Summary of the Clark Fork River Voluntary Nutrient Reduction Program 1998-2008

Draft prepared by V. Watson, UM Professor Emeritus, 11/2018

In the 1980's the Clark Fork River was determined to be impaired by excess nutrients and algae from Warm Springs Creek to the confluence with the Flathead. The EPA granted permission for Montana to try a voluntary approach to addressing these impairments, and in 1994 a Nutrient Target Subcommittee was formed to develop a Voluntary Nutrient Reduction Program (VNRP) with nutrient and algae targets, actions to reduce nutrient levels to targets, and a monitoring plan.

Committee participants included: cities of Butte, Deer Lodge, Missoula; Missoula County, Stone Container, Clark Fork Coalition, UM, Montana Department of Environmental Quality and EPA.

The VNRP called for actions to be taken over a 10 year period to reduce nutrient loading from four key point source dischargers and from key nonpoint sources. At three-year intervals, the VNRP targets, discharger actions, and river water quality were to be evaluated and revisions made as needed. The goal was to achieve instream targets and restore beneficial uses by the end of the 10 year period.

Targets are: attached algae chlorophyll a: 100 mg/square meter (summer mean) and 150 mg/square meter (peak); Total Nitrogen 300 ug/L; Total Phosphorus 20 ug/L upstream of Missoula's Reserve Street (where Cladophora is a problem so a 15:1 N:P ratio is desired) and 39 ug/1 downstream. Based on river monitoring, Mike Suplee of DEQ and Vicki Watson of UM recommended applying the 20ug/L TP standard throughout the river, but that awaits an update of this TMDL.

VNRP participants agreed to these and other measures :

Tri-State Implementation Council (later the Tri-State Water Quality Council) would provide oversight of the VNRP. However, funding for the Council ran out in 2012, and the council's duties were taken on by DEQ and the Coalition.

MT DEQ: implement subdivision review procedures to reduce water quality impacts; work with Missoula to address septic effluent & groundwater-surface water issue; work with Tristate Council to develop strategy to reduce nonpoint sources.

Clark Fork-Pend Oreille Coalition: participate in subcommittee to monitor and evaluate program effectiveness.

All 3 cities agreed to continue the phosphate detergent ban and agreed to these additional measures:
Butte-Silver Bow: augment flows in Warm Springs Creek from Silver Lake; install effluent pump at sewer plant.
City of Deer Lodge: land apply municipal wastewater (this occurred from about 1998 to about 2011.
City of Missoula: upgrade wastewater treatment to biological nutrient removal (accomplished in 2004);
With county, address septic effluent/groundwater issues; offer incentives to connect to public sewer; modify subdivision regulations to encourage higher density housing & connection to sewer; encourage land application; connect 50% of Missoula's existing septic systems to sewer.

Stone Container Corporation: reduce nutrient loading to river by early start-up of color removal plant at low flows; no direct discharge to river in July-Aug or below 4000 cfs; in summer, use storage ponds farthest from river. (Note the pulp mill ceased operation in 2010).

River monitoring has continued since the adoption of the VNRP, and the subcommittee continues to meet annually to discuss strategy. Periodically, monitoring results are summarized in a trends report, and the latest report is summarized on the next page.

HydroSolutions. 2014. Clark Fork River Water Quality Trends Report 1998–2012. Helena, MT.Prepared for Montana Department of Environmental Quality, Helena, MT and Avista Corporation, Spokane, WA.
Full document (pp) at http://clarkfork.org/wp-content/uploads/2016/03/1998-2012-Nutrient-Trend-Report-.pdf

EXECUTIVE SUMMARY (shortened and updated by V. Watson)
This report was completed by HydroSolutions for the Clark Fork River Water Quality Monitoring Committee under contract with Montana DEQ and Avista Corporation. This report addresses these objectives:

1..Summarize history of problems with nutrients & attached algae and efforts to reduce nutrient loads to the river
2. Evaluate time trends in nutrient and attached algae levels in the Clark Fork River from 1998-2012
3. Estimate nutrient loading to Lake Pend Oreille from the Clark Fork River from 1998-2012

History: The Clark Fork mainstem was determined to be impaired by excessive nutrients and algae in the 1980's and a Voluntary Nutrient Reduction Plan was developed in 1998 and accepted as a TMDL by EPA in a letter that translated the VNRP information into TMDL language. The plan spelled out nutrient & algae targets, actions to reduce nutrient levels to the targets, and a monitoring plan.

