

# Powder Basin Water Quality Status Report and Action Plan Summary

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Department of  
Environmental  
Quality

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restoring, maintaining and  
enhancing the quality of  
Oregon's air, land and  
water.*

This document summarizes DEQ’s updated look at the status of water quality in northeast Oregon’s Powder River Basin. It examines possible sources of pollutants, water quality trends in the basin, specific pollutants of concern and plans to improve water quality in the basin.

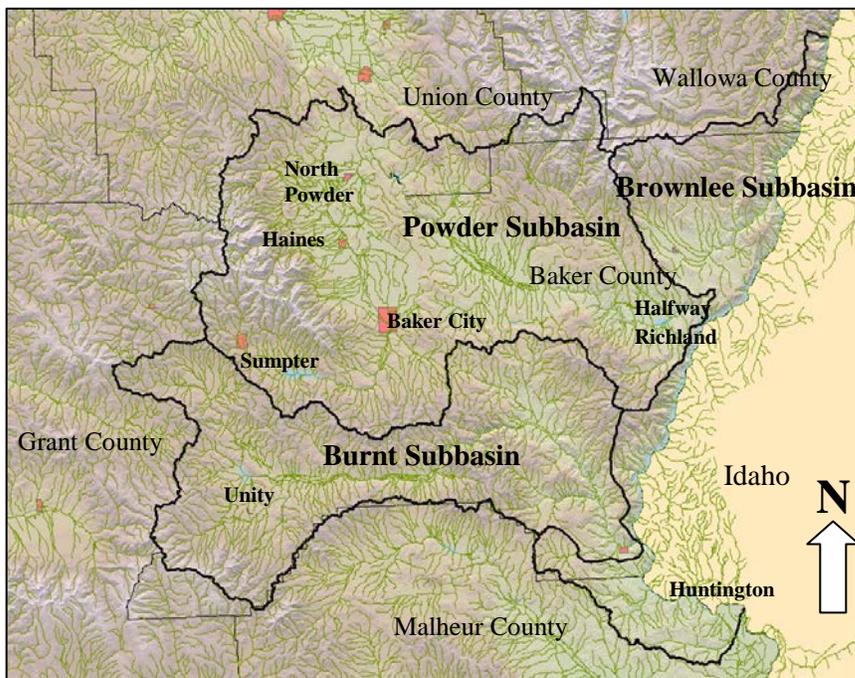
Streams in the Powder Basin flow from headwaters in the Blue Mountains eastward to the Snake River, along the Oregon/Idaho border. Major streams include the Burnt River, Powder River and Pine Creek. These streams provide irrigation and drinking water for residents in the area as well as habitat for many species of fish and wildlife.

Local groups as well as federal and state agencies have been working to address water quality issues in the Powder Basin for many years. In 2011, DEQ initiated a watershed approach process which examined a wide variety of watershed issues. The watershed approach included development of a Basin Status Report and Action Plan for various watersheds. The Status Report summarizes DEQ’s current knowledge of water quality conditions for the Powder Basin, while the Action Plan identifies priority actions and sets the stage for implementation. DEQ hopes this holistic approach will allow for more input from people in the basin that in turn will guide water quality improvement.

This plan is an initial version and should not be viewed as a static or final document. It builds on previous studies and assessments and attempts to summarize available information in a way that’s useful for planning and identifying future actions.

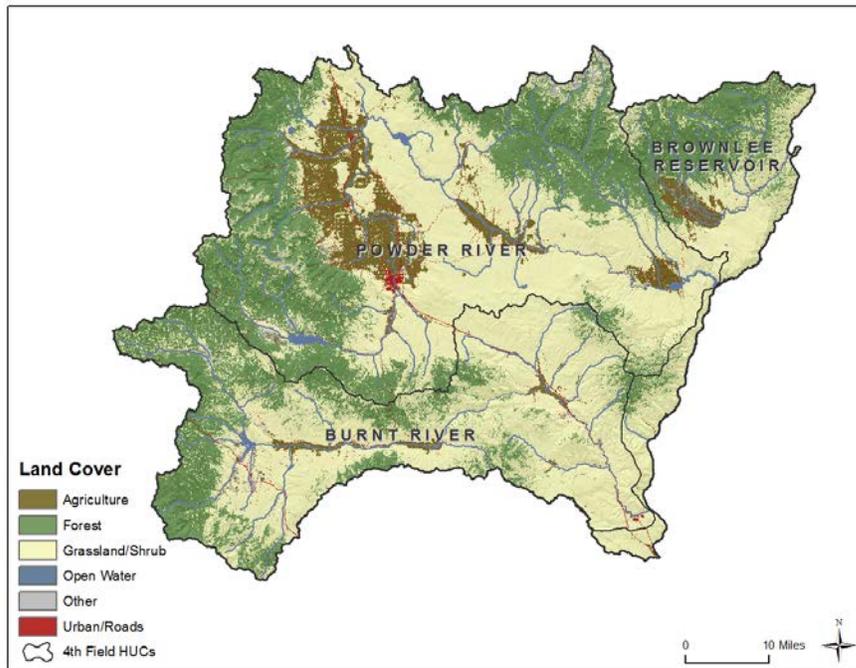
### **Basin Characteristics**

The Powder Basin includes the Brownlee (1750201), Burnt (17050202), and Powder (17050203) USGS 4<sup>th</sup> Field HUC watersheds. All streams in these watersheds drain into the Snake River along the border of Oregon and Idaho. The Powder Basin is almost entirely located in Baker County, Oregon, with smaller portions of the northern part of the basin in Union and Wallowa counties, and the southeast corner in Malheur County.



