



PALOUSE BASIN  
**AQUIFER**  
committee

# ANNUAL WATER USE REPORT

---

---

## 2019

Palouse Basin Aquifer Committee  
University of Idaho  
875 Perimeter Drive MS 3301  
Moscow, ID 83844-3301

**Phone:** (208) 885-6429  
**Email:** [pbac@uidaho.edu](mailto:pbac@uidaho.edu)



# WATER IS ESSENTIAL

*Water in the Palouse Basin aquifers is declining, and conservation is a huge part of solving the problem*



Photo by Katherine M. Watts

## Executive Summary

Water is the essential ingredient needed for human residency in any region. The Palouse Groundwater Basin provides the sole drinking water supply for over 60,000 Whitman County (Washington) and Latah County (Idaho) residence. There are two significant aquifers within the basin: the Wanapum (upper aquifer) and Grande Ronde (lower aquifer), confined aquifers. An aquifer is an underground layer of water stored in permeable rock or between layers of rock. A confined aquifer differs from an unconfined aquifer in that there is an impermeable layer of rock or soil present that prevents water from readily entering from the surface above. Therefore, while we pump water out of our confined aquifers, water is not reentering the aquifers at the rate that we are pumping water out. As a result, the aquifer levels have been declining since the beginning of usage.

The Palouse Basin Aquifer Committee (PBAC) is a voluntary, cooperative, multijurisdictional group with representatives from the basin's cities, counties, and universities. PBAC's task is to ensure a long-term, quality water supply for the Palouse basin region, implemented through the Ground Water Management Plan (GWMP), enacted in 1992.

The GWMP and an associated intergovernmental agreement include requirements to report accomplishments, pumpage, and water level information. This report aims to review groundwater pumpage, summarize aquifer water levels, and review research accomplishments during 2019 and 2020. Some of the graphs and figures seen in previous reports are located on our website, [palousebasin.org](http://palousebasin.org).

The 2019 total combined groundwater pumpage by the reporting pumping entities within the basin was 2.35 billion gallons ([Figure 1](#)). In aggregate (Pullman, Moscow, WSU, UI, Palouse), pumpage for 2019 was approximately 0.9% less than in 2018 and 14.4% less than in 1992, the first year the GWMP took effect.

A network of deep and shallow monitoring wells has been instrumented and records information that provides a valuable

