McKenzie Watershed Water Quality Discussion Article

Oregon Department of Environmental Quality Report: Water Years 1996 – 2004

"…fostering better stewardship of the McKenzie Watershed resources through voluntary partnerships and collaboration…"

Introduction

The McKenzie River, at tributary of the Willamette River, is an important regional resource for Oregonians living in southern Willamette valley in Western Oregon. It provides high quality drinking water, hydroelectric energy, and world-renown recreation and fishing, as well as providing habitat for endangered salmon.[1] However, its predicted that within the next 50 years, the area's urban population of approximately 250,000 will double, increasing the challenges of maintaining the current high water quality and outstanding amenities provided by the river. In an effort to protect this resource, the McKenzie Watershed Council (MWC or Council) strives to balance the economic, social and environmental needs of the McKenzie Watershed.

The Council manages a comprehensive and award winning water quality program, which tracks and documents water quality throughout the system. The program includes three components (ambient, tributary, and macroinvertebrate) which fit together to provide a better understanding of the quality of water throughout the McKenzie Watershed. A MWC Water Quality Committee is convened regularly to directly oversee the Monitoring Program.[2]

McKenzie Watershed Water Quality Report: Water Years 1996-2004

The monitoring program was formed with the goal of identifying the long-term water quality trends for the McKenzie River and key tributaries. This program has been underway since November 1995 and samples seven sites on the McKenzie River, ranging from McKenzie River at Highway 126 (downstream of Clear Lake) near the headwaters to McKenzie River at Coburg Road, near the confluence with the Willamette River. It also tracks three tributaries – the Mohawk River, the Blue River, and the South Fork of the McKenzie. Important trend information from the monitoring provides good baseline water quality information, as well as serves as the basis for the MWC's Restoration Program.

McKenzie Watershed Council
Monitoring Program Objectives

- Monitor the overall health of the McKenzie River
- Determine if and how water quality in the McKenzie River is changing over time, accounting for natural and seasonal variation
- Provide credible data upon which management decisions can be made
- Provide an affordable and sustainable measurement tool to evaluate the effectiveness of steps taken to protect and enhance water quality in the basin
- Provide an early warning system to signal if any adverse trends are developing
- Use historical data to develop longer trends

The Oregon Department of Environmental Quality Laboratory Division (ODEQ) collects and analyzes all of the data with exception of fecal coliform and E. coli, which are analyzed by the Oregon Health Division Laboratory. According to DEQ's Oregon Waters Quality Index (OWQI)

[1] Eugene's drinking water (McKenzie River) received the best ranking in a 2004 study conducted by *Organic Style* magazine.

[2] At least 1 representative appointed from at least the following interest groups comprise the Committee: City of Eugene, City of Springfield, Eugene Water & Electric Board, Mohawk Watershed Partnership, Springfield Utility Board, timber industry, U.S. Bureau of Land Management and U.S. Forest Service.

six of the top ten ambient water quality monitoring sites across the State are located on the McKenzie River (2004).

The following discussion expands upon the trends found in the May 2005 DEQ Water Quality Report, which can be found on the MWC website at www.mckenziewatershedcouncil.org.

Biochemical Oxygen Demand (BOD_5)

BOD_5 measures the amount of oxygen consumed by decaying organic matter and microorganisms in the water over a five-day period. Streams that are polluted or have a lot of plant growth and decay will have a high BOD_5 level, while those that are relatively clean will have a low level.

BOD_5 levels in the McKenzie show an upward trend, away from the previous healthy levels. Despite the fact that there is no data to determine the cause of the increase of BOD_5 at the McKenzie Bridge site, the Eugene Water & Electric Board (EWEB) is currently conducting a Septic System Survey that could target areas for improvement above the Hayden Bridge intake facility.

Dissolved Oxygen (DO)

Oxygen is as important to life in water as it is to life on land. Most aquatic plants and animals require oxygen for survival and the availability of oxygen affects their growth and development. The amount of oxygen found in water is called the dissolved oxygen concentration (DO). DO is a very important measure of the health of a stream – the presence of oxygen in water is a positive sign, the absence of oxygen in the water is often a sign that the stream is polluted.

DO levels in the system are decreasing. Though the cause for the decreasing trend in DO at the South Fork, Blue River, and Hendricks Bridge sites is unknown, the trend could be due to temperature changes throughout the system stemming from the U. S. Army Corps of Engineers Temperature Control Project or recent blue green algae blooms (cyanobacteria species) in the system's reservoirs.

Nitrate/Nitrite Nitrogen

Nitrogen is present in water as nitrates and nitrites, and continually changes from one molecule to another as it is processed in the food chain and the water column. Excessive amounts of nutrients, especially nitrogen and phosphorus, speed up the eutrophication process, the slow, natural nutrient enrichment of streams and lakes responsible for the "aging" of ponds, lakes, and reservoirs. As algae grow, die, and decompose, they deplete the dissolved oxygen in the water. In this way, high concentrations of nitrogen compounds can result in fish kills, offensive odors, unsightliness, and reduced attractiveness of the water for recreation and other public uses.

