



### **Numeric Target(s)**

*Submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.*

Clear Lake's designated uses are primary contact recreation (A1), aquatic life (B(LW)), potable water source (C) and high quality resource (HQR). The impaired use is primary contact recreation because of aesthetically objectionable blooms of algae and the presence of nuisance aquatic species. The applicable water quality standard (567 IAC 61.3(2)(c) is narrative. The limiting nutrient for algal growth is determined to be phosphorus and the TMDL uses the relationship of phosphorus to chlorophyll and Secchi depth described through Carlson's Trophic State Index (TSI) to set a numeric phosphorus condition of  $TSI(TP) < 70$ . This target should result in the  $TSI(CH)$  (Chlorophyll) and  $TSI(SD)$  Secchi Depth) both  $< 65$ .

### **Link Between Numeric Target(s) and Pollutant(s) of concern**

*An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g. parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety that do not exceed the load capacity.*

The submittal links algal density to phosphorus loading, chlorophyll concentration and Secchi transparency (depth) through use of TSI conditions. Nutrient ratios suggest phosphorus limitation in this lake. The phosphorus load relationship to inlake phosphorus concentrations is modeled through the use of the Vollenweider 1982 Combined OECD Lake Model. The allocations and margin of safety do not exceed the load capacity.

### **Source Analysis**

*Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, non point and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered.*

Clear Lake is influenced only by nonpoint sources of phosphorus loading. A two-year diagnostic study estimated phosphorus load as 31% rainfall, 24% marsh inflow, 19% agriculture, 10% urban and residential, 9% internal marsh load and 7% groundwater. There are no point source discharges but there are stormwater runoff from urban and residential areas. The diagnostic study determined that rainfall concentrations of phosphorus were higher than the usually assumed concentrations. All significant sources have been considered.

### **Allocation**

*Submittal identifies appropriate wasteload allocations for point, and load allocations for nonpoint sources. If no point sources are present the wasteload allocation is zero. If no nonpoint sources are present, the load allocation is zero.*

Phase I of this TMDL sets the phosphorus load allocations to result in a TSI(TP) <70 which will result in TSI(SD) and (CH)<65. The load capacity is set to 9,500 pounds per year.

**WLA Comment**

There are no permitted point sources located in this watershed, the WLA is set to zero.

**LA Comment**

The nonpoint load allocation is set to 9,100 pounds per year.

**Margin of Safety**

*Submittal describes explicit and/or implicit margin of safety for each pollutant. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided.*

The MOS is explicit, it is set at 10% of the non-background phosphorus load (400 pounds per year).

**Seasonal Variation and Critical Conditions**

*Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s).*

The TMDL was determined based on the annual phosphorus load that results in the targeted TSI(TP) during the growing season which is the period for which increased algal populations are seen.

**Public Participation**

*Submittal describes public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s).*

This TMDL was placed on public notice on the IDNR TMDL web site. In addition, a presentation was made on the process to the Clear Lake City Council on June 21, 2004 and presented at a public meeting in Clear Lake on January 19, 2005. Comments received were, where appropriate integrated into the document.

**Monitoring Plan for TMDL(s) Under Phased Approach**

*The TMDL identifies the monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used).*

Follow-up monitoring will continue to meet, at a minimum, the minimum data requirements established by Iowa's 305(b) guidelines. An assessment will be completed by 2010 containing 3 lake samples per year for three years or 10 lake samples over a two year period.

The CLEAR project has continued sampling at the sites used during the diagnostic study. Iowa State is also currently working on methodology to better estimate the contribution of

rainfall loaded phosphorus and this data will be reviewed for incorporation into phase II of this TMDL.

**Reasonable assurance**

*Reasonable assurance only applies when reduction in nonpoint source loading is required to meet the prescribed waste load allocations.*

No waste load allocation is included in this TMDL, reasonable assurances do not apply.

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