

# **Development of Delisting Targets for Presque Isle Bay Area of Concern**

## ***Delisting Targets Workshop (May 10 - 12, 2005): Summary Report***

### **1.0 Introduction**

On May 10 - 12, 2005, a workshop was convened in Erie, PA (Gannon University) to support the establishment of delisting targets for the Presque Isle Bay Area of Concern (PIB AOC). More specifically, the PIB AOC Sediment Sub-committee and representatives of the national Science Advisory Group on Sediment Quality Assessment met to:

- Assess the status and trends of sediment quality conditions in PIB AOC; and,
- Identify delisting targets that can be used to determine when sediment quality conditions have improved sufficiently to justify petitioning for delisting of PIB as a Great Lakes AOC.

The delisting targets will also provide a basis for designing a long-term monitoring program that will provide the data required to assess trends in sediment quality conditions and to support sediment management decisions in PIB. The workshop agenda is provided in Appendix 1 of this summary report and the results of the workshop are summarized below.

### **2.0 Key Questions Regarding Sediment Quality Conditions**

When workshop participants were asked to identify the key questions that should be answered regarding sediment quality conditions in Presque Isle Bay, they articulated the following questions:

- Are sediment quality conditions improving?

- Are contaminated sediments causing lesions and/or tumors in fish?
- Are sediments “suitable” for open water disposal?
- What are acceptable levels of chemicals of potential concern (COPCs) in sediments relative to beneficial use impairments?
- Can we dispose of dredged materials in the confined disposal facility?
- What types of studies should be done to assess adverse impacts on wildlife?
- Are contaminated sediments having an adverse effect on human health?
- How can contaminants of concern (i.e., substances causing or contributing to adverse effects) be identified from the COPCs?
- What do we need to do to delist Presque Isle Bay as an AOC?

### **3.0 Identification of the Decisions Needed to be Made Regarding Sediment Quality Management in Presque Isle Bay**

Workshop participants recognized that identification of key questions regarding sediment quality conditions would depend on what decisions could be made to manage contaminated sediments. Some of the possible decisions that may be contemplated include:

- Whether or not remedial actions are needed;
- The type of remedial actions needed to restore beneficial uses;
- The actions needed to improve environmental quality conditions in the bay;
- Selection of primary sediment targets for delisting;
- Selection of indicators and metrics for the long-term monitoring program.

### **4.0 Emerging Issues**

While it was recognized that metals and PAHs represent the primary COPCs in Presque Isle Bay, workshop participants noted that new issues may emerge in the

future, including:

- Phenoxy herbicides;
- Polybrominated diethyl ethers (PBDEs); and,
- Other metals.

As such, monitoring programs and sediment quality management strategies may need to address these emerging issues in the future.

## **5.0 Key Indicators of Sediment Quality Conditions**

Workshop participants identified a number of key indicators of sediment quality conditions, based on the beneficial use under consideration (Table 1). These indicators were classified as primary and secondary indicators.

## **6.0 Delisting Targets**

Workshop participants considered a number of options for establishing delisting targets for Presque Isle Bay. Based on the results of this discussion, it was generally agreed that two types of delisting targets should be established including narrative targets and numerical targets. It was further agreed that the narrative targets could be established in the near-term, while further information would be needed to establish the numerical targets. In addition, workshop participants generally agreed that ecosystem health targets should also be established to compliment the delisting targets and provide a basis for measuring and reporting on broader sediment quality issues and concerns in the bay. The delisting and ecosystem health targets that were developed by workshop participants are presented in Table 2.

In addition to identifying preliminary delisting and ecosystem health targets, workshop participants identified a number of considerations that relate to the development and implementation of delisting targets, including:

- It is acceptable to infrequently exceed the targets and still have sediment

quality conditions that are sufficient to support beneficial uses (i.e., 5% incidence of exceedance is probably acceptable). However, it is important to address a location that consistently exceeds the target;

- It is important to identify suitable reference areas to facilitate discrimination between AOC-specific and lake-wide problems. For water quality, reference locations could include South Pier, Dobbins Landing, and Lake Erie (Hammermill site and drinking water intake site). Reference sites should have only low levels of COPCs and similar physical conditions as test sites;
- It is necessary to maintain a tight linkage between the sediment monitoring program and the fish monitoring program; and,
- There are several sources of fish tissue chemistry data, including: 1) historical data on COPC levels in whole fish; 2) ongoing fish tissue sample conducted by PADEP and ECDoH; 3) estimation of whole fish COPC concentrations from existing data on COPC levels in fish fillets; and, 4) National Sediment Inventory database.

