuhammer, 1987), this use should be considered impaired. Studies are needed to determine the extent of this impairment.</p>	<p>Kinnickinnic River Sediment Remediation-KK Ave to Becher St.</p> <p>Kinnickinnic River Streambank Improvement-Becher St. to Chase Ave.</p> <p>Grand Trunk Wetland Restoration and Public Access</p> <p>Kinnickinnic River Corridor Neighborhood Plan</p> <p>Solvay Coke Superfund Alternative Site</p> <p>Key Riparian Buffer Improvement Opportunities</p> <p>WisDOT Villa Mann Stream and Corridor Restoration</p>	<p>No data.</p>	<p>Do you agree with this target as stated? (circle one) YES NO If NO, please suggest an alternative target. _____ _____</p> <p>Because these deformities were presumed, but not documented, at the time of listing, and because there are no past or present data to assess this impairment, do you think that this impairment should be removed from the list of concerns within the Kinnickinnic River portion of the Area of Concern (AOC)? YES NO If NO, how would you suggest that this impairment be documented in order to determine whether or not the remedial actions have addressed this concern (i.e., what criteria should we use to address this target/ how do we determine success)? _____ _____</p>

BENEFICIAL USE IMPAIRMENT (BUI)/Target	Applicable standards/guidelines	Historic Conditions in Kinnickinnic River Lobe of AOC at time of Listing	Actions Taken/Needed to Address Historic Conditions in Kinnickinnic River Lobe	Current Conditions in Kinnickinnic River Lobe of AOC	Achievement of Goal
<p>5. DEGRADATION OF BENTHOS</p> <p>Goal: Healthy, self-sustaining communities of desired benthic organisms.</p> <p>2008 Target (pp. 37-38): Delisting may occur if:</p> <ol style="list-style-type: none"> 1. Known contaminant sources contributing to sediment contamination and degraded benthos have been identified and control measures implemented, and 2. All remediation actions for contaminated sediments are completed and monitored according to the approved plan with consideration to using consensus based sediment quality guidelines and equilibrium partitioning sediment benchmarks; or 3. The benthic community within the site being evaluated is statistically similar to a reference site with similar habitat and minimal sediment contamination. 	<p>2011 Recommendation: Work with benthic experts to establish a reasonably measurable target.</p>	<p>Macrobenthos-1984 Conditions within the Kinnickinnic Lobe of the AOC</p> <p>18 species All Very Tolerant to pollution</p> <p>Macrobenthos-1975-1986 Conditions upstream of the Kinnickinnic Lobe River of the AOC</p> <p><u>Benthic Community HBI- Rating</u> Fair</p> <p><u>EPT-Rating</u> < 30%</p> <p><u>Toxicity</u> Estimated Incidence of Toxicity 1975-1986 100%</p>	<p>Kinnickinnic River Sediment Remediation-KK Ave to Becher St.</p> <p>Kinnickinnic River Streambank Improvement-Becher St. to Chase Ave.</p> <p>Kinnickinnic River Corridor Neighborhood Plan</p> <p>Solvay Coke Superfund Alternative Site</p> <p>Key Riparian Buffer Improvement Opportunities</p> <p>WisDOT Villa Mann Stream and Corridor Restoration</p>	<p>Macrobenthos-current Conditions within the Kinnickinnic Lobe of the AOC No data</p> <p>Macrobenthos1994-1997 Conditions upstream of the Kinnickinnic Lobe of the AOC</p> <p><u>Benthic Community HBI- Rating</u> Fair</p> <p><u>EPT-Rating</u> 30%</p> <p><u>Toxicity</u> Estimated Incidence of Toxicity 1994-1997 25 – 60%</p>	<p>Do you agree with the target and recommendation as stated? (circle one) If NO for either, please explain.</p> <p>YES NO</p> <p>Would you agree with a target Benthic Community HBI-Rating of “Fair – Good” (with “good” being fully supportive of all uses)? (circle one)</p> <p>YES NO</p> <p>If NO, please suggest an alternative target.</p> <p>_____</p> <p>_____</p> <p>Do you believe this target has been achieved based upon the information? (circle one)</p> <p>YES NO</p> <p>If NO, what further actions do you think are required to achieve the target or your desired alternative?</p> <p>_____</p> <p>_____</p> <p>Based on this information, do you agree that the abundance and diversity of the benthic organisms in the Kinnickinnic River portion of the Area of Concern (AOC) have improved since it was listed as a concern?</p> <p>Rank 1 (strongly agree) through 5 (strongly disagree)</p> <p>1.....2.....3.....4.....5.....No Opinion</p> <p>Based on this information, do you agree that the level of toxicity in the benthic organisms in the Kinnickinnic River portion of the Area of Concern (AOC) has diminished since it was listed as a concern?</p> <p>Rank 1 (strongly agree) through 5 (strongly disagree)</p> <p>1.....2.....3.....4.....5.....No Opinion</p>

BENEFICIAL USE IMPAIRMENT (BUI)/Target	Applicable standards/guidelines	Historic Conditions in Kinnickinnic River Lobe of AOC at time of Listing	Actions Taken/Needed to Address Historic Conditions in Kinnickinnic River Lobe	Current Conditions in Kinnickinnic River Lobe of AOC	Achievement of Goal
<p>6. RESTRICTIONS ON DREDGING ACTIVITIES</p> <p>Goal: Sediment quality is such that additional disposal restrictions (and associated costs) are not imposed for dredging activities.</p> <p>2008 Target (pp. 39-40):</p> <p>Delisting of this BUI can occur when:</p> <ol style="list-style-type: none"> 1. Contaminated sediment hot spots within and upstream from the AOC have been identified. 2. 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 delisting is possible. 3. There are no restrictions on routine navigational dredging done by the U.S. Army Corps of Engineers and/or private dredging companies due to contamination originating from controllable sources within the AOC. 	<p>NR 347</p> <p>Sediment clean up guidelines are selected on a site-specific basis using multiple lines of evidence.</p>	<p>PAHs, PCBs, and heavy metals found in sediments throughout the AOC at elevated levels.</p>	<p>Kinnickinnic River Sediment Remediation-KK Ave to Becher St.</p> <p>Kinnickinnic River Streambank Improvement-Becher St. to Chase Ave.</p> <p>Solvay Coke Superfund Alternative Site</p> <p>MMSD Channel Maintenance</p>	<p>Estimated 167,000 cubic yards of contaminated sediments removed from the Kinnickinnic River portion of the Area of Concern (AOC).</p>	<p>Do you agree with this target as stated? (circle one)</p> <p>YES</p> <p>NO</p> <p>If NO, please suggest an alternative target.</p> <p>_____</p> <p>_____</p> <p>If YES, do you believe this target has been achieved based upon the information? (circle one)</p> <p>YES</p> <p>NO</p> <p>If NO, what further actions do you think are required to achieve the target or your desired alternative?</p> <p>_____</p> <p>_____</p> <p>Based on this information, do you agree that we've made progress on this particular BUI for the Kinnickinnic River portion of the Area of Concern (AOC)?</p> <p>Rank 1 (strongly agree) through 5 (strongly disagree)</p> <p>1.....2.....3.....4.....5.....No Opinion</p> <p>Based on this information, do you agree that the volume of contaminated sediments in the Kinnickinnic River portion of the Area of Concern (AOC) has been reduced since it was listed as a concern?</p> <p>Rank 1 (strongly agree) through 5 (strongly disagree)</p> <p>1.....2.....3.....4.....5.....No Opinion</p>

BENEFICIAL USE IMPAIRMENT (BUI)/Target	Applicable standards/guidelines	Historic Conditions in Kinnickinnic River Lobe of AOC at time of Listing	Actions Taken/Needed to Address Historic Conditions in Kinnickinnic River Lobe	Current Conditions in Kinnickinnic River Lobe of AOC	Achievement of Goal
<p>7. EUTROPHICATION OR UNDESIRABLE ALGAE</p> <p>Goal: Water quality has improved sufficient to meet state water quality standards.</p> <p>2008 Target (pp. 40-41):</p> <p>Delisting of this BUI can occur when:</p> <ol style="list-style-type: none"> Total phosphorus (TP) concentrations within the AOC rivers do not exceed 0.05 mg/L OR in-river TP concentrations meet Wisconsin criteria when promulgated. TP concentrations in the inner and outer harbor areas do not exceed 0.02 mg/L OR TP concentrations meet WI criteria when promulgated. TP concentrations in near shore waters do not exceed 0.02 mg/L OR TP concentrations meet WI criteria when promulgated. There are no exceedances of the minimum dissolved oxygen (DO) concentrations established in Chapter NR 102, due to excessive sediment deposition or algae growth. Chlorophyll-a concentrations within the AOC lake and impoundment areas do not exceed 4.0 µg/L. 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. There are no beach closures in the AOC due to excessive nuisance algae growth. 	<p>DO variance water standard (KK River) Min = 2 mg/L</p> <p>DO fish and aquatic life standard Min = 5 mg/L</p> <p>Chronic Toxicity Criterion Ammonia 2.25 mg/L</p> <p>Total phosphorus (TP) 0.1 mg/L</p>	<p>Comparison within the AOC: 1975-1986 Concentrations</p> <p>DO 0 – 20 mg/L Md = 9 mg/L</p> <p>Ammonia 0 – 2.8 mg/L Md = 0.2 mg/L</p> <p>TP 0 – 7.1 mg/L Md = 0.05 mg/L</p> <p>Summary of Water Resource Problems in the AOC: 1986 Conditions per PR 37</p> <p>Low dissolved oxygen levels during dry weather, warm periods - Severe</p> <p>Low dissolved oxygen levels during wet weather periods - Moderate</p> <p>High fecal coliform levels - Severe</p> <p>High phosphorus levels - Moderate</p> <p>Ammonia nitrogen toxicity - None</p> <p>Toxic substances in fish - Severe</p> <p>Toxic substances in sediment - Severe</p> <p>Toxic substances in water - Moderate</p> <p>Poor quality benthic habitat - Severe</p> <p>Limited fish communities - Moderate</p> <p>Excessive algal growths - Slight</p> <p>Poor aesthetic quality - Moderate</p>	<p>Kinnickinnic River Corridor Neighborhood Plan</p> <p>Solvay Coke Superfund Alternative Site</p> <p>Green Roof Initiative</p> <p>S 15th Street Residential Stormwater Project</p> <p>Key Riparian Buffer Improvement Opportunities</p> <p>WisDOT Villa Mann Stream and Corridor Restoration</p>	<p>Comparison within the AOC: 1998-2001 Concentrations</p> <p>DO 4 – 20 mg/L Md = 9 mg/L</p> <p>Ammonia 0 – 2.0 mg/L Md = 0.1 mg/L</p> <p>TP 0 -0.4 mg/L Md = 0.1 mg/L</p> <p>Summary of Water Resource Problems in the AOC: 1998-2001 Conditions per TR 39</p> <p>Low dissolved oxygen levels during dry weather, warm periods - Moderate</p> <p>Low dissolved oxygen levels during wet weather periods - Moderate</p> <p>High fecal coliform levels - Severe</p> <p>High phosphorus levels - Moderate</p> <p>Ammonia nitrogen toxicity - None</p> <p>Toxic substances in fish - Moderate</p> <p>Toxic substances in sediment - Slight</p> <p>Toxic substances in water - Moderate</p> <p>Poor quality benthic habitat - Moderate</p> <p>Limited fish communities - Moderate</p> <p>Excessive algal growths - Slight</p> <p>Poor aesthetic quality - Moderate</p>	<p>Would you agree with a target dissolved oxygen concentration of 5 mg/l to fully meet the standard for fish and aquatic life on the KK River? YES NO</p> <p>Do you believe this target has been achieved based upon ammonia concentrations? Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion</p> <p>Do you believe this target has been achieved based upon total phosphorus (Total P) concentrations? Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion</p> <p>Based on concentrations, do you agree that water quality in the Kinnickinnic River portion of the Area of Concern (AOC) has improved since it was listed as a concern? (circle one) YES NO</p> <p>If NO, what further actions do you think are required to achieve the target or your desired alternative? _____ _____</p> <p>Based on the severity of water resource problems, do you agree that water quality in the Kinnickinnic River portion of the Area of Concern (AOC) has improved since it was listed as a concern? Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion</p> <p>Based on the comparison of upstream and downstream conditions, do you agree that water quality in the Kinnickinnic River portion of the Area of Concern (AOC) has improved compared to the upstream river conditions since it was listed as a concern? Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion</p>

