

Kitsap Connection

For customers of Kitsap PUD's drinking water utility November/December 2017

State of the Science: The USGS Study of Kitsap's Water Resources

In 2010, the United States Geological Survey (USGS) began a multi-year effort to analyze and model the groundwater system of the Kitsap Peninsula. The study, which was funded by Washington Department of Health, Kitsap PUD, local cities (including Gig Harbor), tribes, and water purveyors was meant to characterize and model the Kitsap Peninsula's groundwater system, the system from which the vast majority of us get our drinking water supplies. In 2014, the USGS published the Hydrogeologic Framework, Groundwater Movement and Water Budget of the Kitsap Peninsula. This was followed in 2016 by the Numerical Simulation of the Groundwater-Flow System of the Kitsap Peninsula. In this newsletter we will take a look at these important reports.

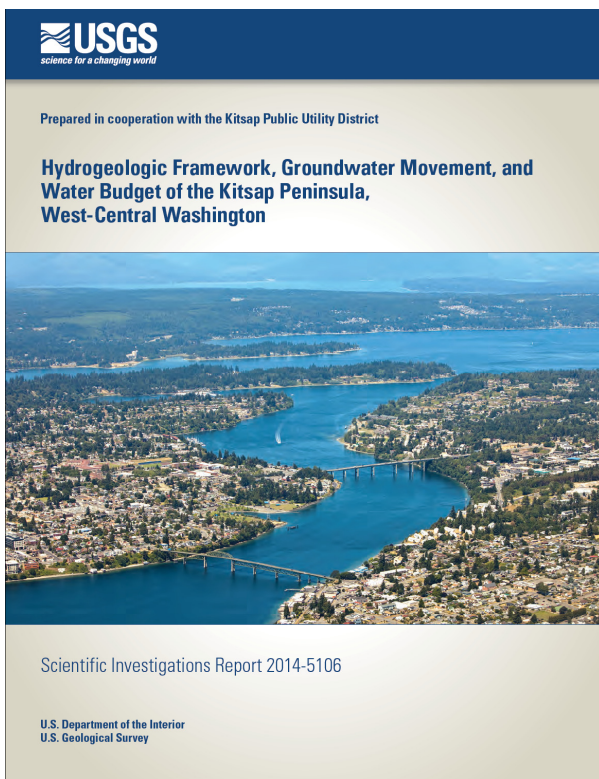


Table 9. Estimated annual water budget for the groundwater system of the Kitsap Peninsula, west-central Washington, 2012.

[Values may not sum to 100 due to rounding]

Water-budget component	Acre-feet	Percent
Groundwater recharge		
From precipitation	664,610	97
From return flows	22,122	3
Total	686,732	100
Fate of recharge		
Discharge to streams	455,550	66
Other natural discharge	200,316	30
Withdrawals from wells	30,866	4
Total	686,732	100

Describing the System

The first report, Hydrogeologic Framework, Groundwater Movement and Water Budget of the Kitsap Peninsula, characterizes the groundwater system of the Kitsap Peninsula. It delineates our major aquifers and quantifies the major components of our hydrologic cycle (precipitation, streamflow, groundwater withdrawals, etc.). Some of its findings:

The study identified twelve “hydrogeologic units” that make up Kitsap’s geology. Generally speaking these are major aquifers and/or confining layers (clay, bedrock). These hydrogeologic units—laid down over eons of ice age glaciation—are stacked upon one another. The highest unit is, as you would expect, the “youngest”. Shallower aquifers (*I will use that word here versus the unwieldy “hydrogeologic unit”*) support summer streamflows and many shallower, domestic wells. Deeper aquifers support deeper, municipal supply wells and seep huge quantities of water to Puget Sound and Hood Canal.

The USGS found the water “budget” of the Kitsap Peninsula

to be as follows:

Inflow to the groundwater system comes from precipitation (97%) and return flows from septic systems (3%).

Once it enters the groundwater system:

- 66% discharges as streamflow.
- 30% discharges to marine waters (largely via underwater seeps).
- 4% is withdrawn via wells.

During the study year 2012, the USGS quantified these components thusly:

Total Inflow to the system was 686,732 acre-feet. (One acre-foot equals 325,851 gallons). Of that:

455,550 acre-feet (66%) discharged as **streamflows**.

200,316 acre-feet (30%) discharged to **marine waters**.

30,866 acre-feet (4%) was withdrawn via **groundwater wells**.