There is no data to conclude why all sites with exception of South Fork have significantly decreasing nitrate/nitrite nitrogen trends however, this is a positive trend for the watershed.

pH

pH is an important measure of the acidity or alkalinity of water, and is a critical quality because many plants and animals are sensitive to slight changes in pH. There are many natural processes that can affect pH including changes in temperature, oxygen and carbon dioxide levels, and changes can also be a product of organic decomposition in the water. Additionally, pH changes can result from the discharge of various man-made pollutants.

Monitoring trends in the McKenzie indicate an increase in pH, or a trend toward less acidic water. Increases in pH trends at the South Fork, Mohawk and Coburg sites may be related to the time of

sampling event. Levels of pH change throughout the day (diurnal), therefore if sampling events occur at different times it may explain the increasing trend.

Temperature

Proper water temperature is an important factor for the survival of aquatic plants and animals. Temperature directly affects the growth, migration, spawning, and activity of animals, and may directly impact the lifecycle of aquatic plants. It also affects many of the physical, biological and chemical characteristics of a stream.

The increase in grab temperature trends at the South Fork and Blue River sites may be due to the regulated streams within the system. Three impoundments exist in the McKenzie system: Blue River, Cougar and Leaburg. The statistically significant temperature increases noted were likely the result of the relationship between sample dates and reservoir operations, especially at South Fork where the Army Corps of Engineers is now intentionally operating the reservoir to increase temperatures during substantial portions of the year.

The ODEQ has been developing Total Maximum Daily Loads (TMDLs) for the Willamette Basin including the McKenzie Subbasin. TMDLs represent detailed plans for bringing the Willamette River and its tributaries back into compliance with water quality standards. Specifically, the McKenzie River is listed for having exceeded the State's temperature standard.

TMDLs for temperature highlight the need to restore natural riparian vegetation throughout the Willamette Basin. The direct discharge of treated wastewater or cooling water can also be a source of heating, as can reservoir operations. The selective withdrawal modifications at Cougar Reservoir represent an attempt to mitigate the reservoir's effects on downstream temperatures.

Total Solids

As the name indicates, total solids is a measure of the amount of solid or particulate matter suspended in a solution. The concentration of total solids differ from turbidity, a measure of the cloudiness of the water, by the fact that solids typically will settle out of solution quickly when the water is not flowing.

There is no data to conclude the cause of increase in total solids at the South Fork and Clear Lake sites. Refilling the Cougar Reservoir after completion of the Army Corps of Engineers Temperature Control Project, in addition to increased road and activity in the area may have had an impact on total solid counts.

Conclusion

Council programs, in collaboration with other agencies and the residents of the McKenzie basin continue to preserve high water quality at high levels, while conducting outreach and education efforts to ensure water quality issues are shared community goals.

Since 1995, the Council has supported DEQ monitoring in the basin to identify water quality trends. In August 2005, the MWC Water Quality Committee decided to redirect the funds that were supporting the DEQ's monitoring efforts to support a more proactive approach to watershed monitoring. The ODEQ will continue to monitor three of the seven sites for statewide water quality trend analysis. Over the next few months the Committee will finalize the new monitoring plan and will begin sampling in January 2006. The potential of a collaborative long-term watershed monitoring program is significant in that it:

1) Establishes an interagency watershed monitoring system to collect data and

information about the health of the river over the long term;
2) Acts as a clearinghouse for agency or organization specific monitoring data and information;
3) Establishes a GIS-based website to disseminate this information to the public, local schools, partner agencies and academia;
4) Produces an annual interagency state of the watershed report that pulls together all monitoring activities and data into a concise discussion that can be used to educate residents and other watershed stakeholders, and
5) Allows local, state and federal partners to identify watershed priority areas based on monitoring data and better collaborate on restoration and protection projects as well as establish pre- and post- project monitoring over time.

The McKenzie Watershed Council has been involved in monitoring and tracking water quality in the McKenzie since 1995. The monitoring program is an integral piece of the *McKenzie River Watershed Conservation Strategy* (January 2002). The intent of the *Conservation Strategy* is to work with local communities and other interests to define a future for the watershed that includes a healthy ecosystem which supports thriving social and economic systems.

The *Conservation Strategy* outlines a variety of ways to achieve the MWC mission of improving the watershed through voluntary conservation actions, education, and voluntary landowner partnerships. These collaborative actions build upon the principles outlined in the *Oregon Plan for Salmon and Watersheds.* Since its inception the McKenzie Watershed Council has worked to foster better stewardship of McKenzie Watershed resources through voluntary and collaborative partnerships.