Long-term monitoring plan & upper river results
Fox River, Wisconsin

Contaminated Sediment Forum
May 18, 2011
Kansas City

James Hahnenberg
Remedial Project Manager

Photo from Wikipedia
The Great Lakes Song

The Earth Tones' 15th Anniversary Concert

Bill Tong, Karen Reshkin, Mary Ann Suero

U.S. EPA - Region 5

Chicago, IL - April 20, 2011

Video by Bill Tong
Fox River long-term monitoring

- Long-term monitoring plan for Fox River
- Upper river 2010 results: 1 year after cleanup completion (Yea!)
Upper river

Fox River
Long-term monitoring

Green Bay

Lower river

Lake Winnebago (background)
Fox River
Long-term monitoring

• Sediment

• Fish
  – Walleye & bass: human health
  – Carp & drum: ecological
  – Shad: rapid response

• Surface water
Long-term sediment monitoring
Considerations

• Frequency

• Number of samples

• Composites or individual samples

• Statistical concerns

• Sediment monitoring (?)
Confirmation sampling

From: Tetra Tech Inc. EC, Weekly QC Report, week ending April 22, 2011
Figure 1-26, from: GW Partners, LLC, Remedial Action Certification of Completion Report, Lower Fox OU1, November 2010.

Fox upper river
Sediment confirmation
Sampling (northern half)

- 2,422 post-dredge locations
- Biased sampling
Upper river
Long-term sediment Sampling

- Unbiased grid
- 63 locations
- 315 samples (5 composites per location)
Fish & water Monitoring Locations Upper river Example

Fish sampling target locations

Water transect

Figure 2-3, from: Anchor, et al, 2009, Lower Fox River Long-Term Monitoring Plan.
Long-term monitoring fish
Sampling considerations

- Species
- Size & age
- Number
- Frequency & time of year
- Collection methods
Long-term monitoring fish
Sampling considerations (continued)

• Locations

• Composites or individual

• Whole or fillets

• Statistical considerations

• Baseline sampling
Primary species

Walleye (human health)  Carp (ecological)

Gizzard shad (early indicator)
Secondary fish species

**Human health**

Bass

**Ecological**

Drum

*If needed, secondary species will substitute for primary species*

From: WDNR website
## Species, number, size, & processing

**Collection period:** August – September

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>SIZE RANGE</th>
<th>Skin-on Fillet</th>
<th>Skinned Fillet</th>
<th>Whole Fish</th>
<th>No. Individuals</th>
<th>No. Composites</th>
<th>No. Fish/Composite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walleye</td>
<td>12 to 22 inches</td>
<td>X</td>
<td></td>
<td></td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Carp</td>
<td>10 to 20 inches</td>
<td></td>
<td>X</td>
<td>25</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Gizzard Shad</td>
<td>&lt; 3 inches</td>
<td></td>
<td>X</td>
<td>125</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Channel Catfish</td>
<td>12 to 22 inches</td>
<td></td>
<td></td>
<td>15</td>
<td></td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Drum</td>
<td>12 to 22 inches</td>
<td></td>
<td></td>
<td>25</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

(1) Walleye and channel catfish will be analyzed as individuals, not composites.
## Species and size

<table>
<thead>
<tr>
<th>Primary Species</th>
<th>2-4&quot;</th>
<th>4-6&quot;</th>
<th>6-8&quot;</th>
<th>8-10&quot;</th>
<th>10-12&quot;</th>
<th>12-14&quot;</th>
<th>14-16&quot;</th>
<th>16-18&quot;</th>
<th>18-20&quot;</th>
<th>20-22&quot;</th>
<th>22-24&quot;</th>
<th>Total Fish (Optimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walleye</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Carp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>Gizzard shad</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>175</td>
</tr>
<tr>
<td>Secondary Species</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smallmouth bass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Drum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25</td>
</tr>
</tbody>
</table>

Notes:
- **Dark gray**: Target size class
- **Light gray**: Alternate size class

From: Manchester, Jon, 2011, OU1-LTMP Year Zero Fish Collection and Compositing Memorandum.
Collection methods

