

# GIS and Source Water Protection

## Drinking Water Protection Program

February 2024  
Newport, Oregon

# Overview

---



WHAT IS SOURCE  
WATER  
PROTECTION?



WHAT IS GIS?



WHAT ARE DATA  
DOES OUR  
PROGRAM AT DEQ  
MAINTAIN?



WHAT ARE THE  
MAPS IN THE  
SOURCE WATER  
ASSESSMENTS AND  
WHERE CAN YOU  
ACCESS THEM?

# What is source water protection?

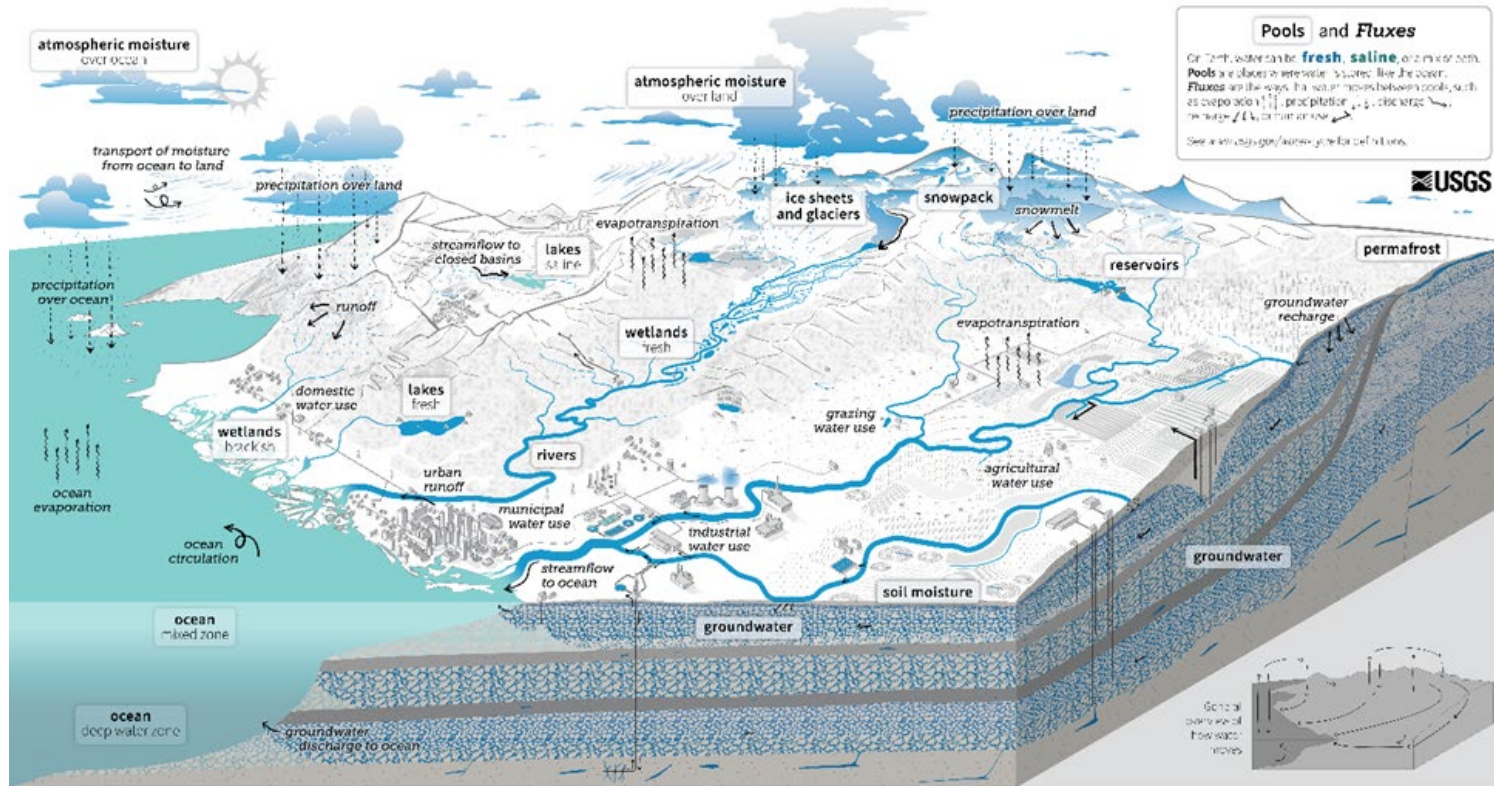
---



Source water refers to sources of water (such as rivers, streams, lakes, reservoirs, springs, and groundwater) that provide water to public drinking water supplies and private wells.



Protecting source water can reduce risks by preventing exposures to contaminated water. Protecting source water from contamination helps reduce treatment costs and may avoid or defer the need for complex treatment.



**Pools and Fluxes**  
 On Earth, water can be **fresh, saline**, or a mix (brackish). **Pools** are places where water is stored, like the ocean. **Fluxes** are the ways that water moves between pools, such as evaporation, precipitation, runoff, streamflow, recharge, and groundwater discharge.