## 7.0 Next Steps

Workshop participants identified a number of tasks that should be undertaken in the near-term to support the development and implementation of delisting targets for Presque Isle Bay, including:

- Disseminate the workshop results to workshop participants (Action: Don MacDonald);
- Review and provide comments on the workshop summary (Action: All);
- Develop a “To Do List” that reflects the input from workshop participants (Action: Lori Boughton);
- Incorporate comments from workshop participants to establish the preliminary delisting targets for Presque Isle Bay (Action: Don MacDonald);
- Engage the PAC in a discussion on the preliminary delisting targets and compile input and comments (Action: Dick Kubiak and Lori Boughton);

- Identify priority indicators for delisting beneficial use impairments (Action: Scott Ireland);
- Seek guidance from GLNPO on whether or not sediments at Great Lakes AOCs must be suitable for open water disposal and/or beneficial reuse applications to justify delisting of the restrictions on dredging beneficial use impairment (Action: Lori Boughton, Eric Obert, and Scott Ireland);
- Include a discussion of individual studies in the evaluation of sediment quality conditions in Presque Isle Bay (Action: Don MacDonald);
- Determine how much of the historical data could be used to evaluate the status of priority indicators and create a summary that identifies which data can be used to assess the status of each indicator (i.e., in tabular format; Action: Don MacDonald, Chris Ingersoll, and Scott Ireland);
- Review Great Lakes trophic transfer model and USACE trophic trace model, and report on their relevance for assessing conditions in Presque Isle Bay (Action: Scott Ireland);
- Determine if both the delisting targets and ecosystem health targets should be packaged together in the Petition for Delisting that is submitted to USEPA (in making this decision, it will be important to remember why the AOC was listed; Action: PAC, PADEP, PA SeaGrant, and GLNPO); and,
- Convene a workshop on monitoring on June 21 and 22, 2005 (Action: All).

**Table 1. Primary and Secondary Indicators for Assessing Sediment Quality Conditions.**

Beneficial Use Impairment	Delisting Indicator/Ecosystem Health Indicator								
	Elutriate Chemistry	Elutriate Toxicity	Whole-Sediment Toxicity	Bioaccumulation (28-day)	Whole-Sediment Chemistry and Physical Variables	Lesions and Tumors in Fish (1° liver tumors) (2° skin tumors)	Benthic Invertebrate Community Structure	Fish Tissue Chemistry	Surface Water Chemistry
Dredging (as defined in USACE/USEPA ITM/GLTM)	1°	1°	1°	1°	1°	Requires more information to identify indicators: a) 401 - PADEP; b) 404 - USACE to USEPA; and, c) Regional Dredging Team			
Dredging (as defined in PA and UTM)	1°								
Lesions and Tumors in Fish					2°	1°			
EcoHealth Sediment-Related			1°	2°	1°	1°	2°	2°	2°
Human Health Sediment-Related				1.5 (1°/2°)	2°	1°		1°	

USEPA = United States Environmental Protection Agency; USACE United States Army Corps of Engineers; PADEP = Pennsylvania Department of Environmental Protection; ITM = Inland Testing Manual; UTM = Upland Testing Manual; GLTM = Great Lakes Testing Manual.

**Table 2. Summary of Preliminary Delisting Targets for Presque Isle Bay**

Beneficial Use	Preliminary Indicators, Metrics, and Targets
<b>Dredging</b>	
Beneficial Use Impairment	Restrictions on Dredging Activities
Ecosystem Objective	Maintain and protect the benthic invertebrate, fish and wildlife communities of Presque Isle Bay.
Sediment Management Objective	Maintain and/or restore sediment quality conditions such that human health is protected and the human uses of the aquatic ecosystem (e.g., fish and wildlife consumption; navigation and shipping) are protected and, where necessary, restored.
Primary Sediment Quality Indicator	Elutriate Chemistry
Metric	Concentrations of COPCs in elutriates prepared with Presque Isle Bay sediment samples
Candidate Delisting Target	Concentrations of all major COPCs in elutriates are $\leq 1.5$ relative to concentrations measured in the selected dilution water samples from the near-shore areas of Lake Erie and/or below state water quality standards (or as required in the appropriate regulation, policy or manual), such that the dredged material can be disposed of in the confined disposal facility.
Assumptions	a) No more than 5% of samples will exceed the target. b) Targets will be evaluated using at least 5 reference sites (e.g., using a reference envelope approach). Note: there are water quality monitoring stations in the bay and the historic data set for the 401 evaluations.
<b>Fish Tumors and Other Deformities</b>	
Beneficial Use Impairment	Fish Tumors and Other Deformities
Ecosystem Objective	Maintain and protect the benthic invertebrate, fish and wildlife communities of Presque Isle Bay.
Sediment Management Objective	Maintain and/or restore sediment quality conditions such that the health of fish populations is protected and, where necessary, restored.
Primary Sediment Quality Indicator	Fish Health
Metric	a) Incidence of liver tumors in Brown bullheads b) Incidence of external tumors in Brown bullheads
Candidate Delisting Target	Incidence of tumors in Brown bullheads from Presque Isle Bay are $\leq$ the response observed in Brown bullheads from reference sites in Lake Erie.