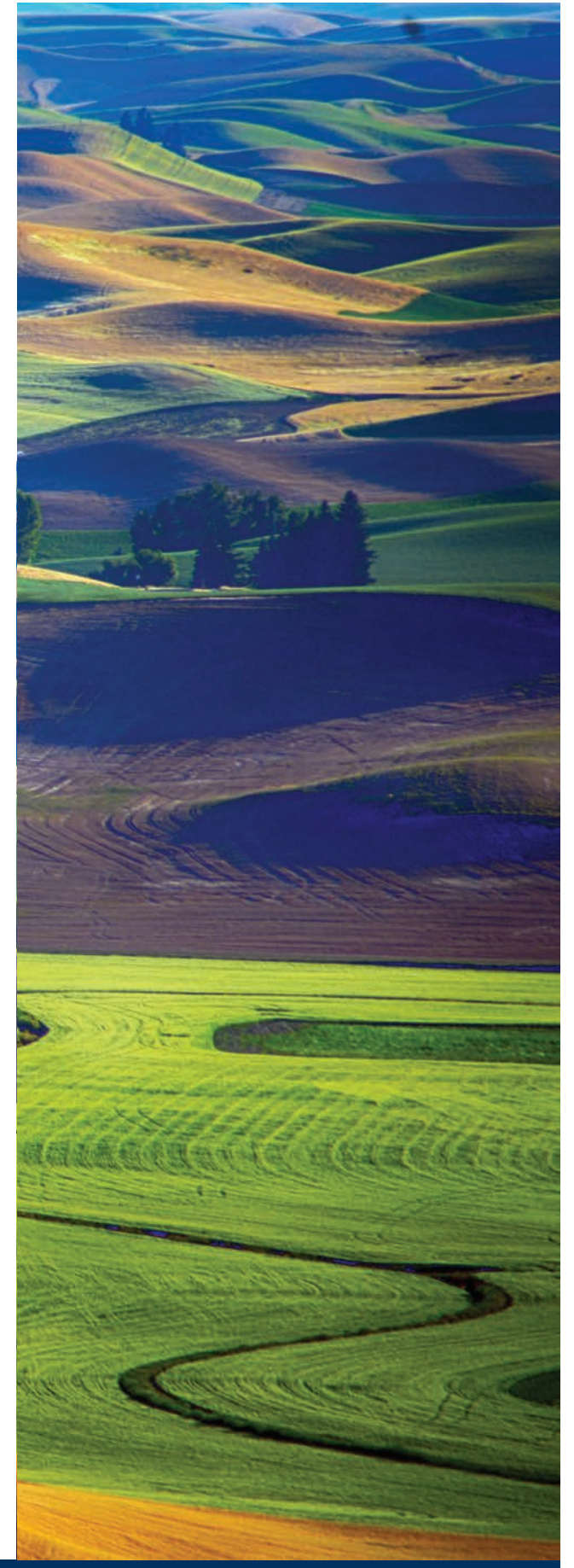


Photo by Katherine M. Watts



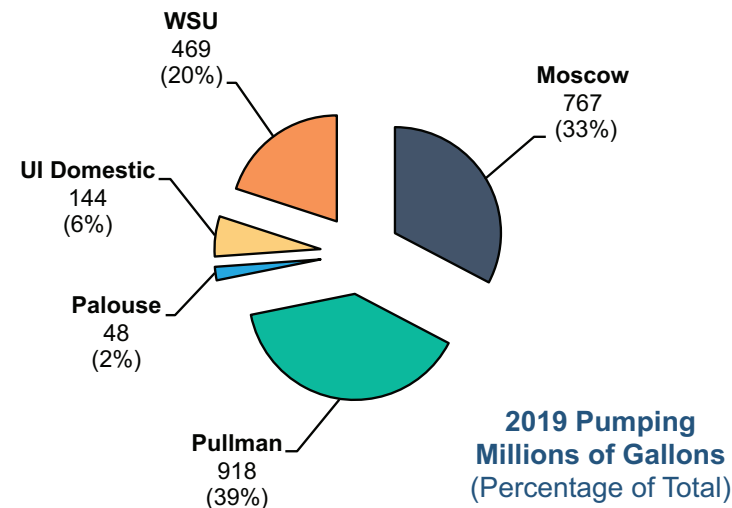


Figure 1: 2019 groundwater pumping

long-term record of groundwater levels throughout the basin. Hydrograph records for representative wells in upper and lower aquifers are located on our website under the information tab ([palousebasin.org](http://palousebasin.org)). The 2019 water level data exhibits a reasonably consistent decline in maximum water level of slightly less than 1 foot per year in the Grande Ronde. In the Moscow Police Department well (Wanapum), there was about a 13-foot rise in water levels from mid-2017 to mid-2020 due to a decrease in Wanapum pumping from the City of Moscow (Figure 6). The City of Moscow continues to pump less from the Wanapum aquifer due to the extra costs and water wasted from the filters required for upper aquifer water. The Wanapum aquifer water is filtered due to its high mineral content, and the filters are cleaned in a back-flushing process.

The GWMP consists of a set of goals that PBAC pursues. PBAC's current focus is to develop and implement a balanced, basin-wide water supply and use program by 2025. As a step toward this, in 2019, PBAC continued work on the Palouse Groundwater Basin Water Supply Alternatives project to analyze the four alternatives further and developed another survey to seek community feedback. In addition, PBAC hired Alta Science and Engineering to help with project management, outreach, and further feasibility review. One major undertaking for the project is to break each alternative down into interim steps. These interim steps will allow for the gradual implantation of an alternative or combination of alternatives over time.

# ANNUAL WATER USE REPORT

*"The PBAC mission is to ensure a long-term quality water supply for the Palouse Basin region"*

The report that follows includes water use and water level information for the period from 1992 through 2019. We also include 2020 data that is available to provide up-to-date information. Water use reports for earlier years are on the PBAC website ([www.palousebasin.org](http://www.palousebasin.org)). If you are having trouble finding information on our website, please contact us at [pbac@uidaho.edu](mailto:pbac@uidaho.edu).

## Palouse Basin Aquifer Committee

Groundwater is pumped in the basin by five major water suppliers (Pullman, Moscow, Colfax, Washington State University, and the University of Idaho), several smaller cities and towns, and many businesses and rural residents residing in the unincorporated areas of Whitman County, Washington, and Latah County, Idaho. Groundwater levels in the lower aquifer system have been declining since measurement began in the late 19th century. Growth in the area following World War II led to increased pumping from the aquifer system. By the late 1950s, the cities, state institutions, and regulatory agencies recognized a severe decline in water levels. Concerns