		<p>Comparison between upstream River stations and downstream Estuary stations: 1975-1986</p> <p><u>Biological/Bacteria</u> Fecal Coliform - > in River <i>E. coli</i> - Not Enough Data Chlorophyll-a - No difference</p> <p><u>Chemical/Physical</u> Alkalinity - > in River BOD - > in River Dissolved Oxygen - > in River Hardness - > in River pH - > in River Specific Conductance - > in River</p> <p><u>Suspended Material</u> Total Suspended Solids - > in River</p> <p><u>Nutrients</u> Ammonia, Dissolved - > in Estuary Kjeldahl Nitrogen - > in Estuary Nitrate, Dissolved - > in Estuary Nitrite, Dissolved - > in Estuary Organic Nitrogen - No Difference Phosphorus, Dissolved - > in Estuary Total Nitrogen - > in Estuary Total Phosphorus - No Difference</p> <p><u>Metals/Salts</u> Arsenic - Not Enough Data Cadmium - > in Estuary Chloride - > in River Chromium - > in Estuary Copper - No Difference Lead - > in Estuary Mercury - Not Enough Data Nickel - Not Enough Data Zinc - > in River</p>		<p>Comparison between upstream River stations and downstream Estuary stations: 1998-2001</p> <p><u>Biological/Bacteria</u> Fecal Coliform - > in River <i>E. coli</i> - No Difference Chlorophyll-a - > in River</p> <p><u>Chemical/Physical</u> Alkalinity - > in River BOD - > in River Dissolved Oxygen - > in River Hardness - > in River pH - > in River Specific Conductance - > in River</p> <p><u>Suspended Material</u> Total Suspended Solids - > in River</p> <p><u>Nutrients</u> Ammonia, Dissolved - > in Estuary Kjeldahl Nitrogen - > in Estuary Nitrate, Dissolved - > in Estuary Nitrite, Dissolved - No Difference Organic Nitrogen - No Difference Phosphorus, Dissolved - > in River Total Nitrogen - > in Estuary Total Phosphorus - > in River</p> <p><u>Metals/Salts</u> Arsenic - No Difference Cadmium - No Difference Chloride - > in River Chromium - No Difference Copper - No Difference Lead - > in Estuary Mercury - > in Estuary Nickel - No Difference Zinc - > in River</p>	
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BENEFICIAL USE IMPAIRMENT (BUI)/Target	Applicable standards/guidelines	Historic Conditions in Kinnickinnic River Lobe of AOC at time of Listing	Actions Taken/Needed to Address Historic Conditions in Kinnickinnic River Lobe	Current Conditions in Kinnickinnic River Lobe of AOC	Achievement of Goal
<p>9. DEGRADATION OF AESTHETICS</p> <p>Goal: Improved aesthetics</p> <ul style="list-style-type: none"> - Trash and debris inputs controlled - Limited number of road crossings <p>2008 Target (pp. 44-45): This delisting target is consistent with Chapter NR 102, Water Quality Standards for Surface Waters. Delisting shall occur when monitoring data within the AOC and/or surveys for any five 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> <p>(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.</p> <p>(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.</p> <p>(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> <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 all known sources of materials contributing to the degradation of aesthetics within the AOC. 	<p>No standards</p> <p>2011 Recommendation:</p> <p>Check to see if records exist about the amounts of debris removed per unit time on the water for the MMSD skimmer to determine if the amount of trash in the water has diminished over time.</p>	<p>From the 1994 Milwaukee Estuary Remedial Action Plan (p. 2-19):</p> <p>The aesthetics of the AOC are considered impaired because of the poor visual quality of the water resources and adjacent land. After storms, considerable debris can be seen near all of the combined sewer overflows and storm water outfalls. To remove some of this debris, the MMSD operates a skimmer on the rivers throughout the summer. In addition, flushing tunnels on the KK and the MKE Rivers are used in the warm summer months to flush debris and polluted water from the river system, and replace polluted water with Lake Michigan water that is cooler and contains higher concentrations of dissolved oxygen.</p>	<p>Kinnickinnic River Sediment Remediation-KK Ave to Becher St.</p> <p>Kinnickinnic River Streambank Improvement-Becher St. to Chase Ave.</p> <p>Gateway to Improved Long-term Spawning</p> <p>Grand Trunk Wetland Restoration and Public Access</p> <p>Kinnickinnic River Corridor Neighborhood Plan</p> <p>Solvay Coke Superfund Alternative Site</p> <p>Green Roof Initiative</p> <p>S 15th Street Residential Stormwater Project</p> <p>Key Riparian Buffer Improvement Opportunities</p> <p>WisDOT Villa Mann Stream and Corridor Restoration</p> <p>MMSD Channel Maintenance</p> <p>Milwaukee Riverkeeper Annual Clean Ups</p> <p>MMSD River Skimmer</p>		<p>Do you agree with this target as stated? (circle one)</p> <p>YES</p> <p>NO</p> <p>If NO, please suggest an alternative target.</p> <p>_____</p> <p>_____</p> <p>Do you believe this target has been achieved based upon your knowledge of the aesthetic conditions in the Kinnickinnic River portion of the Area of Concern (AOC)?</p> <p>Rank 1 (strongly agree) through 5 (strongly disagree)</p> <p>1.....2.....3.....4.....5.....No Opinion</p> <p>Based on this information, do you agree that the aesthetic conditions in the Kinnickinnic River portion of the Area of Concern (AOC) have improved since it was listed as a concern? (circle one)</p> <p>YES</p> <p>NO</p> <p>If NO, what further actions do you think are required to achieve the target, or your desired alternative?</p> <p>_____</p> <p>_____</p>

BENEFICIAL USE IMPAIRMENT (BUI)/Target	Applicable standards/guidelines	Historic Conditions in Kinnickinnic River Lobe of AOC at time of Listing	Actions Taken/Needed to Address Historic Conditions in Kinnickinnic River Lobe	Current Conditions in Kinnickinnic River Lobe of AOC	Achievement of Goal
<p>10. DEGRADATION OF PHYTOPLANKTON AND ZOOPLANKTON POPULATIONS</p> <p>Goal: Improved phytoplankton and zooplankton populations.</p> <p>2008 Target (p. 46): A stepped approach is needed for delisting for this impairment: 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. 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>	<p>2011 Recommendation: Work with experts to set target to meet goal.</p>	<p>Chlorophyll-a as an indicator of algal abundance: 1975-1986 0 – 172 µg/l Md = 5 µg/l</p> <p>Phytoplankton have been collected by the MMSD within the AOC since 1979. Collections in 1980, '81, and '82 indicate that more pollution tolerant species exist in greater numbers in the outer harbor than in the nearshore waters (1 mile outside the breakwalls). The greater concentrations of nutrients within the harbor not only allow the more pollution tolerant organisms to gain the competitive advantage over other organisms, but also adds to the quantity of organisms found. Eutrophic conditions usually lead to a quantity-rich, species-poor community. Conversely, oligotrophic conditions usually lead to a quantity poor, species-rich community. This is not always the case, however, since some eutrophic lakes have many species because of immigration from other sources (Wetzel, 1975).</p> <p>For more information, please see pp. 2-20 and 2-21 in the 1994 Milwaukee Estuary Remedial Action Plan.</p>	<p>Kinnickinnic River Sediment Remediation-KK Ave to Becher St.</p> <p>Kinnickinnic River Streambank Improvement-Becher St. to Chase Ave.</p> <p>Kinnickinnic River Corridor Neighborhood Plan</p> <p>Solvay Coke Superfund Alternative Site</p> <p>Green Roof Initiative</p> <p>S 15th Street Residential Stormwater Project</p> <p>Key Riparian Buffer Improvement Opportunities</p> <p>WisDOT Villa Mann Stream and Corridor Restoration</p> <p>Chlorides Control</p>	<p>Chlorophyll-a as an indicator of algal abundance: 1994-1997 0 – 40 µg/l Md = 2 µg/l</p>	<p>Do you agree with this target as stated? (circle one) YES NO If NO, please suggest an alternative target.</p> <hr/> <hr/> <p>Because degraded zooplankton and phytoplankton populations were presumed but not documented at the time of listing, and because there are no present data to assess this impairment, would you agree that this impairment be removed from the list of concerns within the Kinnickinnic River portion of the Area of Concern (AOC)? (circle one) YES NO If NO, how would you suggest that this impairment be documented in order to determine whether or not the remedial actions have addressed this concern (i.e. what criteria should we use to address this target/ how do we determine success)?</p> <hr/> <hr/> <p>What further actions do you think are required to achieve the target, or your desired alternative?</p> <hr/> <hr/>

BENEFICIAL USE IMPAIRMENT (BUI)/Target	Applicable standards/guidelines	Historic Conditions in Kinnickinnic River Lobe of AOC at time of Listing	Actions Taken/Needed to Address Historic Conditions in Kinnickinnic River Lobe	Current Conditions in Kinnickinnic River Lobe of AOC	Achievement of Goal
<p>11. LOSS OF FISH AND WILDLIFE HABITAT</p> <p>Goal: Improvement of fish and wildlife habitat by improving the riparian corridor, removing concrete channels, and restoring wetlands.</p> <p>2008 Target (pp. 33-34): This BUI will be considered eligible for delisting when the following have occurred:</p> <ol style="list-style-type: none"> A local fish and wildlife management and restoration plan has been developed for the entire AOC 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 restoration 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 responsible for all fish and wildlife population restoration activities needed within the AOC. The programs necessary to accomplish the recommendations of the fish and wildlife plan are implemented. <p>Populations for native indicator fish species are statistically similar to populations in reference sites with similar habitat but little to no contamination.</p>	<p>2011 Recommendation: Set specific goals in consultation with experts.</p>	<p>1984 Conditions Within AOC Stream channelization - Poor Streambank erosion upstream of Beecher St - Fair Streambank erosion downstream of Beecher St - Good Bank channel capacity - Good Bottom scouring/deposition - Poor Bottom substrate diversity - Poor Average water depth - Excellent</p> <p>Upstream Conditions Within the Kinnickinnic Watershed 1985</p> <p><u>Streambed conditions</u> Not assessed</p> <p><u>Streambank conditions</u> Not assessed</p> <p><u>Obstructions</u> Not assessed</p> <p><u>Point Source Outfall Locations</u> Not assessed</p> <p><u>Riparian Buffer Widths</u> Not assessed</p> <p><u>Plant Community Floristic Quality Index (FQI) Assessment</u> Not assessed</p> <p>Primary Environmental Corridors (PEC) = 15 acres Secondary Environmental Corridors (SEC) = 182 acres Isolated Natural Resource Areas (INRA) = 100 acres</p>	<p>Kinnickinnic River Sediment Remediation-Phase I</p> <p>Kinnickinnic River Streambank Improvement-Becher St. to Chase Ave.</p> <p>Gateway to Improved Long-term Spawning</p> <p>Grand Trunk Wetland Restoration and Public Access</p> <p>Kinnickinnic River Corridor Neighborhood Plan</p> <p>Solvay Coke Superfund Alternative Site</p> <p>Key Riparian Buffer Improvement Opportunities</p> <p>WisDOT Villa Mann Stream and Corridor Restoration</p> <p>MMSD Concrete Removal</p> <p>6th Street Bridge Reconstruction and Concrete Removal</p>	<p>2009 Conditions Within AOC Stream channelization - Poor Streambank erosion upstream of Beecher St - Good Streambank erosion downstream of Beecher St - Excellent Bank channel capacity - Good Bottom scouring/deposition - Good Bottom substrate - Good Average water depth - Excellent</p> <p>Upstream AOC Conditions Within the Kinnickinnic Watershed 2000-2009</p> <p><u>Streambed conditions</u> Concrete Lined Channel - 32% Enclosed Channel - 30%</p> <p><u>Streambank conditions</u> Proportion eroding - 25 to 63%</p> <p><u>Obstructions</u> Dam and drop structures (number) - 15 Road crossings (number) - 70 Total obstructions (number/mi) - 51</p> <p><u>Point Source Outfall Locations</u> Non-Contact Cooling water permits (number) - 14 Individual Permits (number) - 4 SSOs (number) - 16 CSO s(number) - 6 Stormwater Outfalls (number) - 50 Point source outlet totals (number) - 90 Stormwater Outfalls (number/stream mile) - 1.5 to 5.5 Point source outlets (number/stream mile) - 0.4 to 18.2</p> <p><u>Riparian Buffer Widths</u> Proportion of Total Stream Length of riparian buffers < 25 feet (percent) - 55 to 80% 25-50 feet (percent) - 4 to 5% 51-75 feet (percent) - 4 to 5% > 75 feet (percent) - 0 to 27%</p> <p><u>Plant Community Floristic Quality Index (FQI) Assessment</u> FQI-Poor (number sites) - 2 FQI-Fair (number sites) - 3 FQI-Fairly Good (number sites) - 1 Total (number) - 6</p> <p>Primary Environmental Corridors (PEC) = 15 acres Secondary Environmental Corridors (SEC) = 182 acres Isolated Natural Resource Areas (INRA) = 100 acres</p>	<p>Do you agree with this Target as stated? (circle one) YES NO If NO, please suggest an alternative target. _____</p> <p>Based on this information, do you agree that fish and wildlife habitat within the Kinnickinnic River portion of the Area of Concern (AOC) has improved since it was listed as an area of concern? Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion</p> <p>Based on this information, do you agree that fish and wildlife habitat upstream of the Kinnickinnic River portion of the Area of Concern (AOC) has improved since it was listed as an area of concern? Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion</p> <p>Based on this information, do you agree that fish and wildlife habitat areas throughout the Kinnickinnic River watershed have improved since it was listed as an area of concern? Rank 1 (strongly agree) through 5 (strongly disagree) 1.....2.....3.....4.....5.....No Opinion</p> <p>What further actions do you think are required to achieve the target, or your desired alternative? _____ _____</p>