**Table 2. Summary of Preliminary Delisting Targets for Presque Isle Bay**

Beneficial Use	Preliminary Indicators, Metrics, and Targets
<b>Fish Tumors and Other Deformities (cont.)</b>	
Assumptions	<ul style="list-style-type: none"> <li>a) Comparisons will be made to reference sites (may be reference tumor rates in Brown bullheads from Lake Erie.</li> <li>b) The relationship will be evaluated between COPCs in sediment or tissue samples in Presque Isle Bay to the incidence of tumors observed in Brown bullheads.</li> <li>c) COPC concentrations may be causing or contributing to observed adverse effects in fish.</li> </ul>
<b>Ecosystem Health for Benthos</b>	
Beneficial Use Impairment	Not Applicable
Ecosystem Objective	Maintain and protect the benthic invertebrate, fish, and wildlife communities of Presque Isle Bay.
Sediment Management Objective	Maintain and/or restore sediment quality conditions such that benthic communities, including epibenthic and infaunal species, are protected and, where necessary, restored.
Primary Sediment Quality Indicator	<ul style="list-style-type: none"> <li>a) Whole-sediment chemistry</li> <li>b) Whole-sediment toxicity</li> </ul>
Metric	<ul style="list-style-type: none"> <li>a) Concentrations of COPCs in whole-sediment samples</li> <li>b) Whole-sediment toxicity tests               <ul style="list-style-type: none"> <li>i) 28-d <i>Hyalella azteca</i> survival and growth</li> <li>ii) 10-d <i>Chironomus dilutus</i> survival and growth</li> </ul> </li> </ul>
Candidate Delisting Target	<ul style="list-style-type: none"> <li>a) Concentrations of COPCs (e.g., metals, PAHs) in sediment samples from Presque Isle Bay are <math>\leq</math> concentrations that are associated with toxicity to sediment-dwelling organisms, based on a site-specific calibration of various sediment quality guidelines (SQGs; e.g., mean PEC-Q, ESB-TU, SEM-AVS) or are <math>\leq</math> the concentrations observed for reference sediment samples from the near-shore areas of Lake Erie.</li> <li>b) Survival or growth of <i>H. azteca</i> or <i>C. dilutus</i> in sediment samples from Presque Isle Bay are <math>\geq</math> the response observed for reference sediment samples from the near-shore areas of Lake Erie.</li> </ul>

