Components of a Comprehensive Regional Mercury TMDL

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Elements of a TMDL Required by Statute

- Loading capacity;
- Wasteload allocation;
- Load allocation;
- Margin of safety; and
- Seasonal variation.

Key Elements of TMDL

1. Describe quantified water quality goals, targets, or endpoints. The TMDL must establish numeric endpoints for the water quality standards, including beneficial uses to be protected, as a result of implementing the TMDL. This often requires an interpretation that clearly describes the linkage(s) between factors impacting water quality standards.

2. Analyze/account for all sources of pollutants. All significant pollutant sources are described, including the magnitude and location of sources.

3. Identify pollution reduction goals. The TMDL plan includes pollutant reduction targets for all point and non-point sources of pollution.

Key Elements of TMDL

4. Describe the linkage between water quality endpoints and pollutants of concern. The TMDL must explain the relationship between the numeric targets and the pollutants of concern. That is, do the recommended pollutant load allocations exceed the loading capacity of the receiving water?

5. Develop margin of safety that considers uncertainties, seasonal variations, and critical conditions. The TMDL must describe how any uncertainties regarding the ability of the plan to meet water quality standards will be addressed. The plan must consider these issues in its recommended pollution reduction targets and must provide reasonable assurances that the appropriate load reductions will be implemented.

Key Elements of TMDL

6. Provide implementation recommendations for pollutant reduction actions and a monitoring plan. The TMDL should provide a specific process and schedule for achieving pollutant reduction targets. A monitoring plan should also be included, especially where management actions will be phased in over time and to assess the achievement and validity of the pollutant reduction goals.

7. Include an appropriate level of public involvement in the TMDL process. This is usually met by publishing public notice of the TMDL, circulating the TMDL for public comment, and holding public meetings in local communities. Public involvement must be documented in the state's TMDL submittal to USEPA Region 5.

Traditional Single Ecosystem TMDL

- Identify and quantify all sources of contaminant to water body of interest.
- Develop a hydrologic and contaminant mass balance model (ideally calibrated and verified)
- Predict load reductions necessary to meet target endpoint with appropriate margin of safety factor applied
- Allocate requisite source reductions to meet TMDL.

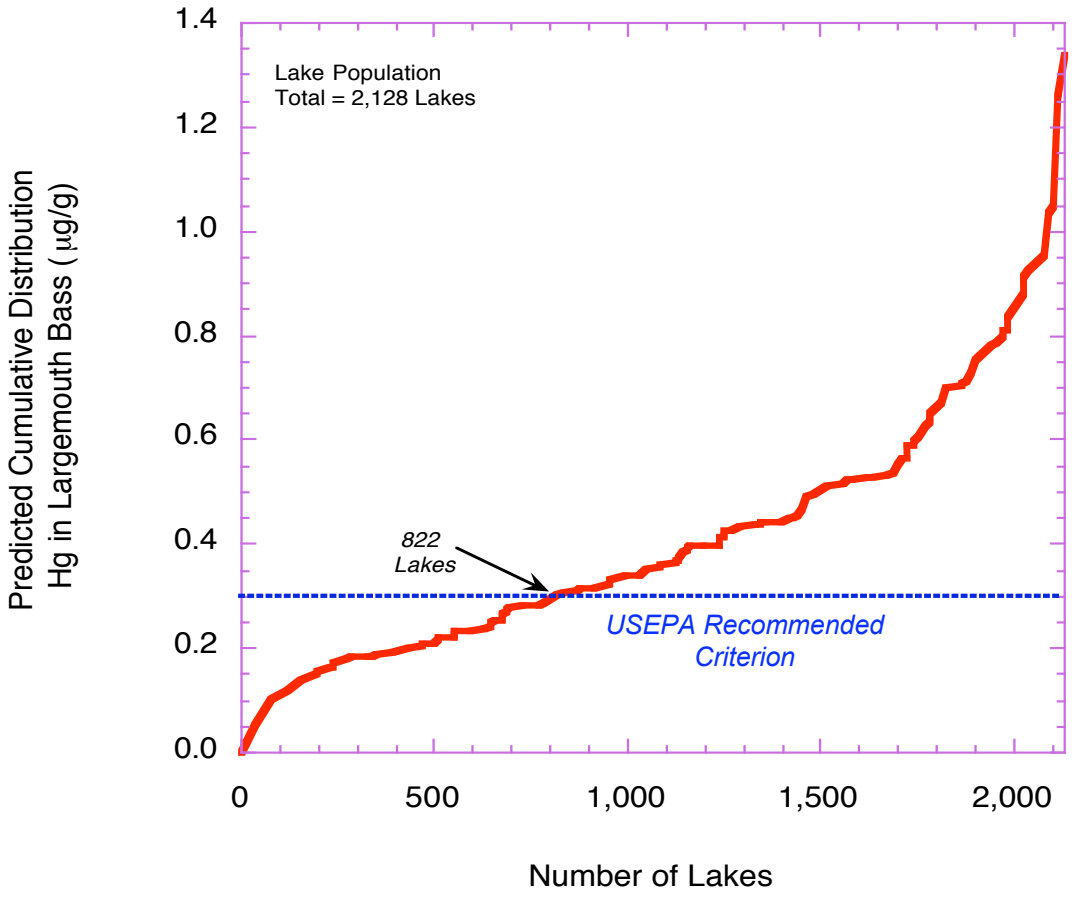
Individual Aquatic Ecosystem TMDL's for Florida