ABBREVIATIONS AND SYMBOLS (in order of occurrence)

AOC = Area of Concern, specifically the Kinnickinnic River Lobe of the Milwaukee Estuary
IJC = United States and Canada International Joint Commission
BUI = Beneficial Use Impairment
303(d) = Section of the Clean Water Act providing guidelines for the determination of impaired waters
WDNR = Wisconsin Department of Natural Resources
WisDOT = Wisconsin Department of Transportation
MMSD = Milwaukee Metropolitan Sewerage District
Hg = Mercury
PCBs = Polychlorinated biphenyls
spp = Species
IBI = Index of Biotic Integrity, a measure of fisheries quality
Cu = Copper
Pb = Lead
Zn = Zinc
HBI = Hilsenhoff Biotic Index, a measure of the quality of the macrobenthos
EPT = Ephemeroptera, Plecoptera, and Tricoptera, a measure of the quality of the aquatic insect population
PEC-Q = Probable Effect Concentration-Quotient, a measure of the likelihood of negative impacts on benthic community in the waterways from polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and metals; a PEC-Q value of 0.7 or greater is chronically toxic to sediment-dwelling organisms, with the frequency of sediment toxicity being greater than 50%, severely impacting the benthic community
PAH = Polycyclical aromatic hydrocarbons
DO = Dissolved oxygen concentration
mg/l = Milligrams per liter (1,000 µg/l) = parts per million (ppm)
µg/l = Micrograms per liter = parts per billion (ppb)
Md = Median value, a measure of the central tendency or midpoint of a data set
BOD = Biological Oxygen Demand
Chlorophyll-a = A measure of the green algal pigment in a water sample, with concentrations greater than 10 µg/l producing a visibly green tint to the water
Total N = Total nitrogen
TP = Total phosphorus
E. coli = *Escherichia coli*, an intestinal bacterium commonly found in mammals
pH = Hydrogen ion concentration, a measure of acidity
PR 37 = SEWRPC Planning Report No. 37, *A Water Resources Management Plan for the Milwaukee Harbor Estuary*, Volume One, *Inventory Findings*, March 1987; Volume Two, *Alternative and Recommended Plans*, December 1987
TR 39 = SEWRPC Technical Report No. 39, *Water Quality Conditions and Sources of Pollution in the Greater Milwaukee Watersheds*, Part One of Three, Chapters 1-4; Part Two of Three, Chapters 5-12; and Part Three of Three, Appendices, November 2007
CSO = Combined sewer overflow, or a discharge from a sewer that carried both wastewater and stormwater
SSO = Separated sewer overflow, or a discharge from a stormwater sewer
WPDES = Wisconsin Pollution Discharge Elimination System, the State permitting system for discharges to waters of the State
FQI = Floristic Quality Index, a measure of vegetation quality
PEC = Primary Environmental Corridors contain concentrations of our most significant natural resources, and are at least 400 acres in size, at least two miles long, and at least 200 feet wide
SEC = Secondary Environmental Corridors contain significant but smaller concentrations of natural resources, and are at least 100 acres in size and at least one mile long, unless serving to link primary corridors
INRA = Isolated Natural Resource Areas contain significant remaining resources apart from environmental corridors, and are at least five acres in size and at least 200 feet wide

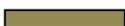
Color-codes:

 = Unacceptable or not meeting applicable standards or guidelines

 = Marginal or not fully meeting applicable standards or guidelines

 = Acceptable and fully meeting applicable standards or guidelines

 = Actions completed or underway

 = Proposed actions

Source: SEWRPC.

#158066 V1 - REVISED KK RIVER DELISTING TABLE-2011_07_11
300-1000
JAT/TMS/MCO
06/07/11, 07/18/11, 07/21/11

Appendix C

Fish Consumption Advisories in the AOC

This document was developed by DNR and the state Department of Health Services. It summarizes the fish consumption advisories that exist in the Milwaukee Estuary AOC. Each AOC in Wisconsin has a similar fact sheet.



Fish Consumption Advice for the Milwaukee Estuary Area of Concern



Why should I eat fish?

Fish are a nutritious family food. Modest amounts of fish can provide health benefits, although little additional benefit is gained by eating more than 1-2 servings per week. Some of the benefits of catching and eating fish include:

- Low cost and fun to catch your own fish
- Low in fat, yet high in protein
- Great source of vitamins, minerals, and omega-3 fatty acids

However, polychlorinated biphenyls (PCBs) in the Milwaukee, Menomonee, and Kinnickinnic Rivers, in addition to Lincoln Creek pose health risks and prompt the need for fish consumption advisories. The advice for this area varies by species and location on the river (*see the advisory table on page 2*). **Fish caught in Cedar Creek and Zeunert Pond should not be eaten.**

What are polychlorinated biphenyls (PCBs)?

PCBs are man-made chemicals that were used in electrical equipment, industrial processes, and manufacturing and recycling of carbonless copy paper. PCBs were discharged into the Milwaukee, Menomonee, and Kinnickinnic Rivers, as well as Lincoln Creek for decades before it was discovered that these chemicals build up in the environment and pose health risks to humans and wildlife. Restrictions on PCB use, manufacturing, and disposal began in the 1970s, but PCBs remain in the sediment of these rivers. Efforts are underway to remediate contaminants in the affected river sediments.

Tell me about PCBs in fish and what types of fish are safe to eat.

- PCBs are resistant to degradation and bioaccumulate to higher concentrations through the food chain
- Younger, smaller fish have lower amounts of PCBs than larger, older predator fish
- PCBs accumulate in the fatty tissue, so fatty fish such as carp and catfish have higher levels of PCBs.
- No fish from Cedar Creek and Zeunert Pond are currently safe to eat

What are the health risks?

PCBs are stored in your body fat for years. Your health risk may increase as you eat more fish that are high in PCBs. Health risks include:

- Developmental impairments in children
- Harm to the reproductive system
- Higher risk of cancer
- Harm to the immune system
- Altered thyroid function

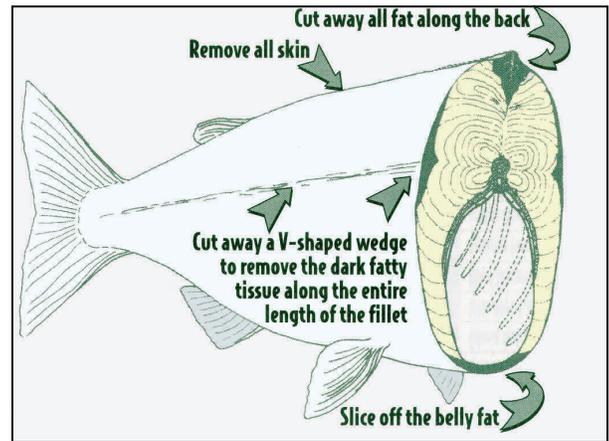


Milwaukee River at Estabrook Park

How should I prepare and cook my fish?

Proper cleaning and cooking techniques can reduce PCB levels by up to 70%. Follow the following preparation techniques:

- Fillet your fish
- Remove the skin
- Trim away belly fat, fat on the backsides, and fatty dark meat
- Do not eat the eggs
- Bake, broil, or grill
- Discard all liquids and frying oils



Species	Eat no more than 1 meal/week	Eat no more than 1 meal/month	Eat no more than 1 meal every 2 months	Do Not Eat
Cedar Creek from Bridge Rd in the Village of Cedarburg, including Zeunert Pond downstream to Milwaukee River				
All Species				All Sizes
Milwaukee River from the city of Grafton downstream to Estabrook Falls				
Black crappie, Rock bass	All Sizes 			
Largemouth bass, Redhorse, Smallmouth bass, Walleye		All Sizes		
Northern pike			All Sizes	
Carp				All Sizes
Milwaukee River from Estabrook Falls downstream to the estuary including Menomonee River, Kinnickinnic River, and Lincoln Creek				
Yellow Perch 	All sizes			
Bluegill, Channel catfish, Rock bass, Smallmouth bass, Walleye		All Sizes 		
Black crappie, Northern pike, Redhorse, White sucker			All Sizes	
Carp				All Sizes
Milwaukee River from city of Grafton to the estuary including Menomonee River, Kinnickinnic River, and Lincoln Creek (Lake Michigan PCB advisory)				
Brown trout		Less than 25"	Larger than 25"	
Chinook salmon 		Less than 36"	Larger than 36"	
Rainbow trout	Less than 22"	Larger than 22"		
Coho salmon		All sizes		

See the WDNR's website or the *Choose Wisely* booklet for updates on fish safe-eating guidelines. <http://dnr.wi.gov/fish/consumption/>

Appendix F

U.S. Geological Survey Benthos and Plankton Proposal

As part of the work on the Sheboygan River AOC, the Milwaukee Estuary AOC will be surveyed in 2012 for benthos and plankton to determine the status of these impairments. This is the final project proposal under which the work will be done starting in the spring of 2012.

Benthos & Plankton BUIs Evaluation in Wisconsin's Lake Michigan Areas of Concern

Brief Project Description

Benthos (benthic invertebrate) and plankton (phytoplankton/zooplankton) communities in Wisconsin's four Lake Michigan Areas of Concern (AOCs; Menominee River, Lower Green Bay and Fox River, Sheboygan River, and Milwaukee Estuary) and six non-AOCs will be quantified. The inclusion of non-AOC sites will allow comparison of AOC sites to relatively un-impacted or less-impacted control sites with natural physical and chemical characteristics that are as close as possible to that of the AOCs. Comparison to less-impacted control sites as site pairs and as a group is consistent with the approaches used by other Great Lakes states, such as Michigan and Ohio (Michigan Department of Environmental Quality, 2008; Ohio EPA, 2008). The community data within and between the AOCs and non-AOCs will be analyzed and the differences and similarities will assist in determining the status of the communities and, when appropriate, support delisting of the "Degraded Benthos" and "Degradation of phytoplankton / zooplankton populations" beneficial use impairments in each AOC. This project is a cooperative agreement between the Wisconsin Department of Natural Resources (WDNR) and the US Geological Survey (USGS).

Project Location

Wisconsin Areas of Concern (AOCs) and non-AOCs for potential comparison along Lake Michigan's western shore.

Wisconsin's Lake Michigan Areas of Concern (AOCs)	Approximate Decimal Lon-Lat Harbor/River mouth
Menominee River	-87.592264, 45.093712
Lower Green Bay and Fox River	-88.004528, 44.539139
Sheboygan River	-87.703243, 43.748877
Milwaukee Estuary	-87.895958, 43.025215
Proposed non-AOCs (comparison sites)	
Manitowoc River/Harbor	-87.651565, 44.092347
Twin River/Harbor	-87.563848, 44.145584
Kewaunee River/Harbor	-87.499389, 44.459425
Little Bay de Noc	-87.023391, 45.718166
Root River/Racine Harbor	-87.779949, 42.732715
Oconto River Harbor	-87.830544, 44.894127
Algoma River/Harbor	-87.433056, 44.608866

Seven non-AOC harbors have been identified as possible comparison sites; however, six of these will be sampled; the feasibility of each site will be determined from local input, site visits, data collection, and professional judgment. One non-AOC will be used as an alternate site, in case reconnaissance shows that a proposed non-AOC is unsuitable. A map of each location is available at:

<http://maps.google.com/maps/ms?ie=UTF8&hl=en&oe=UTF8&msa=0&msid=102008844605005406045.0004790db30557e1a6328>

Full Project Description

Purpose

This project will answer the following questions:

1. What is the current state of benthic invertebrate and plankton communities in Wisconsin's Lake Michigan AOCs?
2. How do the benthos and plankton communities in these AOCs differ from rivers and harbors that are not considered AOCs?
3. What community measures (richness, abundance, diversity, and tolerance) can be used as guides for determining benthos and plankton impairment in the AOCs?

To do so, the Wisconsin Department of Natural Resources (WDNR) will enter into a cooperative agreement with the USGS to quantify benthic invertebrate (benthos, hereafter) and phytoplankton / zooplankton (plankton, hereafter) communities of Wisconsin's four Lake Michigan AOCs. These will be compared with non-AOC rivers and harbors along the Lake Michigan shoreline to be used as comparison or reference sites for data analysis; use of the term "reference" in this case does not imply "pristine." The community data within and between both the AOCs and non-AOCs will be analyzed and differences and similarities will assist in determining whether or not the "Degraded Benthos" and "Degraded Plankton Populations" beneficial use impairments (BUIs) are still valid for each AOC. By developing community-based metrics that can quantify subtle differences between sampled communities we will be able to determine if the benthos and plankton in the AOCs are significantly different from those in the non-AOCs. If there is no statistically significant difference between the sampled communities from an AOC and a comparable non-AOC site, the data may be used to support delisting of that BUI once all other components of the delisting target have been met. If statistically significant differences exist between AOC and non-AOC sites, future examination of the potential causes of the impairment will be required. Characterization of current benthos and plankton populations is a critical first step that must occur before these BUIs can be considered for delisting.

