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# Seawater Intrusion in Washington: What does it mean to us?



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## Seawater Intrusion – What is it?

Seawater intrusion is the movement of seawater into fresh water aquifers due to natural processes or human activities. The boundary between seawater and fresh water is usually a zone of mixing between the two. Small increases of sodium chloride (salt) in ground water near the coast may indicate a landward movement of the zone of mixing known as seawater intrusion. Some scientists use the value of 100 milligrams of chloride per liter of water as an indicator of intrusion. By comparison, seawater contains 19,000 milligrams per liter (mg/l) while fresh water generally contains less than 30 mg/l. Most people notice a salty taste in drinking water when chloride concentrations exceed 250 mg/l.



“The seawater is coming! The seawater is coming!”

## Why do we care about seawater intrusion?

Some coastal wells in Washington are now unusable because of seawater intrusion. This is particularly true in coastal areas where high population growth has placed increased demands on groundwater supplies. Seawater intrusion can potentially render large portions of Washington’s coastal aquifers unusable through degradation of water quality.

Seawater intrusion can cause aesthetic, health, agricultural, and environmental problems for users of ground water. The quantity of salt in drinking water is an aesthetic concern since salty tasting water is unpalatable for most people. Health issues are a concern in seawater intruded areas, particularly for people on salt restricted diets. Intrusion is a concern to those using groundwater for agricultural purposes since salty water is detrimental to most plants. Intruded ground water can also have detrimental effects on wetlands and estuaries of our coastal environments.

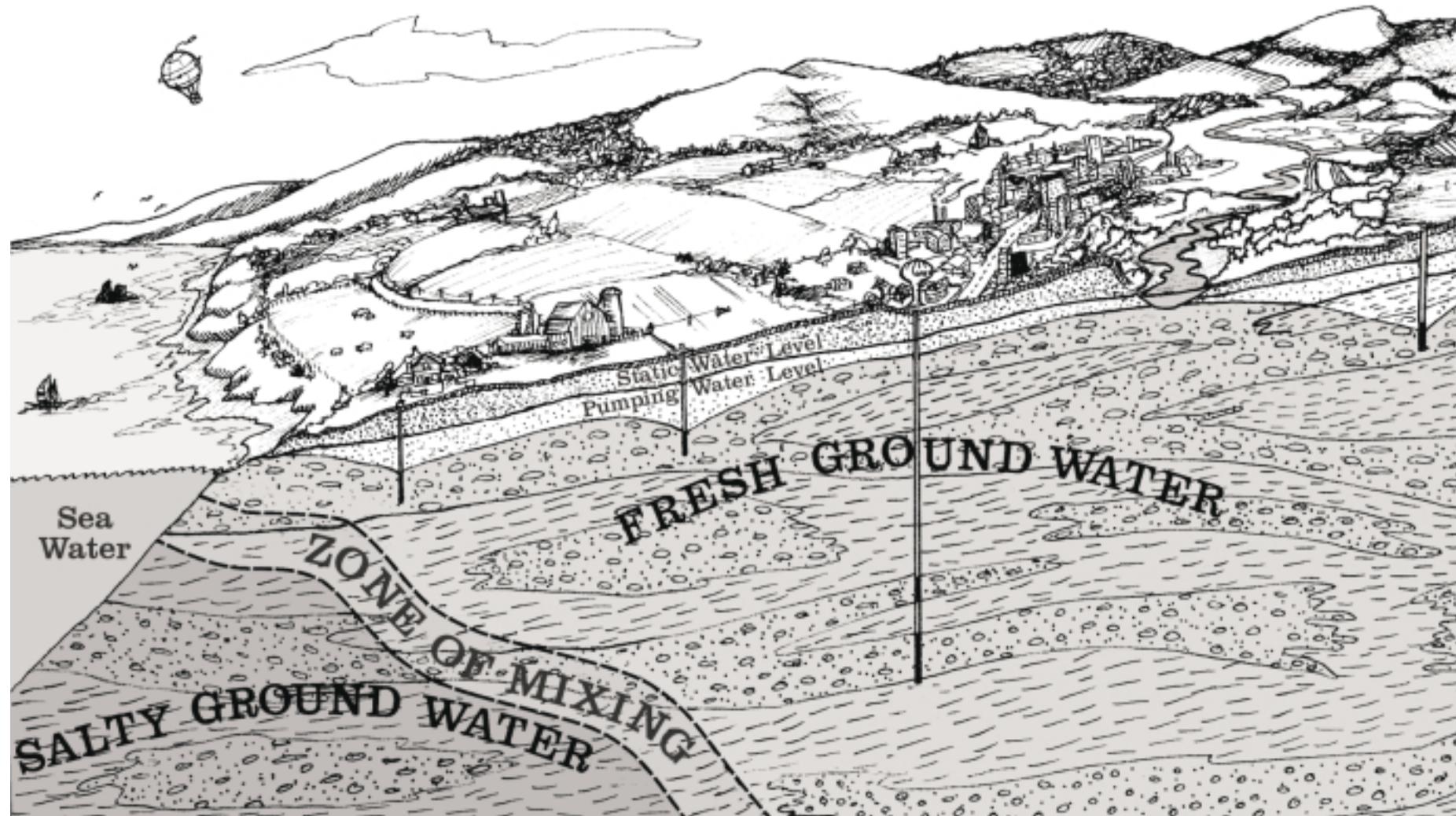
Once an aquifer is intruded, it is difficult and extremely costly to restore the water quality of that aquifer to its pre-intruded state. Therefore, it is wiser to plan ahead to prevent seawater intrusion rather than to react after an aquifer has been intruded.

## What are the causes of seawater intrusion?

Seawater intrusion is caused by decreases in ground water levels. Regional declines in ground water levels are caused by decreases in the quantity of fresh ground water flowing to the sea. Rising sea level may also cause seawater intrusion. The amount of ground water flowing to the sea can be

reduced by pumping from wells and natural or human caused reduction in ground water recharge. Pumping water from wells causes local declines in ground water levels in the vicinity of pumped wells and may cause localized seawater intrusion. Droughts, diversions from surface water sources, and

urban development can decrease recharge. Intrusion can affect the quality of water not only at the pumping well site, but also at other well sites, and undeveloped portions of the aquifer. As a result, subsequent wells completed in the aquifer may encounter salty water in the once fresh aquifer.



## Seawater Intrusion and Hydrologic System

The diagram to the left illustrates the connection between multiple water wells, the hydrologic system, and seawater intrusion. All components of the hydrologic system; the sea, surface water, ground water, precipitation, recharge, and discharge are integrally connected. When a change occurs in one part of the hydrologic system (as through pumping from wells or a long term drought) it affects the others. Seemingly easy solutions to seawater intrusion such as completing wells above sea level or locating wells further from shore will not necessarily prevent seawater intrusion. The well in question may not be directly affected by intrusion but it may be contributing to intrusion of the aquifer.

*“All water discharged by wells is balanced by loss of water somewhere.”*

C.V. Theis, 1940