**Table 2. Summary of Preliminary Delisting Targets for Presque Isle Bay**

Beneficial Use	Preliminary Indicators, Metrics, and Targets
<b>Ecosystem Health for Benthos (cont.)</b>	
Assumptions	<ul style="list-style-type: none"> <li>a) No more than 5% of samples will exceed the target.</li> <li>b) Targets will be evaluate using at least 5 reference sediments (e.g., using a reference envelope approach).</li> <li>c) Survival and growth endpoints in reference and test sediments will be normalized to control (e.g., expressed as percent of control response).</li> <li>d) SQGs will be evaluated either on a dry-weight or organic-carbon normalized basis.</li> <li>e) XXX</li> </ul>
EXAMPLE STATING B AS AN ACCEPTABLE FREQUENCY: Survival or growth of <i>H. azteca</i> or <i>C. dilutus</i> <u>in 10% of the</u> sediment samples from Presque Isle Bay are $\leq$ the range observed for reference sediment samples from the near-shore areas of Lake Erie.	
<b>Ecosystem Health for Fish and Wildlife</b>	
Beneficial Use Impairment	Not Applicable
Ecosystem Objective	Maintain and protect the benthic invertebrate, fish and wildlife communities of Presque Isle Bay.
Sediment Management Objective	Maintain and/or restore sediment quality conditions such that fish and wildlife communities, including aquatic dependant amphibians, reptiles, birds and mammals, are protected and, where necessary, restored.
Primary Sediment Quality Indicator	<ul style="list-style-type: none"> <li>a) Fish Health</li> <li>b) Fish Tissue Chemistry</li> <li>c) Invertebrate Tissue Chemistry</li> </ul>
Metric	<ul style="list-style-type: none"> <li>a) Incidence of liver or external tumors in Brown bullheads</li> <li>b) COPCs in tissues of whole fish</li> <li>c) COPCs in 28-d whole-sediment bioaccumulation tests with <i>Lumbriculus variegatus</i></li> </ul>
Candidate Delisting Target	<ul style="list-style-type: none"> <li>a) Incidence of tumors in Brown bullheads from Presque Isle Bay are <math>\leq</math> the response observed in Brown bullheads from reference sites in Lake Erie.</li> <li>b) Concentrations of COPCs (e.g., metals, PAHs) in fish or invertebrate tissues are <math>\leq</math> levels that are associated with adverse effects in fish, birds, or mammals or are <math>\leq</math> the concentrations observed for tissue samples from the near-shore areas of Lake Erie.</li> </ul>
Assumptions	a) XXX

**Table 2. Summary of Preliminary Delisting Targets for Presque Isle Bay**

Beneficial Use	Preliminary Indicators, Metrics, and Targets
<b>Ecosystem Health Relative to Human Uses of Aquatic Resources</b>	
Beneficial Use Impairment	Not Applicable.
Ecosystem Objective	Maintain and protect the human health and uses of aquatic resources of Presque Isle Bay.
Sediment Management Objective	Maintain and/or restore sediment quality conditions such that human health is protected and the human uses of the aquatic ecosystem (e.g., fish and wildlife consumption; navigation and shipping) are protected and, where necessary, restored.
Primary Sediment Quality Indicator	Fish Tissue Chemistry
Metric	Concentrations of COPCs in samples of fish tissues collected from Presque Isle Bay
Candidate Delisting Target	Concentrations of bioaccumulative COPCs in fish tissues from Presque Isle Bay are lower than FDA action levels or equivalent benchmarks or are $\leq$ the concentrations observed for fish tissue samples from the near-shore areas of Lake Erie.
Assumptions	a) XXX

COPCs = chemicals of potential concern; PAHs = polycyclic aromatic hydrocarbons; SQGs = sediment quality guidelines; PEC-Q = probable effect concentration-quotient; -d = -day  
 ESB-TU = equilibrium partitioning sediment benchmark-toxic units; SEM-AVS = simultaneously extracted metals - acid volatile sulfides; FDA = Federal Drug Administration;

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# **Appendix 1**

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# **Development of Delisting Targets for Presque Isle Bay Area of Concern**

**May 10 -12, 2005  
Pietraszek Room, Room 219, Waldron Center  
(Located off 7<sup>th</sup> Street, between Peach and Sassafras Streets)  
Gannon University  
Erie, Pennsylvania**

**Objectives:** This workshop is being convened to support the establishment of delisting targets for the Presque Isle Bay Area of Concern (PIB AOC). More specifically, the PIB AOC Sediment Sub-committee and representatives of the national Science Advisory Group on Sediment Quality Assessment will meet to:

- Assess the status and trends of sediment quality conditions in PIB AOC; and,
- Identify delisting targets that can be used to determine when sediment quality conditions have improved sufficiently to justify petitioning of PIB as a Great Lakes AOC.

The delisting targets so developed will also provide a basis for designing a long-term monitoring program that will provide the data required to assess trends in sediment quality conditions and to support sediment management decisions in PIB.

## **Tentative Workshop Agenda**

**Tuesday, May 10, 2005 (8:30 AM - 4:30 PM)**

- 1.0 Welcome and Introductions (Eric Obert, PA Sea Grant/Lori Boughton, PDEP; 15 minutes)
- 2.0 Project Background (Lori Boughton, PDEP; 5 minutes)
  - Background on PIB
  - Project Overview and Approach
  - Project Milestones and Schedule
- 3.0 Sediment Quality Issues and Concerns (DDM; 15 minutes)
  - Sources and Releases of Contaminants
  - Identification of Chemicals of Potential Concern (COPCs)
  - Environmental Fate and Transport