Timeline

Year 1 – Data Mining Base-line

The first year will include a data mining effort to determine the base of information available on benthos and plankton communities in the AOCs, non-AOCs, and other rivers or harbors along the western shore of Lake Michigan with similar characteristics. Available data will be entered into a central database housed at the USGS office in Middleton, WI. A detailed literature search will be performed for peer-reviewed journals and other agency papers containing information on the AOCs and non-AOCs and rivers that flow into those areas. These papers will be entered into an EndNote Library with applicable links to the documents. Historic data will be used to inform the researchers of appropriate sample locations for this study and to provide context for the data

collected. Decisions about delisting a BUI however, will not be made based on a comparison of current and historic conditions within an AOC unless expressly identified within that AOC's delisting targets.

Year 1 (2) – Data Collection

Sample collection and data analysis will begin in the first year. Sampling will be conducted three times during the growing season per sampling year: the spring sample will be collected in May/June; the summer sample will be collected in July/August; and the fall sample would be collected in September/October. The sampling events will be separated by at least 4 weeks, but preferably 6 weeks to ensure adequate recolonization of the sampling devices. Due to the time required for site reconnaissance, and equipment requisition and preparation, if the award is not received by March 11, 2011, the first sampling would not occur during the spring season, instead the summer sample would be the first sample collected and the spring sample would be postponed until the next calendar year. Only non-wadeable portions of the sites will be sampled to simplify comparisons between AOCs and non-AOCs, and to minimize the variability associated with benthos in complex river/stream systems. Data collected will include parameters to characterize the sites, and the benthos and plankton communities. Details of all data to be collected and associated methods follow below under Methods.

Year 2 – Analysis and Report

The second year will consist of finalizing the data analysis and report writing. A USGS Digital Data Series report will be prepared and an article detailing the methods, data, and results of this project will be submitted to a peer-reviewed journal publication. Progress reports will be prepared and submitted to WDNR and USEPA in January and July for each of the years that the project is continuing. All reporting required by USEPA will be completed by the USGS and WDNR.

Date	Milestone
Spring 2011	GLRI grant award
	Sample sites finalized (review available data, meet with AOC groups)
	Plankton and benthos collections begin (dependant on timing of GLRI award)
	Literature review and EndNote Library prepared
Fall 2011	Plankton and benthos collections complete
Winter 2011	Data received from laboratories reviewed and data analysis begins
Summer 2012	Data analysis completed and report/journal article compiled and submitted for publication
Winter 2012	Final report submitted to WDNR and USEPA

Methods

All sample collections will be performed by boat, so that towing and retrieval speed can be calculated. Coordinates of each sampling location will be recorded on a GPS unit. Flow measurements in the rivers will be conducted in coordination with the benthos sampling using a boat-mounted Doppler. Additional field measurements to be taken at each sampling event include dissolved oxygen, pH, specific conductance, and

temperature using a water-quality sonde. Sediment samples will be collected from each of 5 Ponar dredges to be composited for particle-size analysis and loss-on-ignition, to determine substrate size, type, and organic matter content at each location. Artificial substrate samplers will be deployed at each site. Two types of plankton samples will be collected, one using a tow net and the other using a water filter-assembly.

The Milwaukee Estuary and Lower Green Bay/Fox River AOCs each have unique characteristics that must be researched carefully, and the data collected for those AOCs will be used as baseline data for future analysis. Because three separate and unique river systems converge to create the Milwaukee Inner Harbor, one sample will be collected within each of those three river systems and an additional sample will be collected in the Inner Harbor. These separate samples will be used to determine if the benthos and plankton communities in each of those systems are degraded or if a particular system is more degraded and requires more remediation for these BUIs than the other systems. The Lower Green Bay/Fox River AOC is unique because there is extensive remediation occurring in the river, and the bay is so different from any other system in the Great Lakes. For this AOC, two separate samples will be taken, one from the Fox River and one from the inner bay. The sample from the Fox River will be similar to the other AOCs, whereas both benthos and plankton communities will be sampled. The sample from the Lower Green Bay will be limited to the plankton community only.

All methods for sample collection are based on reports published or used by the USEPA for large rivers and lakes, or are detailed in peer-reviewed papers publically available. Every laboratory has standard operating procedures in place for sample analysis and quality assurance practices.

Details of each of the collection methods follow:

Sample structure summary

A total of 45 plankton samples and 42 benthos samples will be collected, as follows:

- Plankton:
 - Sheboygan AOC: 3 samples
 - Menominee AOC: 3 samples
 - Fox River/Green Bay AOC: 6 samples
 - Milwaukee AOC: 12 samples (3 for each river and 3 for the harbor)
 - Non-AOCs: 18 samples
 - Replicates: 3 samples (one each sampling event)

- Benthos:
 - Sheboygan AOC: 3 samples
 - Menominee AOC: 3 samples
 - Fox River/Green Bay AOC: 3 samples
 - Milwaukee AOC: 12 samples (3 for each river and 3 for the harbor)
 - Non-AOCs: 18 samples
 - Replicates: 3 samples (one each sampling event)

For each location, the following information will be collected:

- Water quality data (temperature, dissolved oxygen, specific conductance, pH)
- GIS location
- Flow of river (discharge using Doppler)

For each sample, the following analyses will be performed:

- 63 μ m plankton tow
 - Large-cell zooplankton community assessment
- 20 μ m plankton sample
 - Small-cell zooplankton community assessment
 - Soft algae phytoplankton community assessment
 - Diatom phytoplankton community assessment
 - Chlorophyll a concentration
 - Ash free dry mass
- Ponar grab sample
 - Benthos community assessment
 - Sediment particle size
 - Loss-on-ignition (organic matter content)
- Artificial substrate benthos sample
 - Benthos community assessment

Phytoplankton / Zooplankton Collection

The methods for zooplankton collection are based on the United States Environmental Protection Agency's (USEPA's) Standard Operating Procedures (SOPs) for zooplankton sample collection and preservation for Great Lakes National Program Office's (GLNPO) Water Quality Survey (WQS) (LG402, Revision 10, March 2005); however, because the samples will be performed in the harbors, bays and rivers, the deeper water sample will not be collected:

One sampling tow is performed at each station from 20 meters below the water surface to the surface using a 63 μ m net. If the station depth is less than the specified depth, the tow is taken from about 0.5 meters above the bottom to the surface. The tow net, with a screened sample bucket attached at the bottom, is lowered to the desired depth, and raised at 0.5 meters/second to collect zooplankton from the water column. After lifting the net from the water it is sprayed with a garden hose to wash the organisms down into the bucket. The sample is concentrated into the sample bucket and is transferred to a sample storage bottle. The organisms are narcotized with soda water and preserved with formalin solution before sending to the analysis laboratory.

In addition to the 63 μ m sample, 1 liter of water from each meter of depth will be collected using an integrator sampling device for a maximum of 20 liters of water. Aliquots of this whole water sample will be subsampled and filtered for chlorophyll a and ash-free dry mass analysis and sent to the Wisconsin State Laboratory of Hygiene (WSLOH). Two one-liter aliquots will then be preserved with formalin and one will be

sent to Dawn Perkins at WSLOH for soft algae phytoplankton identification and enumeration, and one will be sent to Paul Garrison at the WDNR for diatom phytoplankton identification and enumeration. This water will then be filtered through a 20 µm filter to insure collection of smaller rotifer zooplankton that cannot be captured with the larger mesh. This mesh size is not applicable for standard plankton tows due to the clogging that occurs, but is necessary for an accurate assessment of plankton communities. The 63µm sample and 20 µm filtered sample will be sent to Paul Garrison at the WDNR for zooplankton identification and enumeration in accordance with GLNPO SOP LG 403, Zooplankton Analysis. Taxonomic identification of plankton will be down to the lowest practical level.

Mesh size	Disposition	Information gained
63µm	WDNR	Community assessment of zooplankton
20µm	WSLOH	Chlorophyll a concentration
	WSLOH	Ash free dry mass
	WSLOH	Community assessment of soft algae phytoplankton
	WDNR	Community assessment of zooplankton
	WDNR	Community assessment of diatom phytoplankton

Benthos Collection

The two methods for benthos collection are based on the USEPA's Assessment and Remediation of Contaminated Sediments (ARCS) Program Assessment Guidance Document, Chapter 7: Assessment of Benthos Community Structure (EPA 905-B94-002).

The first method includes grab samples of the bottom sediment using a sampler such as a Ponar dredge. This grab sampler will be used to collect samples from 5 locations at each site. To minimize costs of analyzing multiple benthos samples for each location, multiple times per year, compositing the five samples into a single sample will produce a more comprehensive taxa list for the locations and will then be more comparable between sites. Although USEPA's ARCS does not require more than one sample per location, the investigators feel that a composite sample will more accurately reflect the communities within the AOCs and non-AOCS (see <http://www.epa.gov/reg3hscd/risk/eco/faqs/composite.htm> for more information). A small amount of sediment from each grab sample will be collected and composited into one sediment sample for particle-size analysis and loss-on-ignition, to determine substrate size and organic matter content. Each grab sample will then be elutriated to remove debris, larger sand and inorganic particles and rinsed to remove finer sediment through a 500 µm wash frame. The 5 individual Ponar samples will then be composited into one benthos sample, transferred into a collection bottle, and preserved with formalin solution before sending to the analysis laboratory. The sediment particle size samples will be sent to WSLOH and loss-on-ignition will be conducted by Amanda Bell. The benthos samples will be sent to Dr. Schmude at the University of Wisconsin–Superior for identification and enumeration.

The second benthos sample is collected using an artificial sampler constructed using the design shown in figure 7-1 of the ARCS document:

Artificial substrate samplers were constructed from 3M® synthetic mesh and stainless-steel wire rotisserie chicken baskets (Stauffer et al. 1976). Each substrate consisted of five pieces of mesh (20 x 20 cm) folded in half and placed beside each other in a basket. The baskets were 26 cm in length, 17 cm in diameter, and 53 cm in circumference (Figure 7-1). The baskets were wired shut, and three baskets were wired to a cinder block at each sampling station. The baskets were connected to the cinder block with 2-m wires and were placed horizontally on the bottom near the cinder blocks. One end of the wire was attached to the cinder block and the other end was connected to a recognizable landmark on shore to facilitate retrieval of the artificial substrate samplers.

These artificial samplers will be deployed at one location at each site, GPS locations captured, allowed to colonize for 30 days, retrieved, rinsed through a 500µm wash frame, transferred into a collection bottle, and preserved with formalin solution before sending to Dr. Schmude at the University of Wisconsin-Superior for identification and enumeration.

Sample type	Disposition	Information gained
Ponar grab	University of Wisconsin–Superior	Community assessment of benthos
	USGS	Loss on ignition/organic matter content
	WSLOH	Sediment particle size distribution
Artificial substrate	University of Wisconsin–Superior	Community assessment of benthos

Quality Assurance

A Quality Assurance Project Plan will be prepared by the WDNR and USGS to document quality assurance methods for this project. Triplicate zooplankton tows and benthos samples will be collected at one location for each sampling event for a total of 20% sampling replicate. These co-located replicate samples will be collected within a 100-m² area at each station. The data collected from the replicate samples will be compared to original samples to determine sampling and laboratory efficiency. If it is determined that the replicate samples are within 7% of the original sample data for each data type collected, the original sample will be used for further data analysis. If the replicate samples are greater than 7% of the original sample data for each data type collected, then values of the three replicate samples will be averaged and that value will be used for further data analysis.

To minimize disturbance of the different sampling substrates, samples will be collected in the following order: water quality data, plankton tows, Ponar grab samples and deployment or retrieval of artificial samplers. Because no other water or sediment samples are included in this proposal, the samples for this proposal will be collected without regard to other samples.

Data Analysis

Multivariate, multimetric, and correlation methods will be used to analyze the data. Software designed to incorporate the non-normality of ecological data will be used to analyze variability in the biological community data from the sampled AOCs and non-AOCs. Using non-parametric multivariate statistical analyses in the Primer statistical program (Clarke and Gorley, 2006) and observed over expected methods developed by Meador et al. (2008), the community data will be compared amongst the sites and differences between taxa richness, composition, and abundance will be determined for benthos and plankton communities. Routines to be used in PRIMER will likely include nMDS (non-metric MultiDimensional Scaling) to derive plankton and benthos community site scores; PCA (Principal Components Analysis) to derive environmental site scores; and ANOSIM (ANalysis Of SIMilarity) to determine the extent plankton and benthos communities vary across sites. Probability values are based on 1,000 random permutations that are used to develop a nonparametric probability distribution. Site-specific scores based on similarities between communities will be used to determine whether a given site is statistically different from the others. Location specific differences such as drainage area, substrate, soil type, latitude/longitude, land cover, and climate will be incorporated as well. This information will be used to determine if the BUIs in the AOCs are impaired when compared with the non-AOC site pairs and group, and if there are no differences to support delisting of beneficial use impairments for delisting the AOCs.