## The Water Cycle

The water cycle describes where water is found on Earth and how it moves. Water can be stored in the atmosphere, on Earth's surface, or below the ground. It can be in a liquid, solid, or gaseous state. Water moves between the places it is stored at large scales and at very small scales. Water moves naturally and because of human interaction, both of which affect where water is stored, how it moves, and how clean it is.

Liquid water can be fresh, saline (salty), or a mix (brackish). Ninety-six percent of all water is saline and stored in oceans. Places like the ocean, where water is stored, are called **pools**. On land, saline water is stored in **saline lakes**, whereas fresh water is stored in liquid form in **freshwater lakes**, artificial **reservoirs**, **rivers**, **wetlands**, and in soil as **soil moisture**. Deeper underground, liquid water is stored as **groundwater** in aquifers, within the cracks and pores of rock. The solid, frozen form of water is stored in **ice sheets**, **glaciers**, and **snowpack** at high elevations or near the Earth's poles. Frozen water is also found in the soil as **permafrost**. Water vapor, the gaseous form of water, is stored as **atmospheric moisture** over the oceans and land.

As it moves, water can transform into a liquid, a solid, or a gas. The different ways in which water moves between pools are known as **fluxes**. **Circulation** mixes water in the oceans and transports water vapor in the atmosphere. Water moves between the atmosphere and the Earth's surface through **evaporation**, **evapotranspiration**, and **precipitation**. Water moves across the land surface through **snowmelt**, **runoff**, and **streamflow**. Through infiltration and **groundwater recharge**, water moves into the ground. When underground, groundwater flows within aquifers and can return to the surface through **springs** or from natural **groundwater discharge** into rivers and oceans.

Humans alter the water cycle. We redirect rivers, build dams to store water, and drain water from wetlands for development. We use water from rivers, lakes, reservoirs, and groundwater aquifers. We use that water (1) to supply **our homes and communities**; (2) for **agricultural** irrigation and **grazing** livestock; and (3) in **industrial** activities like thermoelectric power generation, mining, and aquaculture. The amount of available water depends on how much water is in each pool (water quantity). Water availability also depends on when and how fast water moves (water timing), how much water is used (water use), and how clean the water is (water quality).

Human activities affect **water quality**. In agricultural and urban areas, irrigation and precipitation wash fertilizers and pesticides into rivers and groundwater. Power plants and factories return heated and contaminated water to rivers. Runoff carries chemicals, sediment, and sewage into rivers and lakes. Downstream from these types of sources, contaminated water can cause harmful algal blooms, spread diseases, and harm habitats. **Climate change** is also affecting the water cycle. It affects water quality, quantity, timing, and use. Climate change is also causing ocean acidification, sea level rise, and extreme weather. Understanding these impacts can allow progress toward sustainable water use.

## Some examples of source water protection:

- Riparian zone restoration to reduce runoff pollution
- Stream bank stabilization to reduce sedimentation
- Land protection or easements
- Best management practices for agricultural and forestry activities or stormwater control
- Education and outreach with stakeholders and landowners

# What is GIS?

---

**Geographic information system is a system that creates, manages, analyzes, and maps all types of data.**

**GIS connects data to a map, integrating location data with all types of descriptive information.**

## **How is GIS used?**

- **Identify Problems**
- **Monitor Change**
- **Set priorities**
- **Share information in a visual format**

# GIS resources

---

[Geocortex Online Map Viewer](#)

[Arc Online Map Viewer](#)



Examples of spatial data we maintain:



Drinking Water Source Areas for Surface and Ground Water community systems



Pollution

Potential contaminant sources- ex: Leaking underground storage tanks, CAFOS (confined animal feeding operations)

# Source water assessments

---

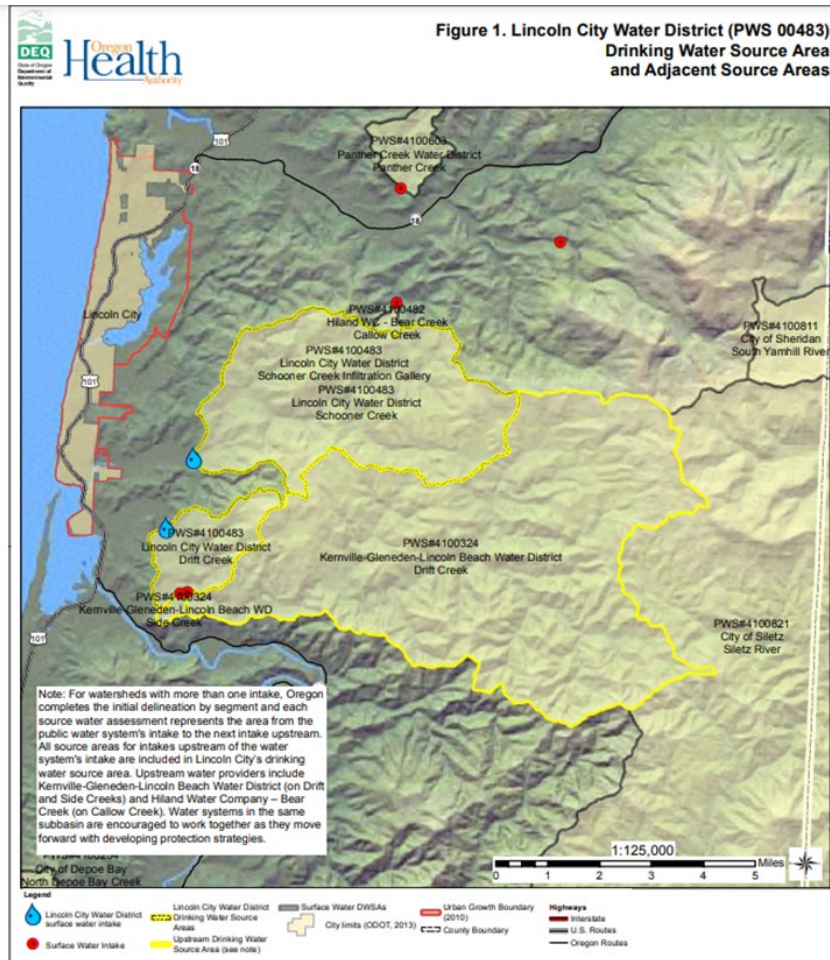
[Where you can find your source water assessment](#)

