

**Lake MI Pilot Study Workshop I Summary:
National Water Quality Monitoring Network
For U.S. Coastal Waters and their Tributaries**

May 10, 2007
Marina Grand Resort ~ New Buffalo, MI

Participants

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Anne Sturm (AS), Great Lakes Commission (via phone)
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General Summary

Discussed Tasks: Develop Management Issues, Inventory current monitoring, Develop Design for Resource Components, Determine Gaps, Develop costs of ongoing and proposed monitoring at gaps, determine data comparability and sharing issues. Use pilots to advance toward implementation of the NMN.

Discussed Resource groups: Three groups look at flux to Lake Michigan (diagnostic) (Atmosphere, Rivers, Groundwater); five groups define the resource conditions and trends (Beaches, Wetlands, Embayments, Nearshore, Open Lake); one group (Great Lakes) makes connections between Lake Michigan and other Great Lakes.

Discussed design requirements: Network of Networks; fixed and probabilistic design; discrete/continuous/remote sampling; integrated continuum sampling network; linkage to GLOS (NMN vs GLOS goals); prioritized design based on funds available

Discussed Management Issues: A comprehensive monitoring approach will allow us to better implement management strategies. Most issues will be able to be extracted from the LAMP, GL regional collaboration, SOLEC, and GLOS. Issues include: water quantity and quality, climate change, beach health, fisheries health, drinking water availability/safety, aesthetics, emerging contaminants, lake levels, trends, ANS,

salmonids, loadings, cladophora, AOC, healthy habitats. Look at components issues individually.

Also discussed 2006 Great Lakes Monitoring Inventory and Data Management topics.

Specific Meeting Dialogue Summary

Welcome and Introductions

Peters welcomed everyone and introduced the National Monitoring Network (NMN) concept (especially for newcomers to the group). Everyone then introduced themselves.

Review of Agenda – Agenda was okay as is; would require some flexibility.

Lake MI Pilot Study: Our charge from the NMN: Deliverables and Timeline –

Hummer presented detailed background on the NMN, outlining what the Lake Michigan Pilot Study (LMPS) must accomplish as one of three national pilot studies (the other two being the Delaware River Basin and San Francisco Bay).

Facilitation of thought process for each resource component/ workgroup –

Garceau led a general discussion on what the Network design is and how each of the components should work with that design to the extent practical. The Wetlands component of the design is the least developed and in need of design ideas and people to make it happen.

Discussion followed the above two presentations:

RG – Are we locked into 6-digit HUCs? This is pilot study. Six-digit granularity not going to help.

CP – Need to make argument that we need to do this different in the Great Lakes.

RG – Going to 8-digit HUCs would add greater level of definition.

AG – 6-digit HUCs were chosen as a cost measure.

AG – Ground water flux into Lake MI is important to measure; will pick up ground water intrusion upstream. Also important for drinking water issue.

CP – Need broad strategy that links together various constituents.

NG – Ground water flow into streams may be of interest. Nutrient flux may be delayed because of larger base flow component. Indirect flow is about 70%.

CP – Need to figure flux of surface water, ground water and atmospheric deposition in a connected way.

AG – Need to look at Lake Superior monitoring design.

JK – It's depth-based.

RG – Re: concept of points on a map, i.e., coastal wetlands have space-borne raster-based imaging. Is that part of it?

AG – NOAA premise is that remote sensing will be used as part of this plan.

RG – Looking at it from a GIS-based framework – if only points on a map, will lose depths of information.

JK – Points on a map is more of a survey/sampling language. Can be from space, on-the-ground; trying to adequately assess a total population.

JBa – Difference if you look at coastal wetlands, i.e., as a component of Lake MI, or as a land-based component; there's a big difference.

JBe – Wetlands are part of the biology framework and management questions.

JK – Wetlands are a good example; many questions that can be asked. Inherent properties, near shore impacts? This is why they deferred on the design at the national level. They did fall toward wetland condition as a default.

GF – If you're trying to say that wetlands affect offshore, that's not going to happen. If look at any parameter offshore, won't be able to state that. Sell wetlands for intrinsic value they have if you want to have scientific credibility.

VH – National folks include both submergent and emergent vegetation.

SB – Are we trying to protect Lake MI for a particular purpose, e.g., recreation? Need a major goal statement like that in the LaMP.

JBa – Need to make a matrix-type table to see which management issues we may be able to check off. Need to relate elements to management issues.

VH – One of the goals was to assess the effectiveness of management strategies.

NG – Need to put a structure to it.