Relevance to the Great Lakes, Existing Comprehensive Plans & Great Lakes Restoration Efforts

Great Lakes Areas of Concern (AOCs) are severely degraded areas within the Great Lakes Basin where beneficial uses have been identified as impaired. This proposal seeks the funds necessary to evaluate the status of two use impairments (Degraded Benthos and Degraded Phytoplankton / Zooplankton Populations) in Wisconsin's four Lake Michigan AOCs. Delisting beneficial use impairments is a high priority referenced by the following programs and documents:

- Great Lakes Restoration Initiative Action Plan
(http://greatlakesrestoration.us/action/wp-content/uploads/glri_actionplan12032009.pdf):

The Great Lakes Restoration Initiative Action Plan (USEPA 12/3/09) lists “comprehensive monitoring and assessment” as a principle action for Focus Area 1 (Toxic Substances and Areas of Concern). This project will assess the status of seven beneficial use impairments: degraded benthos in four AOCs and degraded plankton populations in three (Menominee not impaired). If the uses are not impaired (compared to non-AOC sites), the data will provide the supporting documentation for delisting and contribute to achieving measure of Progress 2, number of “AOC BUIs removed” (p. 19, USEPA 2009).

- USEPA's Strategic Plan (<http://www.epa.gov/ocfo/plan/plan.htm>):
Subobjective 4.3.3 (Improve the Health of Great Lakes Ecosystems) strategic targets include “By 2010, restore and delist a cumulative total of at least 8 Areas of Concern” (p 98, USEPA 2006). This proposed evaluation of seven use impairments will be a critical

step in identifying whether or not the benthos and plankton communities in four Wisconsin AOCs are impaired compared with non-AOCs sites. This step was identified in the AOC delisting targets and must be completed before the use impairments can be considered for delisting.

- Lake Michigan Lakewide Management Plan 2008
(http://epa.gov/greatlakes/lamp/lm_2008/index.html)

Results of this project will help answer the question posed by Subgoal 4 of the Lake Michigan LaMP: "Are all habitats healthy, naturally diverse, and sufficient to sustain viable biological communities?" (USEPA 2008) for the four AOCs.

- Great Lakes Regional Collaboration Strategy to Protect and Restore the Great Lakes (<http://www.glrc.us/strategy.html>):

A recommended action to address obstacles to restoring the AOCs is "providing for the program capacity needed to develop measurable endpoints, design and implement remedial actions, and measure results" (p 37 GLRC 2005). The strategy further states that the "research, remediation and monitoring needed to achieve these restoration targets must be identified, funded, and implemented" (p 37 GLRC 2005). This proposal seeks the funds necessary to conduct the research and monitoring needed to assess and possibly demonstrate the ability to delist these use impairments.

- Wisconsin's Great Lakes Strategy
(http://dnr.wi.gov/org/water/greatlakes/wistrategy/GLStrategy2009_final_wcover.pdf)

This proposal addresses a key point in Wisconsin's strategy by requesting the funds needed to "Evaluate and delist BUIs when monitoring demonstrates that targets have been met" for Wisconsin's four Lake Michigan AOCs (p 28, WDNR 2009).

- Area of Concern Beneficial Use Impairment Delisting Targets (all four AOC delisting targets available at <http://dnr.wi.gov/org/water/greatlakes/priorities/aocs.html>):

WDNR developed delisting targets for the four Lake Michigan AOCs in 2008-2009.

Evaluation of the status of the benthos and plankton communities relative to reference conditions is a critical step in determining whether or not the beneficial uses are currently impaired and is mentioned in the delisting targets documents for the Milwaukee Estuary (p 38 and 46, SEH & ECT 2008), Sheboygan (p 19 and 20, SEH & ECT 2008), and the Lower Green Bay and Fox River (p 7 and 9, WDNR 2009).

- Area of Concern Stage 2 Remedial Action Plans (RAP):

Milwaukee Estuary (<http://www.epa.gov/greatlakes/aoc/milwaukee/Milwaukee-Estuary-RAP1994.pdf>)

Sheboygan River (http://dnr.wi.gov/org/gmu/sheboygan/SHEB_RAP.pdf)

Lower Green Bay and Fox River

(<http://dnr.wi.gov/org/gmu/lowerfox/1993%20RAP%20Complete.pdf>)

Menominee River (http://www.epa.gov/greatlakes/aoc/lowmeno/1996_Lower-Menominee-RAP.pdf)

AOC Stage 2 RAPs outline the need for baseline and periodic updated monitoring for the "Degraded Benthos" and/or "Degraded Phyto/Zooplankton" beneficial use impairments. For example, the Milwaukee Estuary RAP states "long term trend analysis, a quantitative benthos baseline survey and periodic surveys are needed in order to determine the extent of this impairment, and to gauge the effectiveness of any clean-up actions over the long term" (p 2-18, WDNR 1994). The Sheboygan River RAP states "Collect phytoplankton and zooplankton samples for identification and data

analysis. This work will reveal the degree to which phytoplankton and zooplankton populations are degraded, signifying an impaired beneficial use of the waterway” (p 6-26, WDNR 1995).

Facilitation of USEPA oversight & administration

The level of USEPA oversight and administration necessary to successfully implement this project is minimal. Assessment of two use impairments at four AOCs have been combined in a single proposal to minimize the reporting requirements associated with this grant proposal.

WDNR and USGS have over 40 years of cooperative history collecting and analyzing data and publishing their findings in USGS and WDNR reports and peer-reviewed journals.

Education/outreach plan to disseminate results

USGS and WDNR will present the results to each AOC Citizen Advisory Committee (other citizens and local volunteer monitoring groups may be invited to attend). These committees were consulted during the initial planning phase of this proposal and they approved of potential plans. USGS will coordinate with WDNR to ensure a sampling event is captured by photo and/or video for inclusion in AOC education and outreach materials. Final results of the data and analysis will be published as a USGS Digital Data Series report, and an interpretive report will be submitted to a peer-reviewed scientific journal for publication.

Potential for transferability

The results of this project will assist other AOCs with Degraded Benthos and Degraded Phytoplankton/Zooplankton populations determine appropriate levels of monitoring to characterize AOCs. Non-AOC reference site data may be useful for comparison with other AOCs, if they have similar physical, chemical, and biological characteristics. For example, the St. Louis River Estuary is Wisconsin's only other AOC and is located on Lake Superior. The results of this project will be useful when determining the study design necessary to evaluate that AOC's "Degraded Benthos" beneficial use impairment.

Outcomes, Outputs, and Expected Results

This project will definitively determine the status of and result in measurable progress towards delisting up to 7 beneficial use impairments. Data will be collected and analyzed to re-evaluate these existing beneficial use impairments to determine if they are still applicable, an expected result from projects in this program (EPA GLRI RFP p 1-2). The results will also help identify further actions needed to restore the beneficial uses.

The expected outcomes of this study are to determine the baseline conditions of two beneficial use impairments in four AOCs along Wisconsin's Lake Michigan shoreline.

Species/taxa lists for each of the sample types (Ponar, plankton, and artificial substrate) will be provided from the analytical laboratories. These community data will be summarized based on metrics such as nutrient, oxygen, and pollution tolerance, functional feeding groups, substrate preference, and family/taxonomic groupings from Barbour et al. (1999), and Porter et al. (2008), among others. By determining the taxonomic differences between the AOCs and non-AOC sites, the beneficial use impairments can be quantified for the sites in question. Data from the non-AOC sites will be used to determine a preferred taxonomic composition for each AOC which then may be re-evaluated for the zooplankton and benthos Beneficial Use Impairments.

Description of Project Result	Output	Outcome
Compilation of historic benthos and plankton community data for AOC and non-AOC locations	Endnote Library created and available literature brought to common location.	Compiling the abundant relevant agency reports and publications on benthos and plankton communities in one location will allow for new interpretation of historic results. Authors of future RAP updates will be able to easily access relevant data.
	Listing and/or map of historic sample sites at each location.	List may be used to inform decisions about where to sample at each location.
Quantification of Benthos communities	Baseline: unknown BUI status in 4 AOCs Output: definitive determination of BUI status in 4 AOCs. Metrics such as taxonomic richness, pollution tolerance, and functional feeding group generated for 4 AOCs and 6 non-AOCs.	Data will be used to characterize current benthos populations and determine appropriate metric for evaluating impairment.
Quantification of Phytoplankton / Zooplankton communities	Baseline: unknown BUI status in 3 AOCs Output: definitive determination of BUI status in 3 AOCs. Metrics such as taxonomic richness, diversity, and pollution tolerance generated for 4 AOCs and 6 non-AOCs.	Data will be used to characterize current phytoplankton / zooplankton populations and determine appropriate metric for evaluating impairment.
Comparison of AOC and non-AOC benthos and plankton communities	Baseline: <ul style="list-style-type: none"> • 4 Degraded Benthos BUIs • 3 Degraded Phyto/Zooplankton BUIs Output: <ul style="list-style-type: none"> • Potential delisting of up to 7 BUIs 	Evaluation is a necessary step to re-evaluate if the BUIs are still applicable. All other relevant criteria in delisting target documents for these BUIs will have to be met.
Final Report and Peer-reviewed journal article	Publication of results in a widely accessible format.	Scientific peer review will lend additional credibility to decisions made based on data.

Description of Project Result	Output	Outcome
Coordination with AOC citizen committees (e.g. CAC, PAC, or STAC)	<ul style="list-style-type: none"> • Consultation with AOC groups prior to sampling • Presentation of results to AOC groups 	Inclusion of AOC groups as project is developed and executed will increase public understanding and support for decisions about delisting based on the results of this project.
WDNR photographs and/or video of sampling event	Photos and/or video of sampling equipment and methods.	AOC community outreach and education materials will make the results accessible to the public in an understandable manner.

Collaboration, Partnerships, and Overarching Plans

The WDNR will collaborate with the USGS in Middleton, WI to perform necessary data collection, sampling, data analysis and reporting. All phases of the project will be coordinated with AOC site managers and LaMP coordinators. Where feasible, effort will be made to coordinate with other ongoing studies at these sites by the WDNR, USGS (J Larson and others), other agencies, and universities with regard to sampling timing, specific location within each AOC or non-AOC, and data sharing. Additional collaboration with analytical laboratories to perform taxonomic identification of the samples includes:

- Paul Garrison from the WDNR will identify zooplankton and diatom phytoplankton
- Dawn Perkins from the WSLOH will identify the soft-bodied phytoplankton
- Dr. Schmude at UW Superior will be doing the benthos analysis (http://www.uwsuper.edu/acaddept/naturalsciences/employees/kurt-schmude_employee77608)
- WSLOH will also be analyzing the sediment particle size distribution, chlorophyll a, and ash free dry mass of the samples

AOC public stakeholder groups will be consulted prior to initiation of sampling, and results of the sampling will also be presented to them. Inclusion of AOC groups as the project is developed and executed will increase public understanding and support for decisions about delisting based on the results of this project.

Relevant overarching plans to this project include the AOC delisting targets, RAPs, Wisconsin's Great Lakes Strategy, and the Great Lakes Regional Collaboration Strategy (project relevance to each previously described in Section 8 of this proposal, see p 7 and 8).

Programmatic Capability and Past Performance

The WDNR has had the opportunity to be an USEPA grant recipient for the past three decades and has been able to consistently demonstrate grant performance accountability. WDNR grant management is a joint effort that consists of multiple

mechanisms to ensure expected outcomes and deliverables have been satisfactorily met.

Internal GPO's (Grant Project Officer's) are dedicated to each project to provide oversight and coordination. WDNR project officers have been able to satisfactorily meet reporting requirements as outlined in the grants programmatic and administrative conditions (annual, and/or semiannual, and final) for all grants received to date. Project Officers are responsible for meeting technical reporting and periodic project status requirements conveyed through reporting updates or communication/correspondence with USEPA.

Financial accountability has been demonstrated through systematic tracking by our staff grant accountants and financial accountants. State budgetary information systems track project activity and project related expenditures in order to provide accurate fiscal reporting. State procurement policies and processes provide guidelines to ensure funds are managed appropriately. Financial reporting is completed on a quarterly basis as required in programmatic terms and conditions to include a Final Federal Financial Reports (SF-425). Our financial representation has also established credibility for providing additional final reporting requirements; MBE/WBE reporting, Property Reports, Disclosure of Inventions, etc.

Historically, the WDNR has been successful in meeting grant recipient requirements and expectations. We appreciate the opportunity to continue to demonstrate our high performance standards and anticipate these to strengthen in the near future.

Listed below are four grant awards the WDNR has received annually for the past three years. These grants highlight a wide array of programmatic areas and demonstrate our achievement history as a recipient for significantly funded grant awards. Additional WDNR past grant performance detail available upon request.

PPG – Performance Partnership Grant

The Department and USEPA in partnership and through the Environmental Partnership Performance Agreement (EnPPA) will work together toward five shared environmental goals to enhance efforts to protect and restore our water resources and to measure our accomplishments. The five goals are: 1. support healthy aquatic biological communities; 2. support fish populations with safe levels of contaminants; 3. designated swimming waters in will be swimmable; 4. public water supplies will have water that is consistently safe to drink, and; 5. the quantity and quality of critical aquatic habitat, including wetlands, will be maintained or improved. The PPG is the primary federal funding mechanism to work toward these goals.