- Number of systems for which a TMDL would need to conducted and implemented would be prohibitive, both in terms of time and expense.
- Depending upon the endpoint selected, the number of lakes ***alone*** in Florida that would require a TMDL ***would be at least***:
  - 0.5 mg/kg = 637 lakes
  - **0.3 mg/kg = 1,306 lakes** **(USEPA recommended criterion based on human consumption)**
  - 0.2 mg/kg = 1,684 lakes (State of Minnesota endpoint)
- By comparison, Minnesota elected to use a regional approach that initially included 824 lakes and 43 rivers covered by the regional mercury TMDL. Number of systems included was subsequently revised to include 329 lakes and 18 rivers.

Regional TMDL

- Precedence for conducting *regional vs. individual* lake modeling as a policy assessment and analysis tool was first established with the National Acid Precipitation Assessment Program (NAPAP)1990 Integrated Assessment in conjunction with the Clean Air Act Amendments (CAAA).
- Regional lake acidification models have been applied to:
  - Adirondacks
  - Upper Midwest (Minnesota, Wisconsin)
  - **Florida**
- Objective was to predict how changes in atmospheric inputs of sulfate would change the acid-base chemistry characteristics of populations of lakes within a region (*e.g.,* with a reduction of sulfate loading of 25%, the number of lakes with pH less than 5.0 would decrease from *x* lakes to *y* lakes.
- Similar to sulfate (acid deposition), Hg inputs are predominantly atmospheric and, within a given region or sub-region, the sources to all listed water bodies likely will be essentially identical.
- In March, 2007, Minnesota Pollution Control Agency (MPCA) received approval from USEPA for statewide Hg TMDL using a regional *ecoregions* approach.

Predicted Cumulative Distribution of Mercury Concentrations in Largemouth Bass in Florida Lakes



822 lakes out of 2,128 lakes predicted to have LMB Hg *less than* 0.3 mg/kg;

1,306 lakes predicted to have LMB Hg *greater than* 0.3 mg/kg

Mercury Contamination in Aquatic Ecosystems is Largely an Atmospheric Deposition Problem

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Most sensitive systems in Florida are:

- Florida Everglades Protection Area - > 98% direct atmospheric inputs of Hg
- Softwater seepage lakes - ~ 90% to > 99% direct atmospheric inputs
- Upper reaches of high DOC riverine systems (% unknown, but very likely wholly atmospheric)

Analyze/account for all Sources of Pollutants