JK – Has already drafted matrices for this. JK will send matrix to Hummer to send out to all component groups.

Network design background – Jack Kelly led this discussion.

JK made the following points to start the discussion:

- The NMN needs to assess coastal resources of the U.S.
- Top six resource components (Estuaries, Near Shore, Off Shore, Great Lakes, Rivers, Ground water) describe condition.
- Bottom three resource components (Atmospheric Deposition, Beaches, Wetlands): how do they influence the above six (flux and flow)?
- The Big Gap: near shore and coastal systems.
- NMN is to help track trends independently as well as in an integrated system.
- Need to identify management questions/ issues.
- Need to clarify some of the causes of coastal and lake impairment, these become "diagnostic aids".

Discussion followed:

GF – How about an adaptive plan that includes a subset of sampling locations at different scales?

JK – Ask what our objectives will be and ask if there is a different basis to put forward. Use points on a map as an example; can some management questions be satisfied with existing monitoring?

GF – Take a step back and ask about the science behind it.

CP – There is a national streamflow design.

AG – Riverine system designed nationally to say something about 90% of flow into the oceans.

GF – Arguing why it's arbitrary to choose, i.e., the 11 tributaries.

AG – Need to get to how to answer the management questions.

GF – The Grand and Fox could be the focus of the system for Lake Michigan. They are the ones that can most efficiently capture the dominant scales of variation.

GW – Most of what goes in is from the near shore zone, including from a number of tributaries to track the effects of nutrients.

JBe – If you look at AOCs and the 11 tributaries, what's missing are Grand Traverse Bay and the St. Joseph, Grand and Manitowoc rivers.

JK – Went over design with condition and trends objectives including the various components, network objectives, some design elements, and the question, "is existing monitoring 'compatible' with the objectives and design of the NMN?"

CP – How were the “Great Lakes” chosen as their own component?

JK – It’s so we can report out as a region. It’s a balance between not over-prescribing for Lake MI where the elements won’t carry over to the other Great Lakes. Pilots are a “regional gut check.”

CP – Then it’s almost incumbent on each of the other component groups to get the Great Lakes component done.

JK – Point is to cover flow into the lake where all points are represented. Need to think about consistent lakewide design.

RG – NMN design and IOOS – where is correlation occurring? Doesn’t address all of the IOOS societal goals. Group needs to determine early on what is included in this analysis.

JK – It’s a simple thing: assessment of the resource.

RG – Linkage needs to be brought on the ground re: the seven societal goals of IOOS.

JBa – Is this just a status study, or do we relate it to uses, ecosystem services.

CP – Discussion is just getting started; will likely raise more questions than answers. The key thing is that we need to define management issues.

RG – Also need to clearly describe definition of areas we’re looking at for the NMN.

JK – For example, how do we define embayments within the “estuary” component? Can incorporate near shore sensing technologies; an alternative to the “points on a map” scheme.

Inventory of Existing Data and Gap Analysis – Hummer delivered presentation on behalf of colleague Anne Sturm who joined the meeting via phone. The presentation focused on the compilation and utility of the Great Lakes Monitoring Inventory. The inventory includes all information from the older (circa 1999) Lake Michigan Monitoring Inventory, plus any new monitoring programs identified in the Lake Michigan basin since then.

Questions and discussion followed:

JK – How do we mine the database for components of the NMN?

AS – Need to search fields by key words for parameters or broader types of search. Sturm and Hummer will mine the inventory and send this information out to each component group.

AG – Is there a category for QA/QC?

AS – Yes. We asked what methods were used; how they were trained, etc.

Data management and access issues – Gauthier presented on this topic with a focus on the Integrated Ocean Observing System (IOOS) Data Management and Communication (DMAC) System, the Great Lakes Observing System, and how they integrate with the NMN.

Key points:

- IOOS promotes information integration and coordination; and advocates for the resources.
- Critical that LMMCC Pilot Study is looking at IOOS.
- Funding this element could come from a number of other sources over time.
- Previous data management systems have been on a “service-oriented architecture” (SOA) system.

- GLOS linkage to GLIN – a universe of information out there, but agencies don't have good knowledge of open source tools; human resources, or commitment of resources.
- GLOS is funding developing of GLIN-GIS servers.
- If this group can define data priorities, it will help advocate for funding resources.

JK – For the LMPS, we'll need to know what resources and funds are needed to facilitate the means, the concepts and make it happen before the demonstration phase.

RG – The tools are there; need to apply them to the application. Need to define where and what data is available and identify the impediments specific agencies might have for accessing their data.