The EnPPA between the State of Wisconsin and USEPA serves as the overall work plan for federal grant moneys awarded under sections 106, 319, 604(b) and 104(g) of the Clean Water Act. As part of the EnPPA process, the State of Wisconsin prepares a self-assessment annual report at the end of each federal fiscal year identifying work

plan accomplishments. In addition, the state also prepares a more in-depth report for expenditure of s. 319 grant funds.

FY09 Grant # BG97550709 (\$8,497,700) FY08 Grant # BG97550708
(\$8,640,600)
FY07 Grant # BG97550707 (\$8,561,600)

319 Incremental

Section 319 Incremental Grant funds are used by the WDNR to implement the Wisconsin Nonpoint Source Pollution Abatement Program. Funds are targeted to areas and efforts backed by watershed-based nonpoint source control plans or Total Maximum Daily Loads (TMDLs). Incremental funds support implementation of best management practices, water quality monitoring, TMDL development, and TMDL implementation in areas of the state with nonpoint source impaired waterbodies.

WDNR provides regular reports to USEPA on progress made in projects funded with Section 319 incremental monies. Progress is measured through annual reports from counties implementing best management practices, analysis of pollutant load reduction data and water quality monitoring results, TMDL reports submitted to USEPA, and development of an effective TMDL implementation program.

FY06 Grant # C900591706 (\$2,701,600) FY05 Grant # C900591705 (\$2,634,600)
FY04 Grant # C900591704 (\$2,591,600)

GLNPO – Lake Superior/ Lake Michigan LaMP and RAP

The work plans submitted as part of this grant funding are for staff time dedicated to participation and the continued implementation of the RAP and LaMP activities in Lake Michigan and Lake Superior basins. There is also funding for additional staff to work on LaMP and RAP activities that include: developing and promoting implementation projects, coordination with other jurisdictions; participation in workgroups, and public involvement with stakeholders to recreate the local presence of the RAP process; develop and review quality management plans and quality assurance project plans; and coordinate department efforts to compile and distribute information.

The LaMP and RAP efforts move the WDNR towards the goal of de-listing the AOCs or are demonstration projects for implementing new techniques for addressing beneficial use impairments. These projects are collaborative efforts with partner and community groups.

The outputs were qualitative in nature for this grant. Public outreach and education plays a critical role in the implementation of the goals of the LaMP and RAP. Through interaction with the basin partner teams, the Forum and other interested parties, information exchanges resulted in the development and use of educational materials for basin residents. Additionally, through the basin educator, materials and educational sessions were provided for basin residents. Wisconsin prepared informational reports

to document the status of remedial efforts for the public using various media or opportunities.

WDNR worked with USEPA to provide updates and information for the RAP websites, LaMP AOC matrix, LaMP documents and reporting activities required by GLWQA.

WDNR reported on progress in semiannual narratives and will use goals documents which were created as part of the Water Division's realignment that occurred over the last two years. Department managers reported to the Division Administrator and the Department Leadership Team on strategic issues that affect the entire program. There are goals and objectives regarding the Great Lakes included in the realignment document that must be reported on quarterly basis.

FY07 Grant # GL00E06601 (\$375,371) FY06 Grant # GL96574401 (\$450,000)
FY05 Grant # GL96561901 (\$130,000)

Water Quality Planning 205(j)

The purpose of this funding is to conduct planning using the concepts of the federal Unified Watershed. Based on the need to revise portions of the plans as data is obtained particularly in regard to watershed tables for 303d listing and 305b reporting, the biennial activities focused on redesigning the Watershed Program to match new data systems for monitoring and assessments and migrating historical watershed and basin plan data into those systems.

Waters. The Watershed Program designed a plan to update the equivalent of 3 watersheds per Water Management Unit.

Watershed Planning Workshops are held throughout the state and new webpages were developed to support this effort.

A major effort to migrate and quality control the impaired waters data has been undertaken so that the state is preparing to submit an integrated report for the 2008 Clean Water Act Reporting Cycle.

EPA

- Coordinated the State/Federal watershed work group to facilitate exchange of information.
- Provided technical assistance on planning issues.
- Review and award Sect 205(j) grants to local agencies.
- Review and, when appropriate, approve revisions to the Continuing Planning Process and WQM plans. (See attached watershed planning checklist and screen shots).

Review watershed plans against NPS guidance, provide input to the State and work with the State to upgrade the plans.

Pass Through Grants to Water Quality Planning Agencies for at least 40 percent of the total amount of the 604b grant award.

Annual work program contracts with the agencies, which include scope of work, budget, and funding source breakdowns and submit the contracts to Region V USEPA.

A semiannual summary of each local agency's progress in meeting commitments contained in the scope of work for the contracts including a copy of each signed agreement.

FY09 Grant # C600E71701 (\$185,823) FY08 Grant # C600E50501 (\$185,824)
 FY07 Grant # C600E09701 (\$292,271)

Budget

The following table outlines the total cost of the proposed project, which is a cooperative agreement between WDNR and the USGS. WDNR will use the grant funds to purchase equipment and supplies, and pay for analytical costs to minimize costs. Contractual category includes salary, fringe, supply, and travel costs for USGS, WSLOH, WDNR, and UW Superior. The contractual costs are mostly associated with laboratory costs. One of the laboratories is run by WDNR so no competitive sourcing is necessary. WSLOH is a state-owned lab that has contractual services with the WDNR and USGS for discounted prices. The other laboratory is a university that specializes in the types of samples being collected (benthos). No other laboratories in the Midwest were able to process the samples with the expertise of the selected labs with regard to the Great Lakes benthos fauna.

Summary	
Personnel/Salaries	\$0
Fringe Benefits	\$0
Travel	\$0
Equipment	\$4,800
Supplies	\$2,200
Contract Costs	
UW Superior	\$30,500
WDNR	\$17,500
WSLOH	\$10,000
USGS	\$382,000
Construction Costs	\$0
Other Costs	\$3,000
Total Direct Charges	\$450,000
Indirect Charges	\$0
Total Cost	\$450,000

References

Barbour, M.T., Gerritsen, J., Snyder, B.D., and Stribling, J.B., 1999, Rapid bioassessment protocols for use in streams and wadeable rivers: Periphyton, benthic macroinvertebrates, and fish (2nd ed.): Washington, DC, U.S.

- Environmental Protection Agency, Office of Water Report EPA841-B-99-002, 339 p.
- Clarke, K.R and R.N. Gorley, 2006. PRIMER user manual, Plymouth UK, 190 p.
- Great Lakes Regional Collaboration, 2005, "Strategy to protect and restore the Great Lakes" Available at: <http://www.glrc.us/strategy.html> Accessed Jan. 13, 2010
- Makarewicz, J.C., Lewis T., and Bertram, P., 1994, Plankton in Lake Michigan 1983 - 1992: Epilimnetic Phytoplankton and Zooplankton Biomass and Species Composition in Lake Michigan, 1983 to 1992. Available at: <http://www.epa.gov/glnpo/monitoring/plankton/mich83-92/index.html>. Accessed Nov. 25, 2009
- Meador, M.R., Carlisle, D.M., and Coles, J.F., 2008, Use of tolerance values to diagnose water-quality stressors to aquatic biota in New England streams: Ecological Indicators, v. 8, no. 5, p. 718-728.
- Michigan Department of Environmental Quality (Michigan DEQ). 2008. Guidance for Delisting Michigan's Great Lakes Areas of Concern. Report MI/DEQ/WB-06/001, 65 p. Available at http://www.michigan.gov/documents/deq/wb-aoc-delistguide_247421_7.pdf. Accessed Jan, 19, 2011.
- Ohio Environmental Protection Agency (Ohio EPA), 2008, Delisting Targets For Ohio Areas of Concern: Columbus, Ohio, Ohio EPA Division of Surface Water, 85 p. Available at: http://www.epa.state.oh.us/portals/35/rap/DelistingTargetsOhioAOC_2008Revision.pdf. Accessed Jan. 19, 2011.
- Porter, S.D., 2008, Algal attributes--An autecological classification of algal taxa: Reston, VA, U.S. Geological Survey Data Series 329, 22 p.
- U.S. Environmental Protection Agency, 2010, Sampling and Analytical Procedures for GLNPO's Open Lake Water Quality Survey of the Great Lakes, EPA Report EPA 905-R-05-001: Great Lakes National Program Office, Chicago, IL. Available at: <http://www.epa.gov/greatlakes/monitoring/sop/>. Accessed Jan. 19, 2011.
- U.S. Environmental Protection Agency, 2009, "Draft Great Lakes Restoration Initiative Action Plan FY2010 – FY2014" Available at: http://greatlakesrestoration.us/action/wp-content/uploads/glri_actionplan12032009.pdf Accessed Jan. 13, 2010
- U.S. Environmental Protection Agency, 2008, "Lake Michigan Lakewide Management Plan 2008" Available at: http://epa.gov/greatlakes/lamp/lm_2008/index.html Accessed Jan. 22, 2010
- U.S. Environmental Protection Agency, 2006, "2006-2011 EPA Strategic Plan." Available at: <http://www.epa.gov/cfo/plan/plan.htm> Accessed Jan. 13, 2010
- U.S. Environmental Protection Agency, 1994, "ARCS Assessment Guidance Document." EPA-905-B94-002. Great Lakes National Program Office, Chicago, IL. Available at: <http://www.epa.gov/glnpo/arcs/EPA-905-B94-002/EPA-905-B94-002.html>. Accessed Nov. 30, 2009
- Wisconsin Department of Natural Resources. 2009. "Wisconsin's Great Lakes Strategy: Restoring and Protecting our Great Lakes 2009 Update". Available at: http://dnr.wi.gov/org/water/greatlakes/wistrategy/GLStrategy2009_final_wcover.pdf Accessed Jan. 22, 2010

Sheboygan River AOC: Pathway to Delisting Beneficial Use Impairments
Benthos & Plankton BUIs Evaluation in Wisconsin's Lake Michigan Areas of Concern

- Wisconsin Department of Natural Resources. 1996. "Lower Menominee River Remedial Action Plan Update". February 1996. Available at:
http://www.epa.gov/greatlakes/aoc/lowmeno/1996_Lower-Menominee-RAP.pdf
Accessed Jan. 13, 2010
- Wisconsin Department of Natural Resources. 1995. "Sheboygan River Remedial Action Plan Update". October, 1995. Available at:
http://dnr.wi.gov/org/gmu/sheboygan/SHEB_RAP.pdf Accessed Jan. 13, 2010
- Wisconsin Department of Natural Resources. 1994. "Milwaukee Estuary Remedial Action Plan Progress". January 1994. Available at:
<http://www.epa.gov/greatlakes/aoc/milwaukee/Milwaukee-Estuary-RAP1994.pdf>
Accessed Jan. 13, 2010
- Wisconsin Department of Natural Resources. 1993. "Lower Green Bay Remedial Action Plan Update". September 1993
<http://dnr.wi.gov/org/gmu/lowerfox/1993%20RAP%20Complete.pdf> Accessed
Jan. 13, 2010

Appendix G

Other Documents from the Meeting

The Southeastern Wisconsin Planning Commission, under a DNR contract, also assembled a basic water quality report on the Kinnickinnic River watershed for the July 27th meeting. An appendix to this water quality summary with more detailed technical information for those who are interested is available online at <http://fyi.uwex.edu/aocs/files/2011/07/KK-water-quality-summary-final-appendix.pdf>. Additionally, a project inventory list and map of projects addressing impaired beneficial uses was assembled by the AOC Coordinator. These are all included in this appendix.

Milwaukee Estuary Area of Concern-Stakeholder Input Group

SUMMARY OF WATER QUALITY IN THE KINNICKINNIC RIVER WATERSHED

The water quality and pollution sources inventory for the Kinnickinnic River system have been summarized by answering five basic questions. The Appendix contains detailed information needed to answer the questions and is referred to, when appropriate, in the information is summarized below.

How Have Water Quality Conditions Changed Since 1975?

Water quality conditions in the Kinnickinnic River watershed have both improved in some respects and declined in other respects since 1975.

Improvements in Water Quality

Concentrations in the Kinnickinnic River of several pollutants associated with combined sewer overflows, such as biochemical oxygen demand (BOD), fecal coliform bacteria, and ammonia, have decreased. In addition, total phosphorus concentrations in the estuary have also decreased. These reductions in nutrients and oxygen-demanding wastes have produced some improvements in dissolved oxygen concentration and in lower chlorophyll-*a* concentrations in the estuary portion of the River. One important, though not the only, factor responsible for these decreases is the reduction in combined and separate sewer overflows resulting from construction and operation of MMSD's inline storage system. These improvements also likely reflect changes in the types of industries present in the watershed, the connection of most process wastewaters to the MMSD sewerage system, and the implementation of treatment requirements for all industrial discharges. Concentrations of lead have also declined, due largely to the phasing out of the use of lead as an additive to gasoline. Concentrations of mercury in the water have declined.

Some improvement has also occurred in the concentrations of BOD in Wilson Park Creek. While BOD concentrations downstream of General Mitchell International Airport were often very high during the period 1998 to 2001, they were lower than during the period from 1996 to 1997. Deicing compounds from General Mitchell International Airport are likely to constitute a major source of BOD to this stream.

