

CLARK FORK-PEND OREILLE WATERSHED MONITORING, 2003

EXECUTIVE SUMMARY

This report summarizes water quality data collected in the Clark Fork-Pend Oreille Basin in 2003 by the Tri-State Water Quality Council. Analyses presented in this study describe the temporal and spatial variability in concentrations of algal nutrients, heavy metals and periphyton (attached algae) in the Clark Fork-Pend Oreille watershed.

The Tri-State Water Quality Council established seven priority water quality monitoring objectives for the Clark Fork-Pend Oreille watershed. These include:

- 1) Evaluating time trends in nutrient concentrations in the mainstem Clark Fork River and selected tributaries;
- 2) evaluating time trends for algal standing crops in the Clark Fork River;
- 3) monitoring compliance with established summer nutrient concentration target levels in the Clark Fork River;
- 4) estimating nutrient loading rates to Pend Oreille Lake from the Clark Fork River;
- 5) evaluating time trends for algal standing crops in near-shore areas of Pend Oreille Lake;
- 6) evaluating time trends for Secchi disc depth in Pend Oreille Lake; and
- 7) evaluating time trends for nutrient concentrations in the Pend Oreille River.

Nutrient constituents monitored included total phosphorus, total nitrogen (total Kjeldahl nitrogen plus nitrate + nitrite nitrogen), total soluble inorganic nitrogen (nitrate + nitrite plus ammonia nitrogen), and dissolved ortho-phosphorus (soluble reactive phosphorus). Metals constituents included total recoverable and dissolved fractions of copper, zinc, and cadmium. Attached algae levels were measured in terms of chlorophyll *a* and ash-free dry weight from natural substrate samples. Water quality records from 15 river stations and 7 lake stations in a three-state area were analyzed. This study represents the sixth consecutive year of river and lake sampling.

This summary assessment report focuses on water quality status and spatial patterns reflected in instream concentrations of the selected monitoring variables. The report does not provide an in-depth assessment of long-term time trends in the data set, nor does it include an appraisal of nutrient loading to Pend Oreille Lake. Those monitoring objectives are addressed in separate reports, the first representing monitoring during the 1998-2002 time period (Land & Water 2004). The 2003 data described in this report will be analyzed for time trends as part of a planned second assessment report covering the years 2003-2007.

In general, nutrient concentrations in 2003 were lowest at the Thompson River site. Nutrient concentrations in the Clark Fork River from below Thompson Falls Dam to below Cabinet Gorge Dam tended to be higher than the Thompson River, but comparable to each other. Several constituents showed slight downstream increases, depending on the season. Nutrient concentrations in the Pend Oreille River in Washington were lower

than in the Clark Fork River and comparable to the Thompson River. This general pattern existed for total nitrogen, total soluble inorganic nitrogen, and total phosphorus, as well as for most field constituents. Soluble reactive phosphorus was highest in the Thompson River, but generally similar to concentrations measured at the Clark Fork and Pend Oreille River sites.

Total recoverable and dissolved metals constituents were generally low during the 2003 calendar year, with median values often at or below the analytical detection limits. Concentrations above the limits of detection did occur, however, and these were usually associated with high flow events during the late-winter or spring periods.

Measured summer nutrient concentrations in the Clark Fork River during 2003 generally exceeded the established nutrient target levels. Median total nitrogen concentrations exceeded the instream target of 300 µg/L at five of nine monitoring stations. Median total phosphorus concentrations exceeded the instream target of 20 µg/L at three stations above Missoula. Median total soluble nitrogen concentrations exceeded the instream target of 30 µg/L at four sites, and median soluble reactive phosphate concentrations exceeded the instream target of 6 µg/L at six sites in 2003. Median summer concentrations for all measured nutrient variables were below the established targets at Clark Fork monitoring stations above Missoula and above the Flathead River confluence. To achieve target level compliance, no more than one of ten samples can exceed the established target value. Target level compliance was met for total nitrogen at the Clark Fork above Missoula, for total phosphorus at Huson and above Flathead, and for total soluble inorganic nitrogen at Bonita and above Missoula.

Algal standing crops in the Clark Fork River in 2003, measured as chlorophyll *a*, were comparable to those seen in previous years but with a few exceptions. The four Clark Fork monitoring stations above Missoula (at Deer Lodge, above Little Blackfoot River, at Bonita, and above Missoula) all showed decreases from 2002 to 2003. The three sites below Missoula (below Missoula, at Huson, and above Flathead) all showed increases from 2002 to 2003. The Clark Fork at Deer Lodge had a lower mean chlorophyll *a* value in 2003 than in all previous years of monitoring (1998-2002). Mean chlorophyll *a* concentrations met the established instream summer mean target of 100 mg/m² at five of seven monitoring stations in August 2003 (Deer Lodge, above Little Blackfoot River, above Missoula, at Huson, and above Flathead River) and at three of seven stations in September (above Missoula, at Huson, above Flathead). When samples from August and September are combined, four of seven sites met the summer mean target (100 mg/m²), including the Clark Fork above the Little Blackfoot, above Missoula, at Huson, and above the Flathead. Additionally, all sites except the Clark Fork River above Flathead had at least one sample in August or September that exceeded the target maximum concentration (150 mg/m²). In general, algal standing crops were higher in September than in August 2003.

Mean algal standing crops in Pend Oreille Lake, measured as chlorophyll *a* from natural substrates, were slightly higher in 2003 than during any previous sampling year (1998-2002) when data for all monitoring stations are pooled. However, the data for individual stations were generally within the ranges of values seen in previous years. Chlorophyll *a*

concentrations increased from 2002 to 2003 at Bayview (11.27 mg/m² versus 1.44 mg/m²) and Trestle Creek (9.90 mg/m² versus 0.85 mg/m²). The lowest mean chlorophyll *a* values in Pend Oreille Lake during 2003 were measured at Sunnyside (7.1 mg/m²), while the highest values were measured at Springy Point (12.8 mg/m²).

Open water Secchi depth readings were higher in 2003 than in any previous year of monitoring under the Tri-State program. Pend Oreille Lake at Bayview exhibited the highest median value of the three monitoring sites, with the highest readings observed during winter months.

The 2003 monitoring program is the first year of a second five-year data collection cycle. A comprehensive analysis of water quality status, trends and nutrient loads will be performed following the 2007 monitoring year, similar to the recently completed analysis of the 1998-2002 data set.