

Lake Michigan Monitoring Coordination Council

Lake Michigan Tributary Monitoring Workshop

June 10, 2004

LMMCC Tribs Workgroup

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- Development of Tributary Monitoring Options for 2005 Synoptic Monitoring Event – Process to Date
 - *Examine results of Lake Michigan Mass Balance Study*
 - What monitoring parameters and site locations should be considered for this project?

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- **Development of Tributary Monitoring Options for 2005 Synoptic Monitoring Event – Process to Date**
 - *Catalog state and federal tributary monitoring capacity for 2005*
 - To determine potential monitoring locations/parameters in Lake Michigan for 2005
 - Sent out survey to workgroup
 - Incorporate in spreadsheet; discuss later today
 - Will review briefly now

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- Indiana Fixed Station WQ Monit. Program
 - *Routine samples are collected for –*
 - general chemistry, metals, nutrients, and bacteriological analyses.
 - *At some sites uncommon parameters --*
 - pesticides and radiological samples
 - *Specific field parameters*
 - Turbidity
 - Dissolved Oxygen
 - pH
 - Temperature
 - Specific conductance
 - Weather coding

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- Indiana Fixed Station WQ Monit. Program
 - *All locations sampled monthly if possible –*
 - general chemistry, metals, nutrients, and bacteriological analyses.
 - *USGS gaging stations used for flow data for loading calculations --*
 - pesticides and radiological samples
 - *Fixed Station Program – large rivers*
 - *Watershed Monitoring Group-Surveys Section – smaller rivers and tributaries*
 - Uses probabilistic method for sampling site selection

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- Michigan DEQ
 - *Lake MI Trib sampling at mouth each year:*
 - Grand
 - Kalamazoo
 - Menominee
 - Escanaba
 - Manistique
 - Boardman
 - Manistee
 - Pere Marquette
 - Muskegon
 - St. Joseph

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- Michigan DEQ
 - *Samples analyzed for: (water column)*
 - Nutrients
 - Conventional parameters
 - Suite of total metals
 - cadmium, chromium, copper, lead, mercury, nickel, and zinc
 - 2005 - analyze 10-12 samples for PCB congeners from 3 tributaries, including the Grand River, Kalamazoo River, and a third Lake MI trib

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- Michigan DEQ (Gary Kohlhepp)
 - *2005: 12 flow-stratified samples from:*
 - Grand, Kalamazoo, Upper St. Joseph (upstream of Indiana), Pere Marquette, and Escanaba Rivers.
 - *2005: 4 non-flow-stratified samples from:*
 - Menominee, Manistique, Manistee, Boardman, Lower St. Joseph (downstream of Indiana), and Muskegon
 - *Flexible to coordinate w/ other 2005 sampling*

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- Western Michigan University (Jay Means)
 - *Kalamazoo River focus*
 - Sampling strategy involves collection of cores at each location once.
 - # of organic and inorganic contaminants
 - Some sampling has been conducted near the mouth of the Kalamazoo River at Saugatuck Harbor and near-shore Lake Michigan areas (4X during Spring to Fall, 2003)

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- Western Michigan University
 - *Sampling locations:*
 - Allegan Lake, Morrow Lake
 - Trowbridge, Otsego, Plainwell impoundments
 - Upstream control sites at Ceresco and Fort Polk
 - *Future sampling:*
 - St. Joseph River and near-shore discharge areas
 - (this spring, Jay?)
 - Intensive flux measurements of contaminants in the dissolved and suspended particulate phases at the discharges of the Kalamazoo, St. Joe, Muskegon, Grand and Black Rivers would be very useful.

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- USGS/WDNR Fox River
 - *Sampling locations:*
 - Lower Fox
 - At DePere
 - at Neenah & Menasha
 - Upper Fox
 - at Oshkosh
 - at Berlin

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- USGS/WDNR

- *Parameters sampled:*

- pH,
Alk, and
Cond.
 - Turb
 - TKN
 - NOx
 - NH4
 - TP
 - DisPTSS
 - All pig.
CHLA
 - E. coli
 - Cl
 - Ca Mg Hard
 - Tot. Rec. Low-level
metals
(11+Hg)
 - Triazine
 - Fecal
 - Diss Silica

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- Lower Fox River Watershed Monitoring Program -- cooperative monitoring project
 - *3 components:*
 - School-based monitoring program
 - Studies of phosphorus and sediment sources in key watersheds
 - Studies linking stream ecological integrity and land use