- Electrofish
- Fyke net
- Trawl
- Angler catch
- Hoop net
- Set line
- Gillnet

Method depends on species/habitat
Long-term water monitoring Considerations

- Number of transects
- Frequency
- Time period & number of sampling episodes
- Number of samples & compositing
- Volume and analytical methods
Fox River
Surface water transect locations

Water monitoring transect

Contaminated Sediments

MILES

1 0 1 2 3 4

Winnebago  Calumet  Outagamie  Manitowoc

Lake Winnebago
Surface water monitoring

• Transects
  – River: five
  – Lake Winnebago: one
  – Green Bay: three

• 6 samples composited/station

• Monthly sampling (April – November)
Surface water transect example

Water samples

Samples composited

River bottom
Fox River Monitoring results
Upper river

Upper river

Lake Winnebago (background)
Upper river cleanup & monitoring

Dredging & Capping – 800,000 cy

“Baseline”

Sediment sampling

Post-clean-up baseline ("Year 0")
Total PCB Concentration in Surface Sediments
Little Lake Buttes Des Morts, WI

From: Boldt oversight team

94% Reduction
Relative to Pre-dredge Condition

PCB SWAC goal of 0.25 ppm met
Fox upper river 2009
PCB sediment concentrations (northern half)

PCB SWAC: 0.23 ppm

Figure 1-26, from: GW Partners, LLC, Remedial Action Certification of Completion Report, Lower Fox OU1, November 2010.
## Upper river
### Post cleanup SWAC calculation

<table>
<thead>
<tr>
<th>Area</th>
<th>Ave. PCB conc. (ppm)</th>
<th>Acres</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dredged</td>
<td>0.41</td>
<td>173</td>
<td>Confirmation sampling</td>
</tr>
<tr>
<td>Capped</td>
<td>0.0065</td>
<td>114</td>
<td>Cap materials sampling</td>
</tr>
<tr>
<td>Sand cover</td>
<td>0.152 – 0.541</td>
<td>142</td>
<td>Pre-design sampling (7 - 20% of concentration)</td>
</tr>
<tr>
<td>Inter-deposit</td>
<td>0.390</td>
<td>456</td>
<td>Pre-design sampling</td>
</tr>
<tr>
<td>No sediment</td>
<td>0 - 0.0168</td>
<td>471</td>
<td>No recovery &amp; clay sampling</td>
</tr>
<tr>
<td>Utility, shoreline, &amp; artifacts</td>
<td>3.68</td>
<td>8</td>
<td>Pre-design sampling</td>
</tr>
<tr>
<td><strong>ALL AREAS</strong></td>
<td><strong>0.23</strong></td>
<td><strong>1364</strong></td>
<td></td>
</tr>
</tbody>
</table>

From: GW Partners, LLC, Remedial Action Certification of Completion Report, Lower Fox OU1, November 2010.
2010 FIELDS
Upper river sediment sampling (northern half)

PCB SWAC: 0.26 ppm

Legend
- Operating Unit 1 Boundary
- Total PCB Concentration (ppm)
  - 0.017 - 0.25
  - 0.25 - 0.5
  - 0.5 - 1.0
  - 1.0 - 1.5
  - 1.5 - 1.83

From: EPA (FIELDS), Sediment PCB results from the 2010 Long-term sampling event for OU1 of the Lower Fox River, February 2011.
Upper river Fish collection Locations 2010

From: GW Partners, and LLC, Preliminary draft, Year Zero Summary Report, Lower Fox River OU1, May 2011.
Total PCB Concentration in Walleye Fillets
Little Lake Buttes Des Morts, WI

73% Reduction
Relative to No Action

Natural Recovery

* a.k.a.: upper river

From: Boldt oversight team
From: GW Partners, and LLC, Preliminary draft, Year Zero Summary Report, Lower Fox River OU1, May 2011.
Total PCBs in Water

Little Lake Buttes Des Morts, WI

* a.k.a.: upper river

From: Boldt oversight team