Annual precipitation levels range from 10 to 20 inches in the valleys and foothills to 50 to 60 inches in areas of the Elkhorn, Wallowa and Blue mountains. Irrigated agriculture takes place along the Burnt River, and in the Baker Valley north of Baker City, the Keating Valley near Richland, and in the Pine Valley near Halfway. Grassland/shrub areas dominate the plains and

foothill areas, with forested areas concentrated in the mountains. There are few urban areas, with the exception of Baker City, located near the basin's center.



Federal public lands administered by the Bureau of Land Management and U.S. Forest Service make up close to 50 percent of the land area in the Powder Basin, ranging from 45 percent in the Powder River Subbasin to 62 percent in the Brownlee Reservoir Subbasin.

Fishery resources have changed dramatically in the Powder Basin in the last 50-100 years. Salmon and steelhead were eliminated from a majority of the Powder subbasin by the construction of the Thief Valley Dam in 1932, and were eliminated from the rest of the Powder, Brownlee and Burnt subbasins after the construction of Brownlee, Oxbow, and Hells Canyon Dams on the Snake River in the late 1950s and 1960s. Redband Trout and Bull trout are still present in the basin and were identified as important aquatic species in previous investigation reports. They are some of the most sensitive aquatic species in the Powder Basin and their habitat is one of the most sensitive beneficial water uses.

### **Pollution Sources**

DEQ classifies water pollution sources into point sources and non-point sources. Point sources discharge pollution into waterways at specific identifiable places, such as a wastewater discharge pipe. Non-point sources are landscape-wide and include sources such as runoff from agriculture, urban areas, roads, and construction sites. Both types of pollutant sources occur in the Powder Basin.

DEQ regulates point sources in Oregon by requiring them to obtain water quality permits. Permits contain requirements that ensure compliance with water quality regulations that are designed to protect beneficial uses of water. Examples of permitted facilities in the Powder Basin include sewage treatment plants, mining operations, and some dams.

## Water Quality Status

Streams in the Powder Basin are included on the 303(d) list of water quality limited waterbodies with Total Maximum Daily Loads (TMDL) needed for dissolved oxygen, chlorophyll, bacteria, temperature, turbidity, sedimentation, and arsenic. Monitoring is being conducted to support TMDL development for these parameters, as well as the total phosphorus load allocations developed in the Snake River-Hells Canyon TMDL (DEQ, 2004).

### The Watershed Approach and TMDLs

The watershed approach is a method to protect water quality that takes into account a broad range of information regarding the status of water quality, sources of pollution and other environmental factors in a basin. This approach strives to incorporate everyone, from private citizens and companies to nonprofits and government agencies, with a stake in the basin. It also combines the expertise of DEQ's 17 water quality subprograms to ensure that DEQ's resources and scientific information are put to use effectively.

One of DEQ's water quality tools is the Total Daily Maximum Load (TMDL). A "Total Maximum Daily Load" is the amount of pollution that a waterway can receive in one day without causing water quality drop below federal clean water standards. A TMDL identifies the maximum amount of pollution each source is allowed to add to a water body so that the combined quantity of pollution does not affect beneficial uses such as fisheries, agriculture or drinking water supplies. When all sources comply with the TMDL, water quality improves. Exceeding TMDL limits can lead to degradation of water quality.

DEQ has begun work preparing to develop TMDLs for the Powder Basin to address the following pollutants:

- **Bacteria**
- **Chlorophyll *a***
- **Dissolved Oxygen**
- **Nutrients**

## Bacteria

Recent water quality data from sites located throughout the Powder Basin indicate that excessive bacteria levels are widespread problem. Irrigation season bacteria levels are generally higher than non-irrigation season levels, with the exception of the two North Powder River sites where non-irrigation season levels are higher.

High bacteria levels in water bodies are a concern because they pose a human health risk by enabling the spread of disease. The TMDL that is currently being developed will address bacteria pollution in the entire basin throughout the year. Many projects have already been implemented in the basin to reduce bacteria loading from livestock and other sources.

## Chlorophyll, Dissolved Oxygen, pH, and Nutrients

Elevated chlorophyll *a* concentrations have been observed below the Unity Dam on the Burnt River. Dissolved oxygen 303(d) listings also currently apply to portions of the Burnt and Powder Rivers. The chlorophyll *a* action level is intended to trigger further investigation of water bodies where excess phytoplankton (algae) may impair the recognized beneficial uses. Dissolved oxygen, and pH, and nutrient levels (phosphorus and nitrites) are generally reviewed during this type of investigation as they are related to the photosynthesis reactions that produce chlorophyll *a* in algae and other aquatic plants.