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- Lower Fox River Watershed Monitoring Program -- cooperative monitoring project
 - *cooperators:*
 - *flow, nutrient and sediment load work –*
 - *UW-Green Bay, USGS, and Green Bay Metropolitan Sewerage District*
 - *YSI sonde and biotic monitoring activities –*
 - *UW-Milwaukee Biology Department (Dr. Timonthy Ehlinger, stream ecology research lab, is lead staff).*

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- Lower Fox River Watershed Monitoring Program -- cooperative monitoring project
 - *Automated sampling sites, online USGS:*
 - EAST RIVER AT GREEN BAY, WI (near mouth)
 - BAIRD CREEK AT GREEN BAY, (tributary to East River)
 - DUCK CREEK NEAR HOWARD, WI
 - ASHWAUBENON CREEK NEAR LITTLE RAPIDS, WI
 - APPLE CREEK AT SNIDERVILLE, WI

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- Lower Fox River Watershed Monitoring Program -- cooperative monitoring project
 - *Sample collections:*
 - Sediment and phosphorus at automated sites: stage triggered event sampling, bi-monthly low flow sampling (except monthly in December, January, and February).
 - Sondes: March through mid-November; 15 minute increments.

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- Lower Fox River Watershed Monitoring Program -- cooperative monitoring project
 - *Duration:*
 - Flows, nutrient and sediment loads:
 - October 2003 to Oct 2006
 - Aquatic invertebrates, fish and YSI multiprobe sondes:
 - July 2003 to June 2007

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- USGS/WDNR
 - *Other possible sampling locations:*
 - Manistique River (no information on WI spreadsheet)
 - Milwaukee River
 - at Estabrook Park
 - Sheboygan River
 - At Esslingen Park

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- Development of Tributary Monitoring Options for 2005 Synoptic Monitoring Event – Process to Date
 - *Developed a set of monitoring event options*
 - Glenn Warren developed outline of 5 options to consider
 - Held workgroup conference call in late January
 - Narrowed down to 2 options

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- Development of Tributary Monitoring Options for 2005 Synoptic Monitoring Event – Process to Date
 - *Five original options*
 - 1) Load estimates based on discharge -- tributary-specific – look at ('94 – '95) relationships between discharge and load.
 - Cost estimate: Personnel time, data retrieval, database maintenance

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- Development of Tributary Monitoring Options for 2005 Synoptic Monitoring Event – Process to Date
 - *Five original options*
 - 2) “Intensive” measurements of one or two tributaries, with results extrapolated to all tributaries – i.e. using new measurements of concentration and discharge gathered in 2005
 - Compare these with historic LMMB loads
 - Determine if there is a consistent difference or “correction factor” to apply to all tributaries
 - Estimated cost: Similar to #1, depend on DEQ measurements

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- Development of Tributary Monitoring Options for 2005 Synoptic Monitoring Event – Process to Date
 - *Five original options*
 - 3) Measure several important tributaries, (e.g. the Fox, Kalamazoo, Grand), and estimate loads for these.
 - Derive “ correction factors” which could be applied to all tributaries, or attempt to pair the monitored and unmonitored tributaries to provide better overall estimates.
 - Estimated cost: \$75k

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- Development of Tributary Monitoring Options for 2005 Synoptic Monitoring Event – Process to Date
 - *Five original options*
 - 4) Measure tributaries as in option 3, plus the Grand Calumet
 - Several samples would be taken in less important tributaries to get a few “ground truth” numbers for comparison with calculations based on pairing of tributaries.
 - Estimated cost: \$150 - \$200k

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- Development of Tributary Monitoring Options for 2005 Synoptic Monitoring Event – Process to Date
 - *Five original options*
 - 5) Repeat of the LMMBS tributary load sampling, which would sample at the same eleven tributaries as in 1994-1995.
 - Reduced sampling schedule
 - Estimated cost: \$500k

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- **Development of Tributary Monitoring Options for 2005 Synoptic Monitoring Event – Process to Date**
 - *Two selected options from Jan. conf. call:*
 - 3) Measure several important tributaries, (e.g. the Fox, Kalamazoo, Grand), and estimate loads for these.
 - Derive “correction factors”
 - Estimated cost: \$75k
 - 4) Measure tributaries as in option 3, plus the Grand Calumet
 - Several samples would be taken in less important tributaries to get a few “ground truth” numbers for comparison with calculations based on pairing of tributaries.
 - Estimated cost: \$150 - \$200k

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- Our charge for this meeting:
 - Discuss details of each option
 - Finalize parameters to monitor
 - Compare specific monitoring protocols
 - Confirm sites to monitor in 2005
 - Begin development of final plan for 2005 monitoring event

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