- Key Exposure Pathways
- Receptors Potentially at Risk
- Conceptual Site Model

#### 4.0 Status and Trends in Sediment Quality Conditions in PIB

- Sediment Contamination in Lake Erie (Dan Button, USGS; 15 minutes)
- Sediment Contamination in PIB (Rick Diz, Gannon University; 15 minutes)
- Trends in Sediment Quality Conditions (Don MacDonald, MESL; 15 minutes)
- Status of Sediment Quality Conditions (Don MacDonald, MESL; 15 minutes)

#### 5.0 Work Group Session

Workshop participants will be charged with the task of answering the following questions:

- Sediment quality can be evaluated relative to the conditions required to support a variety of uses of the aquatic ecosystem (e.g., protection of sediment-dwelling organisms, protection of fish, protection of wildlife, support dredging activities, etc.). Which uses should be considered when evaluating sediment quality conditions in PIB?
- What types of data are needed to assess sediment quality conditions in PIB?
- How much data of each type is required to assess sediment quality conditions in PIB?
- What additional information is needed to assess the status and trends of sediment quality conditions in PIB?
- How should sediment quality conditions be evaluated (i.e., against reference conditions, historical conditions, toxicity thresholds, etc.)?
- What criteria should be used to select an appropriate reference site(s) for PIB?
- Based on the existing data, have the concentrations of toxic or bioaccumulative substances in PIB sediments increased, decreased, or remained the same since the bay was listed as a Great Lakes AOC in 1991?
- Based on the existing data, are the concentrations of toxic or bioaccumulative substances in PIB sediments currently sufficient to pose unacceptable risks to ecological receptors?

- 6.0 Reconnaissance of Presque Isle Bay (Workshop participants will meet at the Dobins Landing at **4:30 PM** and board the Gannon University's research vessel (Environaut) for a two hour reconnaissance of the bay; bring a jacket, but leave your fishing rod in your room)

**Wednesday, May 11, 2005 (8:30 AM - 4:30 PM)**

- 1.0 Welcome and Introductions (Eric Obert, PA Sea Grant/Lori Boughton, PDEP; 10 minutes)
- 2.0 Framework for Developing Delisting Criteria for Great Lakes AOCs (Scott Ireland, GLNPO-USEPA; 15 minutes)
- 3.0 Requirements for Assessing and Managing Dredged Materials in the Great lakes Basin and Pennsylvania (Walter Berry, USEPA; 15 minutes)
- 4.0 Development of Standardized Criteria for Assessment of Tumors and Deformities in Great Lakes Areas of Concern (Jim Grazio, PADEP; 15 minutes)
- 5.0 Options for Establishing Delisting Criteria (Chris Ingersoll, USGS; 15 minutes)
- 6.0 Options for Selecting Delisting Targets for PIB (Don MacDonald, MESL; 15 minutes)
- 7.0 Work Group Session  
Workshop participants will be charged with the task of answering the following questions:
  - Describe appropriate sediment management objectives for PIB (Note: try to maintain linkage to Vision and lake management objectives for Lake Erie in LaMP).
  - What are the key indicators of sediment quality conditions that should be used in establishing delisting targets? (Note: demonstrate linkage between sediment management objectives and selected indicators).
  - What level of protection should be offered to benthos [Note: narrative should indicate high, moderate, low, or none, and articulate what this means - e.g., delisting targets should identify chemical concentrations that are associated with a low probability of observing toxicity to sediment-dwelling organisms in chronic

toxicity tests (i.e., <10% incidence of toxicity); also consider magnitude of toxicity]?

- What level of protection should be offered to fish (see above for more details)?
- What level of protection should be offered to aquatic-dependent wildlife (see above for more details)?
- What should be the narrative intent of the sediment chemistry targets?
- What are the sediment chemistry targets that meet the selected narrative intent?
- What should be the narrative intent of sediment toxicity targets?
- What are the sediment toxicity targets that meet the selected narrative intent?
- What should be the narrative intent of benthic community targets?
- What are the benthic community targets that meet the selected narrative intent?
- What should be the narrative intent of bioaccumulation targets?
- What are the bioaccumulation targets that meet the selected narrative intent?

**Thursday, May 12, 2005 (8:30 - 12:00 AM)**

- 1.0 Welcome and Introductions (Eric Obert, PA Sea Grant/Lori Boughton, PDEP)
- 2.0 Science Advisory Committee Report to Public Advisory Committee
- 3.0 Discussion on Delisting Targets
- 4.0 Next Steps