JK – Need to identify these issues both during and after the Pilot Study.

Network design resource components: Coordinating Lake MI monitoring with Network design parameters – This was a discussion honing in on the nuts and bolts of what needs to happen for each resource component workgroup of the LMPS.

To set the stage, Judy Beck started the discussion with some comments on current management issues as identified in the Lake Michigan Lakewide Management Plan (LaMP):

Key points:

- Provided overview of the Binational Executive Committee (BEC). JBe presented the LMPS concept at their most recent meeting when she talked about the status of the LaMP.
- Need to brief the Canadians about this; JBe will keep BEC informed on the LMPS.
- Acknowledging comment earlier by RG: The seven IOOS societal goals may be another set of management goals to look at.
- The LaMP lists management goals at the beginning then by questions in various chapters.
- The LaMP pulled together watershed information, water quality information, societal information, and then articulated management issues. (JBe passed around handouts on various Lake MI watersheds the LaMP addressed.)
- The LaMP used a NOAA database to come up with land use trends.

Discussion followed:

JK – **The LaMP is a good place to start for integration of management issues with the NMN.**

JBe – Yes, the LMPS takes us one more step in detail on what LMMCC was set up to do. For instance, the Lake MI Mass Balance (LMMB) anniversary sampling may have been easier had this already been done. What should be the goal for 2010? We would like to have a plan from now till then; this effort will help with that.

JK – How does the LaMP speak to the resource components?

SBra – For example, GLNPO monitors open waters. Fish are impaired; need regulatory action to better control contaminants that are causing impairments. Need tool to better define what and where the problems are.

JBe – The LMMCC has been trying to come up with a better way to collaborate on a five-year cycle. The Lake MI Tributary Monitoring Project (LMMB 10-year anniversary

sampling) isn't perfect, but it's a next step to look at gaps. The LMMB Study was the driver. Need a more long-term plan.

GF – Looking at lakewide assessment is only one model. Canadians have done a great job with monitoring index stations, i.e., what are the index stations we could use to utilize resources efficiently.

NG – That's sort of been the National Water Quality Assessment (NAWQA) model.

CP – Need to continue to refine those models.

JBa – As scientists, how should we look at this resource? How comprehensive and inclusive are we going to be? For the health of ecosystem, e.g., drinking water parameters? Base it on current management issues or look to the future? How do we mix and blend these approaches?

RG – Huge conundrums. Coming to terms with monitoring objectives is quite cumbersome. For the Great Lakes Coastal Wetlands Consortium (GLCWC) Landscape Committee, we developed a decision tree (see

<http://glos.us/wiki/display/GLCW/Wetland+Monitoring+Decision+Tree>). This illustrates how organizations have approached their monitoring missions in one place; then you can discuss relevancy. Getting to details – attributes and monitoring points on a map – can be a distraction. The GLCWC decision tree can be a good model. There are a lot of entities whose missions can be solved with one or a couple monitoring approaches.

JBe – Wetlands priority identified by the Great Lakes Regional Collaboration is mainly a habitat issue for restoring wetlands, but what will be monitored there remains to be seen.

JK – Talking resource-by-resource is a practical starting point, but it eventually must be integrated. **If each resource group focuses on objectives that need to be satisfied rather than a pre-conceived design, this would be a more useful approach.**

CP – For flux-based components, need to separate these from the others.

RG – This group should focus more on tributaries rather than open lake; they have a more significant need for monitoring design.

GF – Disagree. Offshore data is limited. Don't have reasonable characteristics of open lake.

RG – Moorings and offshore observations will suck up all resources available.

CP – Goal is to say here's what we think is needed to respond to management questions over time. Need to think more broadly what is really lacking.

GF – Off shore sampling is diminishing.

JBa – Haven't noticed a big difference. Human use interest is likely more in the near shore. There is an unlimited amount of monitoring that can be done on any one component.

JBe – AOCs are one slice; another slice is the 11 LMMB tributaries.

VH – The Manitowoc has a large contribution of sediment for its size.

JBa – River and tributary monitoring is important, but need to ask the question what we're trying to get from the monitoring? Pollutant concentrations, loads?

GK – **Need to get a grip on management objectives first. The details then will come fairly easily. That should be the first step.**

AG – First major thought was "what is the condition of the resource?"

GF – If interested in resource, more off shore information is needed.

AG – The NMN was designed looking at the oceans first to find out where all the pollution is coming from. Still shouldn't divorce the thought process from the LaMP and near shore, such as AOCs. Need to add to those needs.