Load reduction actions included:
Phosphate detergent ban adopted in 1989; Missoula connected thousands of homes to the sewer and upgraded its WWTP to biological nutrient removal in 2004 and now land applying some effluent to a tree farm; Butte constructed stormwater retention basins, upgraded WWTP and used effluent to grow sod in summer; Deer Lodge replaced leaking sewer lines and temporarily land applied effluent (now proposing an upgrade of their treatment facilities); pulp mill near Frenchtown closed in 2010; Hamilton WWTP upgraded; Stevensville replaced unlined polishing lagoons.

Monitoring & Data Analysis:
Trends in nutrient levels were based on statistical analysis of summer data (July-Sept) from 13 long-term monitoring stations in the Clark Fork River basin extending from the headwaters (confluence of Silver Bow Creek & Warm Springs Creek) to the Clark Fork River below Cabinet Gorge Dam. Nutrients assessed included total and soluble forms of nitrogen and phosphorus. Trends in attached algae levels focused on 7 monitoring stations, extending from the Clark Fork River near Deer Lodge, to the Clark Fork River above the Flathead River.

Nutrient loading analysis evaluated total phosphorus TP and total nitrogen TN loads to Lake Pend Oreille from the River based on year-round data at Station CFR-30, Clark Fork River below Cabinet Gorge Dam, 1998–2012.

Conclusions based on monitoring results and loading analysis from 2998-2012:

•Overall, total and soluble N (TN and TSIN) levels held steady in the Clark Fork River at all monitored sites except Station CFR-18, Clark Fork River below Missoula where the levels have been significantly lowered – probably by the great reductions in loading from the Missoula WWTP.

•Summertime TP levels have been declining since 1998 in the upper and middle Clark Fork River above the confluence with the Flathead River and holding steady in the lower river. Summertime SRP levels appear to be on the rise since 1998 in the upper and lower Clark Fork River. The only decreasing trend in SRP was found at CFR-18, Clark Fork River below Missoula where all nutrients have decreased.

•Attached algal levels are holding steady in the Clark Fork upstream of Missoula and have been declining since 1998 in the river below Missoula.

•Nutrient loading from the Clark Fork River to Lake Pend Oreille varies year to year in proportion to inflow from the watershed. In years when inflow exceeds the long term average, the TP load exceeds the target load of 259,500 kilograms per year (target based on Montana-Idaho Border Agreement). The estimated TP load exceeded the allocated target load four times since 1998 (in 2006, 2008, 2011, and 2012).TN loads were evaluated, but no target load exists (Lake Pend Oreille is considered to be P-limited).

Nutrient loads to the river from point sources were estimated to be reduced by 361 TN & 230 TP kg/day by 2005 (Suplee et al 2012). ***This reduction is about 27% and 38% of the annual TN & TP loads reaching Lake Pend Oreille (averaged from 1998 to 2012)!***

Suplee et al 2012. Response of algal biomass to large-scale nutrient controls in the Clark Fork River,MT. JAWRA 48(5):1008-21. That paper is available online here https://doi.org/10.1111/j.1752-1688.2012.00666.x

Note: Hydrosolutions will release a new trend report at end of 2018 which will cover monitoring data from 1998 to 2017. That report will show that the total Nitrogen standard is being exceeded less frequently in recent years in much of the river, but the total P standard is being exceeded more frequently.