As part of TMDL development activities, water samples were collected by DEQ in May, June, August, and October of 2010, 2011 and 2012 in the Burnt River at the outlet of Unity Dam, and at the Clarks Creek Bridge, just below Bridgeport. Samples were analyzed for nutrients, chlorophyll *a*, and bacteria. Continuous measurements of dissolved oxygen, pH, conductivity and temperature were made during each sampling round. Water samples are also collected on a bi-monthly basis for a similar list of parameters at the DEQ Ambient Water Quality site downstream in Huntington. Elevated chlorophyll *a* concentrations were observed only in the Unity Dam outlet sample location in the October samples when the reservoir was drawn down to at or near its minimum level. Low dissolved oxygen and high pH conditions, which can result from the production of large amounts of chlorophyll *a*, were generally not observed. These data will be evaluated further during TMDL development.

The Snake River Hells Canyon TMDL established a limit on phosphorus concentrations at the mouths of the Powder and Burnt Rivers. Conservation projects in the Powder Basin have addressed impacts from excess nutrients and algae growth through projects such as nutrient management practices on farms, irrigation system improvements, and feedlot improvements. The phosphorus limits will be further examined and developed in the Powder basin TMDL.

### **Temperature, Flow, and Stream Habitat**

Increases in temperature, changes in stream flow, and stream habitat degradation can harm fish and other aquatic life, and have been identified as basin-wide concerns. Temperature monitoring is being conducted in the basin by DEQ and other stakeholders such as the U.S. Forest Service and the Powder Basin Watershed Council, with the goal of providing data for a temperature TMDL. The temperature TMDL development work is being deferred until a new water temperature standard is prepared by DEQ and approved by U.S. EPA.

Stakeholders in the basin have implemented projects to address temperature impacts by restoring stream channels, stabilizing stream banks, planting riparian vegetation, changing livestock management, and thinning juniper stands.

### **Sedimentation and Turbidity**

Stream channels in portions of the Powder Basin have been observed to have embedded gravel conditions where the space between gravel particles is filled with fine sediment and one stream segment is 303(d) listed for excess turbidity caused by excess suspended sediment load. Many of these streams were originally identified as having water quality concerns related to non-point source pollution in DEQ's 1988 *Assessment of NPS-Related Water Quality Problems*. The major nonpoint source water quality problems identified in this report were related to riparian vegetation removal and associated high stream temperatures, and increased erosion leading to sedimentation.

Excess sedimentation can be controlled through Best Management Practices (BMP) that can reduce erosion on farms, forests, roads, and urban areas. The Snake River-Hells Canyon TMDL established a total suspended solids (TSS) load capacity for Snake River tributaries based on a monthly average water column TSS concentration of 50 mg/l. This allocation was applied to the Powder River, Burnt River, and the Brownlee Subbasin tributaries, and will be re-examined during Powder Basin TMDL development.

### **Toxics**

Several investigations have assessed toxic pollutants in Powder Basin water bodies. Monitoring for toxic chemicals in treated sewage effluent has been performed by Baker City in compliance with the requirements of Senate Bill 357 (SB357). The results did not trigger the need for a persistent pollutant reduction plan. Toxic pollutant monitoring has also been performed two Powder River sites sampled in 2011 as part of the DEQ Toxics Monitoring Program. Several dissolved metals, and a few organic compounds were detected. In December 2012, EPA added a

portion of the Powder River to the 303(d) list of impaired water bodies due to elevated arsenic concentrations.

Fish tissue sampling conducted by EPA has identified elevated arsenic concentrations in fish tissue in the upper Powder River, and fish from several reservoirs in the basin contain elevated mercury. Mercury concentrations in fish have been high enough to trigger fish consumption advisories at Phillips Reservoir on the Powder River, and Brownlee Reservoir on the Snake River. Sources of arsenic and mercury in the basin include natural geologic deposits and historic mining areas. Aerial deposition from local and global sources is also a major source of mercury in the basin.

TMDL development for arsenic in the Powder River and mercury in the Snake River are being deferred until more resources and data are available.

### **Action Plan**

The goal of this report is to look more comprehensively at water-related issues in the Powder Basin. It includes a Status Report and Action Plan. The Action Plan includes actions for DEQ water quality subprograms, as well as actions for stakeholders, that will lead to improved water quality. A list of the five highest priority actions is given below:

1. Complete water quality monitoring that will support TMDL development.
2. Work with local cities to complete waste water treatment plant upgrades and renew discharge permits.
3. Support local water quality programs through the DEQ Volunteer Monitoring Program.
4. Work with ODA on area plan updates that include goals and timelines for water quality improvement.
5. Coordinate water quality monitoring and watershed restoration projects with federal agencies.