

What is saltwater intrusion?

Saltwater intrusion occurs when sea water is drawn into a freshwater aquifer. In aquifers adjacent to the coast and on islands such as the Gulf Islands, low density fresh water sits as a lens above higher density sea water. Below the freshwater lens, there is a transition zone where the water is a mix of fresh and salt water. The location vertically (i.e. depth) or horizontally from the coast of this transition zone can vary as a result of factors including groundwater pumping, seasonal variations in groundwater levels, or changes to in the amount of groundwater recharge. Areas at highest risk for seawater intrusion include locations close to the coast, where there is a low topographic gradient (i.e. low to moderate slope), on peninsulas or areas with a limited source area for groundwater recharge, where there is a high density of wells, and/or high rates of pumping (including from a single well or from multiple wells pumping in a particular area). Seawater intrusion can be indicated by increased concentrations of chloride and increased electrical conductivity of groundwater seasonally or showing an increasing trend over time. Once seawater intrusion occurs, the changes in the aquifer may be permanent or may take many years to recover. We recommend that you consider implementing some of the following best management practices to decrease the risk of intrusion affecting your well.

Best management practices for operation of wells in areas at high risk of seawater intrusion*:

- Conserve water by reducing use, and installing higher efficiency appliances and irrigation systems;
- Reduce depth that the pump is set at;
- Increase the frequency and reduce the duration of well pumping (well “sipping”);
- Increase water storage (e.g. cisterns) and pump in wet season for use in drier periods, or augment supplies using water from other sources such as rainwater collection;
- Eliminate “pump on demand” systems and detect and fix leaks quickly (if water is metered, this can help identify if leaks are occurring);
- Monitoring options:
 - Electrical conductivity (automated shut off if it goes above a certain level e.g. 1000 microSiemens per cm)
 - Groundwater levels (automated shut off if water level goes below a certain level)
 - Meter water use
 - Water quality testing (include chloride as one of the monitoring parameters, sample during the dry season, and track changes over time).

*In most cases this will require consultation with a registered qualified well pump installer or registered qualified well driller, for example to change pump settings.

Additional information sources on seawater intrusion:

Report, “Chemical indicators of saltwater intrusion for the Gulf Islands, British Columbia. J. Klassen, D. Allen and D. Kirste. 2014.:

http://www.sfu.ca/personal/dallen/Chemical%20Indicators%20of%20SWI_Final.pdf

USGS report on saltwater intrusion in the San Juan Islands: <https://pubs.usgs.gov/fs/2000/fs-057-00/>