No Change or Reductions in Water Quality

Concentrations of suspended and dissolved pollutants typically associated with stormwater runoff and other nonpoint source pollution, such as chloride, copper, total suspended solids, and zinc have remained unchanged or increased. For some of these pollutants, such as copper, increases in concentration have occurred in all reaches sampled along the Kinnickinnic River. For others, such as chloride and zinc, concentrations have increased in some reaches while remaining unchanged in others. In addition, specific conductance has increased in at least two reaches of the River, suggesting that the total concentration of dissolved material in the water has increased. In other reaches, the concentration of dissolved material, as indicated by specific conductance, has remained unchanged.

List of relevant figures, maps, and tables:

TR-39 Map 18 - Water and Sediment Quality Sample Locations

TR-39 Table 29 - Sample Sites for Water Quality Analysis

TR-39 Table C-1 - (Appendix C) Seasonal and Annual Trends in Water Quality

TR-39 Table 30 - Comparison of Water Quality Between KK River and Milwaukee River Estuary

TR-39 Table 24 - Box Plot Example

TR-39 Figure 28 - Fecal Coliform Bacteria

TR-39 Figure 30 - Chlorophyll-*a*

TR-39 Figure 31 – Water Temperature
TR-39 Figure 33 – Biochemical Oxygen Demand
TR-39 Figure 36 – Chloride
TR-39 Figure 37 – Dissolved Oxygen
TR-39 Figure 41 – Total Nitrogen
TR-39 Figure 42 – Ammonia
TR-39 Figure 43 – Total Phosphorus
TR-39 Figure 45 – Mean Annual Concentration of Total Phosphorus

How Have Toxicity Conditions Changed Since 1975?

In some respects, toxicity conditions in the Kinnickinnic River have improved since 1975; in other respects, they have declined or not changed.

Improvements in Toxicity Conditions

The concentrations of PAHs in water in the section of the Kinnickinnic River upstream from the estuary have declined. In addition, as described above, there have been reductions in concentrations of some toxic metals in the water column.

Worsened Toxicity Conditions

Other toxicity conditions in the Kinnickinnic River have gotten worse. The concentrations of PAHs detected in water in the estuary portion of the River have increased. Also, concentrations of zinc in the water column have increased in the estuary and concentrations of copper in water have increased along the entire Kinnickinnic River mainstem.

Inconclusive Toxicity Data

In some cases the available data are not adequate to assess changes. For example, the concentrations of PCBs detected in water during the period 1998 to 2001 were lower than the concentrations detected in previous samplings; however, these most recent samplings may underestimate PCB concentrations both because of methodological differences in sample collection and because they only screened for a subset of PCB congeners. Various pesticides have been detected in water in the Kinnickinnic River, but different compounds were screened for in recent samplings than were examined in historical samplings. Few recent data are available on tissue concentrations of mercury, PCBs, and pesticides in aquatic organisms in the watershed and consumption advisories remain in effect for several species of fish from portions of the watershed.

Sediment Conditions

In the most recent available data on sediment toxicity, the expected incidence of toxicity to benthic organisms shows a decline from 100 percent to 27 to 62 percent. The overall quality of sediment, as measured by mean probable effects concentration quotient, known as the mPEC-Q, remains poor. Mean PEC-Qs can be calculated for mixtures of chemicals (e.g., metals, PAHs, and PCBs) and can help in evaluating the relationships between sediment chemistry and toxicity. However, in dealing with toxic contamination, clean up guidelines are selected on a site-specific basis using multiple lines of evidence. Sediment in the Kinnickinnic River contains concentrations of chromium, lead, PCBs, PAHs, zinc, and some pesticides high enough to pose substantial risks of toxicity to benthic organisms, and contains concentrations of cadmium, copper, iron, mercury, nickel, and other pesticides high enough to likely produce some toxic effects in benthic organisms.

In terms of known sites of contamination on the Kinnickinnic River, the river between Kinnickinnic Avenue and Becher Street was heavily contaminated with PCBs, PAHs, and heavy metals. Funds from the state and the Great Lakes Legacy Act were used to remove approximately 167,000 cubic yards of

contaminated material. Another known contaminated site is the Solvay Coke Superfund Alternative site. Plans are underway to clean up this former coal gasification site. Contaminants of primary concern are heavy metals and PAHs. The riparian areas adjacent to the federal navigation channel, but not routinely dredged by the U.S. Army Corps of Engineers, in the upstream most portion of the KK River (downstream from the area where sediment remediated in 2009) will be surveyed within the next couple of years for contamination under Great Lakes Legacy Act .

List of relevant figures:

TR-39 Figure 46 – Copper

TR-39 Figure 47 – Lead

TR-39 Figure 48 – Zinc

TR-39 Figure 50 – Tissue Concentrations of Mercury in Fish

TR-39 Figure 51 – Tissue Concentrations of PCBs in Fish

What Are the Sources of Water Pollution?

The Kinnickinnic River watershed contains several potential sources of water pollution. These fall into two broad categories: point sources and nonpoint sources.

Point Sources

There are no public or private sewage treatment plants discharging into the Kinnickinnic River watershed. MMSD has 26 combined sewer overflow outfalls that discharge to the streams in the Kinnickinnic River watershed. These outfalls convey a combination of stormwater runoff and sanitary sewage from the combined sewer system to the surface water system of the watershed as a result of high water volume from stormwater, meltwater, and excessive infiltration and inflow of clear water during wet weather conditions. Prior to 1994, overflows from these sites typically occurred around 50 times per year. Since MMSD's inline storage system came online in 1994, the number of combined sewer overflows per year has declined to about three. Since 1995, separate sewer overflows have been reported at eight locations: four within MMSD's SSO area and four within local communities. The number of SSO events occurring per year has shown a decline similar to that of CSO events. As of July 2011, 23 industrial dischargers and other point sources were permitted through the WPDES program to discharge wastewater to streams in the Kinnickinnic River watershed. About half of the permitted facilities discharged noncontact cooling water. The remaining discharges are of several types as indicated in Table 37. All of the permitted discharges are of a nature which typically complies with the WPDES permit levels which are designed to meet water quality standards.

Nonpoint Sources

The Kinnickinnic River watershed is dominated by urban land uses and contains no significant rural lands. The entire watershed is contained within MMSD's planned sewer service area. Because there are no urban enclaves outside of the planned sewer service area, failure of onsite sewage treatment systems is not an issue in this watershed. About 17 percent of the watershed is served by combined sanitary and storm sewers which convey sewage and stormwater to MMSD's sewage treatment facilities, resulting in a high degree of nonpoint source pollution control from the combined sewer service area. All communities in the watershed have adopted construction erosion control ordinances. All communities in the watershed have adopted stormwater management ordinances or plans. As of February 2003, 81 facilities engaged in industrial activities in the watershed had applied for and obtained WPDES stormwater discharge permits. As a condition of these permits, these facilities are required to develop and follow a stormwater pollution prevention plan. There are currently no active solid waste landfills in the watershed. The watershed contains one inactive solid waste landfill, located in the Wilson Park Creek subwatershed.

Summary of Pollutant Loads

The annual average load of BOD to streams of the Kinnickinnic River watershed is estimated to be 408,500 pounds per year. Combined sewer overflows and separate sewer overflows contribute about 1.7 percent and 3.1 percent, respectively, of this load. Industrial discharges contribute about 3.9 percent of this load. The rest of BOD loadings to streams in the Kinnickinnic River watershed, about 91.3 percent, are contributed by nonpoint sources.

The annual average load of TSS to streams of the Kinnickinnic River watershed is estimated to be 5,298,770 pounds per year. Combined sewer overflows and separate sewer overflows contribute about 0.8 percent and 1.0 percent, respectively, of this load. Industrial discharges contribute about 0.2 percent of this load. The rest of TSS loadings to streams in the Kinnickinnic River watershed, about 98.0 percent, are contributed by nonpoint sources.

The annual average load of fecal coliform bacteria to streams of the Kinnickinnic River watershed is estimated to be 4,891.36 trillion cells per year. Combined sewer overflows and separate sewer overflows contribute about 11.3 percent and 20.0 percent, respectively, of this load. The rest of fecal coliform bacteria loadings to streams in the Kinnickinnic River watershed, about 68.7 percent, are contributed by nonpoint sources.

The annual average load of total phosphorus to streams of the Kinnickinnic River watershed is estimated to be 12,750 pounds per year. Combined sewer overflows and separate sewer overflows contribute about 3.8 percent and 7.0 percent, respectively, of this load. Industrial discharges contribute about 11.3 percent of this load. The rest of total phosphorus loadings to streams in the Kinnickinnic River watershed, about 77.9 percent, are contributed by urban nonpoint sources.

Although not directly comparable, figures have been provided showing 1975 (historic) versus 2000 (current) average annual pollutant loads. These models are based on point source discharges and hydrology that are not the same between historic and current average loading results. In general, all constituents show reduced loads with the exception of TSS that has a dramatic increase in nonpoint source pollution. Overall, point source loads have decreased dramatically over time.

List of relevant tables:

- TR-39 Table 35 – Separate Sanitary Sewer Overflow Locations
- TR-39 Table 36 – Combined Sewer Overflow Outfall Locations
- TR-39 Table 37 – Permitted Wastewater Discharges
- TR-39 Table 40 – Average Annual Total Nonpoint Source Pollutant Loads
- TR-39 Table 41 – Average Annual Loads of Total Phosphorus
- TR-39 Table 42 – Average Annual Loads of Total Suspended Solids
- TR-39 Table 43 – Average Annual Loads of Fecal Coliform Bacteria
- TR-39 Table 44 – Average Annual Loads of Total Nitrogen
- TR-39 Table 45 – Average Annual Loads of Biochemical Oxygen Demand
- TR-39 Table 46 – Average Annual Loads of Copper
- TR-39 Table 47 – Average Annual per Acre Nonpoint Source Pollutant Loads
- Presentation Figure - Average Annual Loads of Total Phosphorus
- Presentation Figure – Average Annual Loads of Total Suspended Solids
- Presentation Figure – Average Annual Loads of Fecal Coliform Bacteria
- Presentation Figure – Average Annual Loads of Total Nitrogen
- Presentation Figure – Average Annual Loads of Biochemical Oxygen Demand

What is the Current Condition of the Fishery?

The Kinnickinnic River watershed seems to have very poor fishery and macroinvertebrate communities at present. The fish community contains relatively few species of fishes, is trophically unbalanced, contains few or no top carnivores, and is dominated by tolerant fishes. The macroinvertebrate community is equally depauperate and dominated by tolerant taxa. Since water quality has generally been improving in the watershed for some constituents, habitat seems to potentially be the most important factor limiting both the fishery and macroinvertebrate community.

List of relevant tables and figures:

MR-194 Table 7 – Fish Species Composition Among Reaches in the KK River

PR-37 Table 109 - Fish Species Composition in the KK River Estuary (edited to update tolerance class)

TR-39 Table 199 – Fish Species Occurance and Abundance in Fiver Lake Michigan Harbors

TR-39 Figure 54 – Dissolved Oxygen Tolerant Fishes

TR-39 Figure 55 – Fisheries IBI

TR-39 Figure 57 – Macroinvertebrate HBI

TR-39 Figure 58 – Macroinvertebrate EPT and HBI

To What Extent Are Water Use Objectives and Water Quality Standards Being Met?

During the 1998 to 2001 study baseline period, the Kinnickinnic River only partially met the water quality criteria supporting its recommended water use classification. In the vast majority of the samples taken from the mainstem of the River temperatures and concentrations of dissolved oxygen and ammonia were in compliance with the relevant water quality standards. Only in occasional samples in the reaches between S. 27th Street and S. 1st Street were temperatures above the standard of 89°F or were dissolved oxygen concentrations below the special variance standard of 2.0 mg/l that applies to the Kinnickinnic River. Concentrations of fecal coliform bacteria in the Kinnickinnic River often exceed the special variance standard of 1,000 cells per 100 ml which applies to the River. The rate of compliance with this standard increased from upstream to downstream. At the S. 27th Street station, fecal coliform counts were below the standard in only about 30 percent of samples. This increased to about 77 percent at the Jones Island Ferry station. Compliance with the standard for total phosphorus recommended in the regional water quality management plan followed the same pattern: the number of samples showing total phosphorus below the 0.1 mg/l standard increased from upstream to downstream from a low of about 30 percent at the S. 27th Street station to a high of about 74 percent at the Jones Island Ferry station.

Figure 63 shows changes over time in the proportions of samples showing compliance with applicable water quality standards for the Kinnickinnic River. Over the entire study period of 1975-2001, water temperatures and concentrations of ammonia were in compliance with the applicable water quality standards in all samples, and dissolved oxygen concentrations were in compliance approximately 90 percent or more of the time, with the proportion of samples in compliance increasing over time. By contrast, significant percentages of samples collected in each period had concentrations of fecal coliform bacteria and total phosphorus that were not in compliance with the applicable water quality standard. In about 50 percent of the samples collected during the period 1975-1986, fecal coliform bacteria concentrations were in compliance with the standard. This rate of compliance increased to close to 70 percent of the samples collected during the period 1994-1997, and then decreased somewhat to just below 60 percent of the samples in the period from 1998-2001. The rate of compliance with the standard recommended for total phosphorus in the regional water quality management plan increased from about 70 percent of samples collected being in compliance during the period 1975-1986 to just over 80 percent of all samples being in compliance

during the period 1994-1997. During the period 1998-2001 the percentage of samples collected in compliance with the standard decreased to just below 60 percent.