Let's look at a local Example:

[Lincoln City, Schooner Creek](#)

# Source water assessment maps

Map 1- Drinking Water Source Area



Where water is removed for drinking water

Drinking Water Source Area

Nearby drinking water source areas for other communities

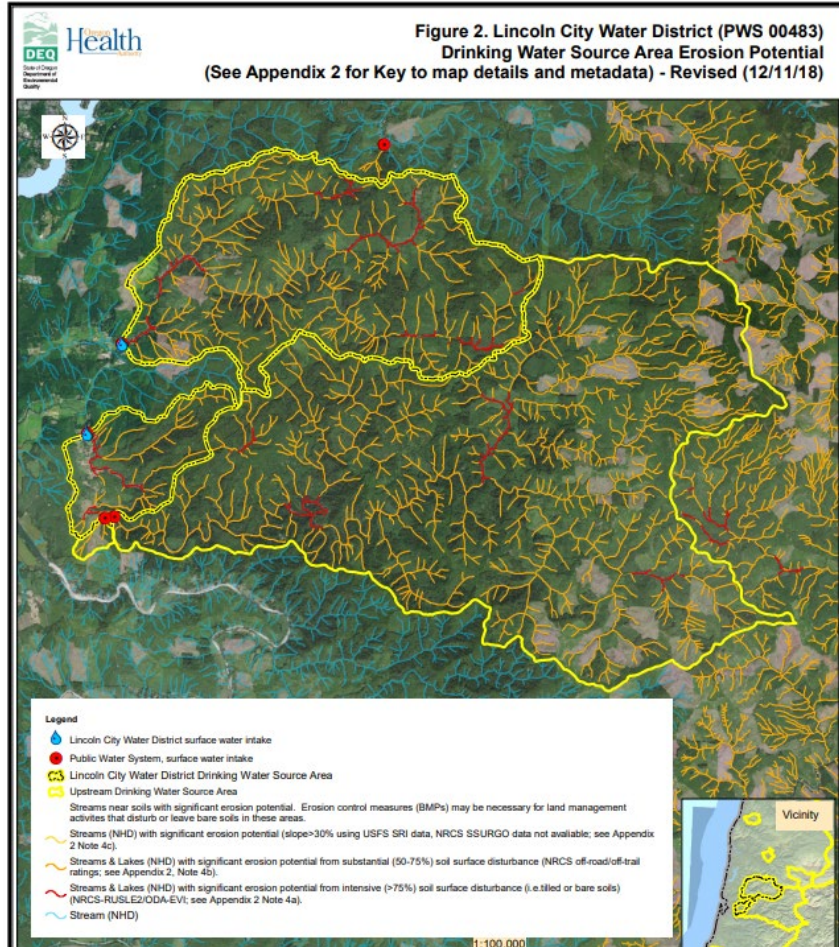
County Boundaries

City Limits



# Source water assessment maps

Map 2 – Erosion Potential



Where water is removed for drinking water

Drinking Water Source Area

Nearby drinking water source areas for other communities

Streams

Landslide deposits

# Thank you

---

Please reach out if you have any questions

---

Ratna Adhar

---

GIS Specialist

---

[Ratnanjali.Adhar@DEQ.Oregon.gov](mailto:Ratnanjali.Adhar@DEQ.Oregon.gov)

# Title VI and alternative formats

---

DEQ does not discriminate on the basis of race, color, national origin, disability, age or sex in administration of its programs or activities.

Visit DEQ's [Civil Rights and Environmental Justice page](#).

[Español](#) | [한국어](#) | [繁體中文](#) | [Русский](#) | [Tiếng Việt](#) | [العربية](#)  
Contact: 800-452-4011 | TTY: 711 | [deqinfo@deq.state.or.us](mailto:deqinfo@deq.state.or.us)