The complete report can be found at: <https://pubs.usgs.gov/sir/2014/5106/>

Modeling the Groundwater System

Once Kitsap's groundwater system was sufficiently characterized, the USGS built a computer model of the system. The model was then subjected to different "scenarios". Some of these were:

- What would the system look like if there were no groundwater withdrawals (wells)?
- What would be the effects of increasing current groundwater withdrawals by 15%?
- What would be the effects of reducing outdoor water usage by 80% (to simulate water conservation efforts)?
- What if there was a 15% decrease in inflow (to simulate a drought)?

The model and corresponding report, Numerical Simulation of the Groundwater-flow System of the Kitsap Peninsula, was published in 2016.

According to the report:

- Reducing recharge by 15 percent between 2005 and 2012 had the largest effect, with water-level altitudes declining throughout

the model domain and baseflow amounts decreasing by as much as 18 percent compared to baseline conditions.

- Changes in pumping volumes had a smaller effect on the model. Removing all pumping and resulting return flows caused increased water-level altitudes in many areas and increased baseflow (*summer streamflow*) amounts of between 1 and 3 percent.

Both the Hydrogeologic Framework, Groundwater Movement and Water Budget of the Kitsap Peninsula and the Numerical Simulation of the Groundwater-flow System of the Kitsap Peninsula are important documents that further understanding of our water resources. As the USGS states, it is hoped these tools will "assist in the development of a long-term watershed management plan to meet the needs of current and future water demands within the watershed, while also working to protect and improve its natural resources."

The full report can be found at: <https://pubs.er.usgs.gov/publication/sir20165052>

In-Store Payment Options

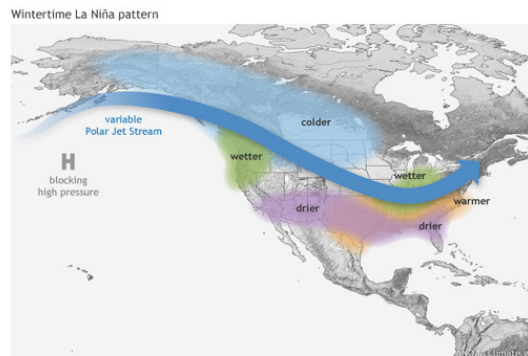
Due to security concerns, Kitsap PUD no longer takes credit card payments over the phone. Customers can make payments with their credit card online, however. As an added convenience, Kitsap PUD has established in-store payment arrangements with the following establishments. For a small fee (noted), customers can now pay their PUD bill at the following locations:

Fred Meyer—Bremerton and Port Orchard locations. \$2 fee

Walmart—Poulsbo, Bremerton and Port Orchard locations. \$1 fee for three day processing, \$1.50 fee for next day processing.

Moneytree—Silverdale, Bremerton and Port Orchard locations. \$1.50 fee for 3-4 day processing, \$2.50 fee for next day processing.

Safeway—Bainbridge Island only. \$2.50 fee for next day processing.



Courtesy Climate Prediction Center

La-la-la-la... La Nina!

Sung to the tune of La Bamba (for those of you old enough to remember that). The Climate Prediction Center, a division of NOAA, has reported that we are entering a La Nina weather pattern. As you can see from the map above, this could foretell a wet winter. Sigh. Bright side: We drink that water. Yes, there are challenges. But better with than without, right? Again, though... sigh.

Kitsap PUD

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2017 Water Rates

2017 Rates shown below are for a typical residential service. Remember: KPUD bills on a bi-monthly basis.

Basic Service Charge

\$24.25 (monthly)
\$48.50 (per 2-month billing)

Commodity Charge

Tier 1 (0-1,400 cubic feet)
\$1.15 per 100 cubic feet*

Tier 2 (1,401—2,400 cubic feet)
\$1.55 per 100 cubic feet

Tier 3 (2,401—4,000 cubic feet)
\$2.40 per 100 cubic feet

Tier 4 (over 4,000 cubic feet)
\$5.50 per 100 cubic feet

*100 cubic feet equals 748 gallons

Kitsap Water Trivia

This isn't so trivial... The West Sound Stormwater Outreach Group—which consists of Kitsap County and the cities of Port Orchard, Bremerton, Poulsbo and Bainbridge Island—has reported that 11,000 pounds (over 5 tons!) of pet waste is deposited EVERY DAY on the ground in Kitsap County.

This waste runs into our streams, lakes and Puget Sound.

If you have a pet, please dispose of their waste properly. Further, for information on sponsoring a "Mutt Mitt" station in your neighborhood, visit <http://www.cleanwaterkitsap.org/Pages/Mutt-Mitt->