JBe – Need to solve problems that Congress and legislators are asking – swimming, beaches, eating the fish, etc. Need to answer these questions. Need to be somewhat practical; can use adaptive management to make it better.

CP – **Everyone should read the objectives from the NMN document.** (Hummer will send each component's objectives out.) The overall objectives can be applied to all components. The NMN is really about doing a status and trends, emerging issues program.

AG – Again, the LaMP can help identify those issues.

CP – When it comes to tributaries, we might want to consider their relationship to harbors, beaches, and recreational opportunities. Can nail major issues down to a half a dozen.

RG – Three of the seven societal goals of IOOS are outside the bounds of the NMN. This will help identify the pieces IOOS will address.

JBe – Areas of Concern (AOC) are really the embayments. Need to correlate with near shore.

CP – Need to leave with component groups engaged. Will need to integrate them in some fashion. The flow & flux groups should be tied together. Others are for particular status and trends.

JK – Think of them as discreet populations.

VH – Is it better to design them by constituents?

AG – Combine groups?

NG – Ground water folks will want to interact with near shore and beaches.

SG – First charge: monitoring questions?

CP – Yes, but also identifying specific management issues.

JK – Would like to use matrices – add columns with new objectives and environmental issues. Also on how they interact across categories.

TC – Are we supposed to look at existing programs and relate them to the NMN?

JK – Yes, and how they satisfy objectives.

VH – For management objectives – we can list them from the LaMP and relate them to the NMN document's objectives for each component.

NG – Is the LaMP divided into human-health-related and ecosystem-related objectives? A smaller set of management objectives may be better at this point.

JBe – Will take LaMP objectives and figure out which may be priorities.

JH – Hummer proposed five combined workgroups – with open membership (recruit as needed) for purposes of necessary interaction:

Combined groups and possible group members and leads:

Embayments and Wetlands

Embayments: Vicky Harris, Val Klump

Wetlands: Tracy Collin (lead), Don Uzarski, Tom Bernthal

Beaches and Near shore

Beaches: Shannon Briggs (lead), Sheridan Haack, Holly Wirick, Sandra McClellan

Near shore: Reuben Goforth (lead), USGS rep

Offshore and Great Lakes and Atmospheric Deposition

Offshore: Glenn Warren (lead?), Gary Fahnenstiel, USGS rep

Atmospheric Deposition: Melissa Hulting (lead), Marty Reich, USGS rep

Great Lakes: Judy Beck (lead); objectives accomplished via all other component groups – no additional members needed

River and Ground water

Rivers: Gary Kohlhepp, Charlie Peters (co-leads); Art Garceau, Jim Baumann
Ground water: Norm Grannemann (lead), Ken Bradbury

Data Management

Roger Gauthier (lead); Nate Booth, Steve Aichele, Pranas Pranckevicius

CP – Groups should communicate via conference calls, the LMPS Wiki, and email.

VH – Bring in outside experts as needed.

JK – Will assist with identifying management objectives, via component groups, as a first step. Will provide statistical and design consulting.

Next Steps

- Develop a matrix that links management issues to resource monitoring needs – Jack Kelly provide, John Hummer will send out, resource groups fill out.
- GLC will develop outline compartments for wiki input and parse portions of relevant documents (inventories, etc) as possible to various resource components.
- Continue to recruit members to each component workgroup.
- Resource component group members to add appropriate information to the wikis.
- Resource workgroups should define their terms.
- Provide guidance to workgroups on matrix, NMN objectives (status and trends, emerging issues, goals and standards), design guidance, comparability, data management, management issues.
- Jack will provide the Lake Superior Monitoring Model.
- Judy will provide refined LaMP management issues.
- Judy, Jack, Art, John, and Charlie will act as a steering committee to move the effort of the resource component groups forward.
- Connect with like groups in other pilots and the network refinement workgroups.

Timeline

May – Develop component groups and identify people to serve on Network refinement groups, provide guidance to component groups, initial development and population of wikis.

June – GLC mine existing information, component groups fill out matrix, continue to populate wikis, confirm inventory, discuss rationale for monitoring design and develop initial design.

July – Component groups finish developing and refine component designs, discuss data comparability and management issues, and develop costs of current monitoring by component.

August – Define component monitoring gaps and costs; develop how filling gaps will improve how management issues are addressed.

September – Pull all resource components together and make sure the system is integrated, refine designs, develop component summary reports/

October – Develop presentation for State of Lake Michigan Conference, Hold 2nd face to face workshop, and refine summary reports.

November – Develop draft Lake Michigan Pilot Study report.