Relatively few data are available for assessing whether streams tributary to the Kinnickinnic River are meeting water use objectives and water quality standards. Based on available data, Wilson Park Creek is only partially meeting its water use objectives. While ammonia concentrations in this stream were below the acute toxicity standard for fish and aquatic life in almost all samples, total phosphorus concentrations exceeded the recommended concentration in about 30 percent of the samples.

List of relevant tables, maps, and figures:

MR-194 Table 2 – Physical and Biological Conditions in the KK River Watershed

TR-39 Table 48 – Characteristics of Streams in the KK River Watershed

TR-39 Table 49 – Toxicity Characteristics of streams in the KK River Watershed

TR-39 Figure 63 – Proportion of samples meeting water quality standards and criteria

TR-39 Map 7 – Water Use Classification

TR-39 Table 16 – Water Use Objectives and Water Quality Standards

TR-39 Table 15 – Regulatory and Auxiliary Fish and Aquatic Life Water and Recreational Use Objectives

References:

SEWRPC Technical Report No.39, *Water Quality Conditions and Sources of Pollution in the Greater Milwaukee Watersheds*, November 2007.

SEWRPC Planning Report No.37, *A Water Resources Management Plan for the Milwaukee Harbor Estuary*, March 1987.

SEWRPC Planning Report No.50, *A Regional Water Quality Management Plan Update for the Greater Milwaukee Watersheds*, December 2007.

SEWRPC Memorandum Report No.194, *Stream Habitat Conditions and Biological Assessment of the Kinnickinnic and Menomonee River Watersheds: 2000-2009*, January 2010.

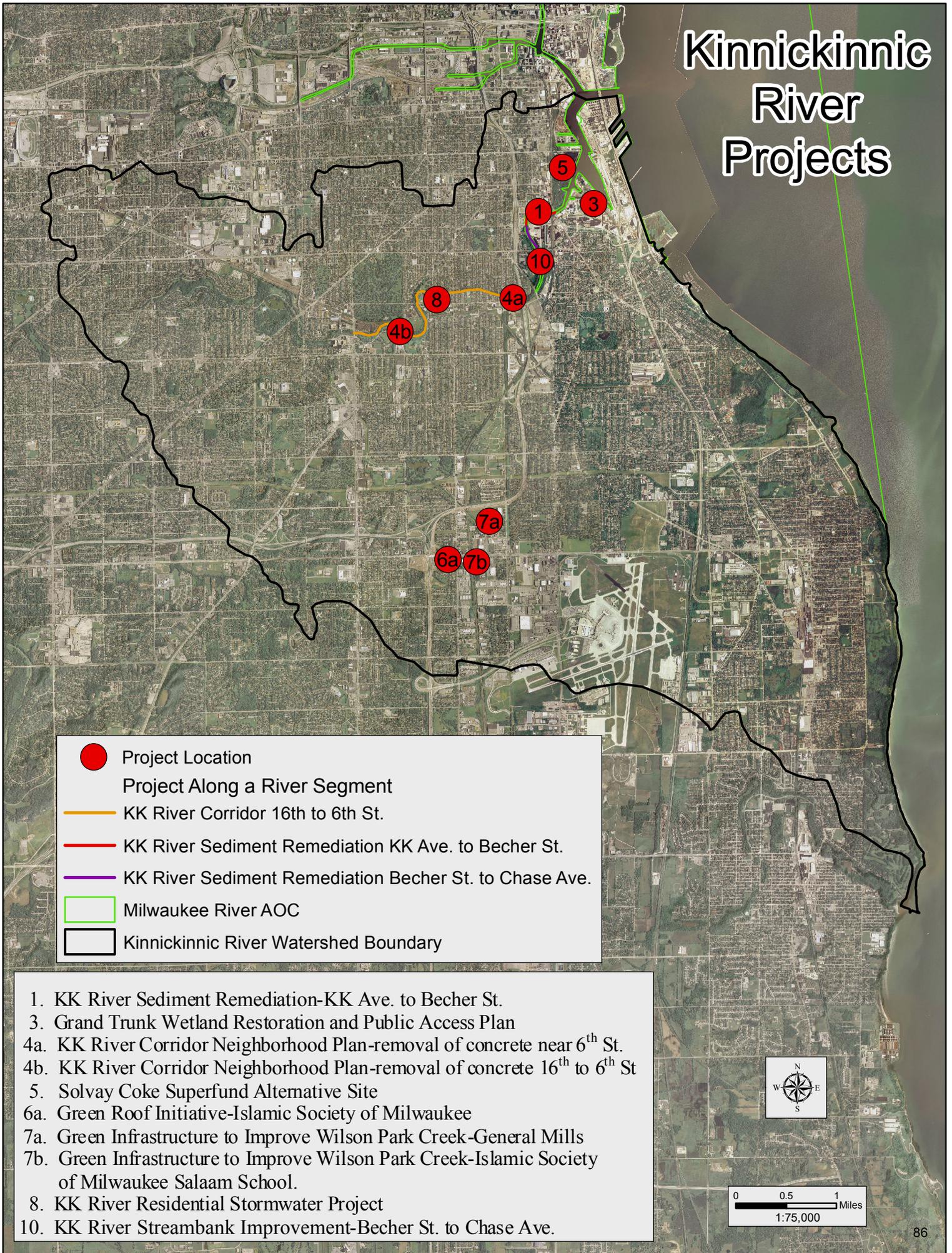
**Kinnickinnic River Project Inventory
Milwaukee Estuary AOC**

	Project Name	Completed, In progress, Potential	Water body	Source issue being addressed	Impairments project addresses	Project manager (organization)	Brief Description	Miles/acres rehabilitated	Project impact	Cost	Funding source	More information
1	KK River Sediment Remediation-KK Ave to Becher St.	C	Estuary	Toxic substances	1, 2, 3, 4, 5, 6, 7, 8, 9, 11	Xiaochun Zhang/DNR	Remediation of contaminated sediments from Kinnickinnic Ave to Becher St.	0.4 miles	167,000 cubic yards of sediment contaminated with PCBs and other toxic substances were removed from the project site. The remediation has helped revitalize the local economy and waterfront businesses along the KK.	\$22,000,000	Great Lakes Legacy Act and the Growing Milwaukee Initiative	http://dnr.wi.gov/org/water/wm/sms/kkriver/index.html
2	Gateway to Improved Long-term Spawning	I	Estuary	Physical habitat alteration	3, 4, 5, 9, 10, 11	Groundwork Milwaukee /Mary Beth Driscoll	Long-term goal is of increasing fish populations and improving spawning patterns along the shipping channel of the Milwaukee River Estuary.	15 total miles of hardened shoreline		\$140,000	Great Lakes Restoration Initiative	http://groundworkmke.org/projects.html
3	Grand Trunk Wetland Restoration and Public Access Plan	I	Estuary	Physical habitat alteration	3, 4, 5, 9, 10, 11	Mike Maierle/City of Milwaukee DCD	Site design for wetland restoration at the site.	6.5 acres		\$60,000	Wisconsin Coastal Management Program	
4	KK River Corridor Neighborhood Plan-6th St. Bridge Reconstruction and Concrete Removal	I	Upstream KK	Sediment, nutrient, and/or bacteria loading; toxic substances; physical habitat alteration	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	Dave Fowler/Patrick Elliott, MMSD; Sixteenth Street Community Health Center	Concrete will be removed along the stretch of the KK that goes from 6th St. to 16th St. The implementation of the plan will also help reduce flooding by creating a more naturalized, meandering channel.	0.7 miles	Components of the plan address water quality and stormwater management features, instream and riparian habitat for fish, birds, insects and other wildlife, and new economic opportunities for local businesses and entrepreneurs.			
5	Solvay Coke Superfund Alternative Site	I	KK	Toxic substances	1, 2, 3, 4, 5, 6, 7, 8, 9, 11	Denise Fowler, USEPA; Margaret Brunette, DNR		46 acres				http://www.epa.gov/region5/cleanup/solvaycoke/index.htm
6a	Green Roof Initiative-Islamic Society of Milwaukee	I	KK	Sediment, nutrient, and/or bacteria loading	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	MMSD; Sean Folz, American Rivers	Green infrastructure project	N/A		\$44,831	MMSD	
6b	Green Roof Initiative-Energy Exchange	I	KK	Sediment, nutrient, and/or bacteria loading	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	MMSD; Sean Folz, American Rivers	Green infrastructure project	N/A	American Rivers has recently completed a 4,000 square foot green roof in the Kinnickinnic watershed, at the Energy Exchange. This project will reduce the amount of stormwater runoff, and result in decreased stress on Milwaukee's aging sewer system.			http://www.americanrivers.org/newsroom/blog/innovative-green-roof-12-2-2010.html

**Kinnickinnic River Project Inventory
Milwaukee Estuary AOC**

7a	Green Infrastructure to Improve Wilson Park Creek-General Mills	I	KK	Sediment, nutrient, and/or bacteria loading	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	Sean Folz, American Rivers	Impervious parking lots will be replaced with porous pavement strips that allow stormwater to infiltrate on site. Rooftop downspouts will be disconnected from the storm sewers, and roof flow will be redirected into bioswales for better infiltration.	2 acres	The combined impact of the installed practices is anticipated to reduce the amount of stormwater runoff by 391,00 gallons per one-inch rainstorm to the Wilson Park Creek tributary of the KK. The projects are also expected to reduce phosphorus, bacteria, and total suspended sediment loads.	\$188,000 for 7a and 7b	Fund for Lake Michigan	
7b	Green Infrastructure to Improve Wilson Park Creek-Islamic Society of Milwaukee	I	KK	Sediment, nutrient, and/or bacteria loading	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	Sean Folz, American Rivers	Impervious parking lots will be replaced with porous pavement strips that allow stormwater to infiltrate on site. Rooftop downspouts will be disconnected from the storm sewers, and roof flow will be redirected into bioswales for better infiltration.	10 acres	The combined impact of the installed practices is anticipated to reduce the amount of stormwater runoff by 391,00 gallons per one-inch rainstorm to the Wilson Park Creek tributary of the KK. The projects are also expected to reduce phosphorus, bacteria, and total suspended sediment loads.		Fund for Lake Michigan	
8	Kinnickinnic River Residential Stormwater Project	I	KK	Sediment, nutrient, and/or bacteria loading	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	Andrea Fuentes, Sixteenth Street Community Health Center	A residential block on S. 15th St. was selected for this project and rain barrels, rain gardens and swale gardens will be installed in summer 2011 on up to 25 residential properties. Three additional sites besides the 15th St. site have been funded to do additional residential stormwater BMP implementation.	TBD	The Sixteenth Street Community Health Center is working to reduce NPS by engaging targeted communities in using storm water best management practices and green infrastructure on their residential properties.			http://www.swwtwater.org/home/ProjectUpdates.cfm#S15thSt
9	Key Riparian Buffer Improvement Opportunities	P	KK	Sediment, nutrient, and/or bacteria loading; physical habitat constraints	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	Theresa Morgan, River Revitalization Foundation	This project identifies and prioritizes specific locations for riparian buffer improvement opportunities throughout the Kinnickinnic River Watershed. Work may include projects such as streambank stabilization, invasive species control, and establishment of native vegetation in riparian corridors.					http://www.swwtwater.org/home/ProjectUpdates.cfm#RiparianBuffers
10	KK River Sediment Streambank Improvement-Becher St. to Chase Ave.	P	KK	Sediment, nutrient, and/or bacteria loading; physical habitat alteration; toxic substances	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	None at this time	The KK from Becher to Chase Ave still has natural streambanks, but altered hydrology has caused excessive streambank erosion.					

Kinnickinnic River Projects



- Project Location
- Project Along a River Segment
- KK River Corridor 16th to 6th St.
- KK River Sediment Remediation KK Ave. to Becher St.
- KK River Sediment Remediation Becher St. to Chase Ave.
- Milwaukee River AOC
- Kinnickinnic River Watershed Boundary

1. KK River Sediment Remediation-KK Ave. to Becher St.
3. Grand Trunk Wetland Restoration and Public Access Plan
- 4a. KK River Corridor Neighborhood Plan-removal of concrete near 6th St.
- 4b. KK River Corridor Neighborhood Plan-removal of concrete 16th to 6th St
5. Solvay Coke Superfund Alternative Site
- 6a. Green Roof Initiative-Islamic Society of Milwaukee
- 7a. Green Infrastructure to Improve Wilson Park Creek-General Mills
- 7b. Green Infrastructure to Improve Wilson Park Creek-Islamic Society of Milwaukee Salaam School.
8. KK River Residential Stormwater Project
10. KK River Streambank Improvement-Becher St. to Chase Ave.