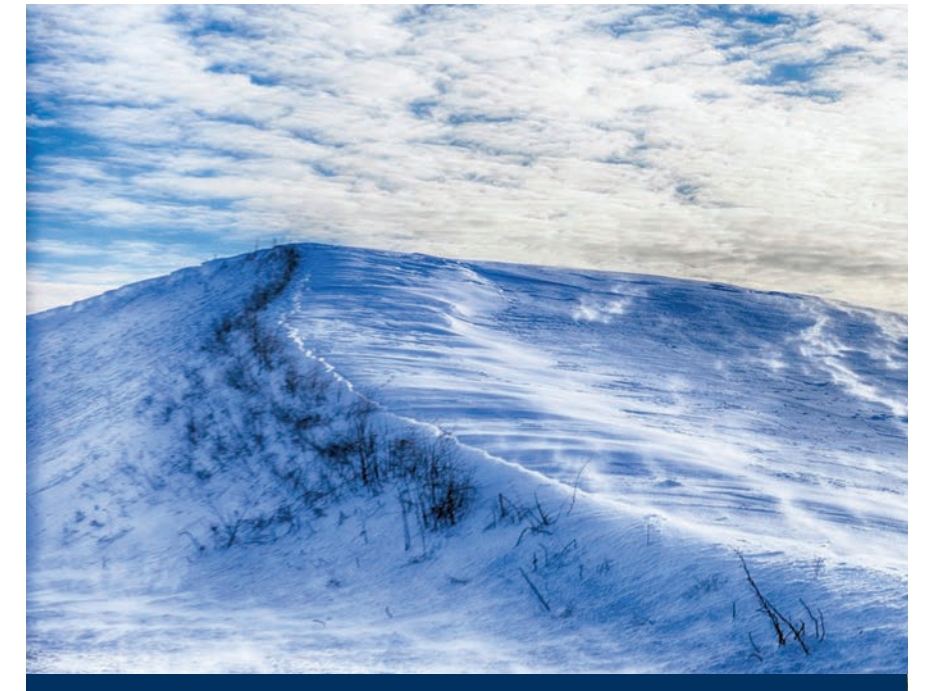


Photo by Katherine M. Watts

regarding long-term water supplies in the area led to the 1967 formation of an informal committee, known then as the Pullman-Moscow Water Resource Committee (PMWRC), to study the problem and make recommendations to the administrative and elected representatives of the major pumping entities. In time, membership on the committee was expanded to include Whitman and Latah counties. In 1998, to reflect its expanded membership and the regional nature of the resource,

the committee name was changed to the Palouse Basin Aquifer Committee (PBAC). Although not a formal PBAC member, since 2006, the City of Palouse has contributed funding toward the administration of the committee. PBAC member contact information is detailed on the last page of this report.

## Ground Water Management Plan (GWMP)

In 1992, the Palouse Basin Aquifer Committee, with the support of Washington and Idaho state regulatory agencies, enacted the Ground Water Management Plan (GWMP). The plan is authorized by an Intergovernmental Agreement between the member entities and an Interagency Agreement between the Washington Department of Ecology and the Idaho Department of Water Resources. The plan details the governance structure of the committee and lays out specific goals for the pumping entities. Since 1992, the goals have been periodically reviewed and updated by PBAC.

## Basin Description

The precise boundaries of the basin are unknown, but the approximate edge is illustrated in Figure 2. Groundwater in the basin is pumped primarily from the Wanapum (upper aquifer) and the Grande Ronde (lower aquifer). The Wanapum and Grande Ronde Formations are part of the Columbia River Basalt Group, which consists of thousands of feet of lava flows that covered much of eastern Washington, northern Oregon, and portions of western Idaho during eruptions that occurred between 17 and 6 million years ago.

The primary municipal drinking water source in the basin is the lower Grande Ronde aquifer. In Pullman, all the city residents obtain their drinking water from the Grande Ronde. Rural basin residents in Whitman County pump from both the upper and lower aquifers. In Moscow,

2% of the 2019 supply came from the Wanapum, significantly less than the 32% pumped from the Wanapum in 2017. Many of the rural residents in Latah County also tap the Wanapum. The Grande Ronde wells are generally more productive and contain better quality water than those in the Wanapum.

Water levels in the Grande Ronde have historically declined at a rate of between 0.9 and 1.5 feet per year for 70 or more years (Figure 3). More recent data (since 2006) indicate the average annual rate of decline has decreased to 0.72 feet per year (Figure 4). Unfortunately, PBAC cannot collect more data on the WSU test well because the water levels are now below the point that can be reached with a data logger. But, thanks to the WSU facilities team, PBAC has access to WSU Well 3, which is a well next to the WSU Test Well, and so far, it appears to be comparable to the data obtained from the WSU Test Well (Figure 5). Unfortunately, the WA DOE Pullman test well water depth is below the point where we can obtain good data.

Water levels in the Wanapum dropped drastically in the late 1950s and early '60s but recovered in the 1970s and '80s when much of the pumping switched to the Grande Ronde aquifer (Figure 6).

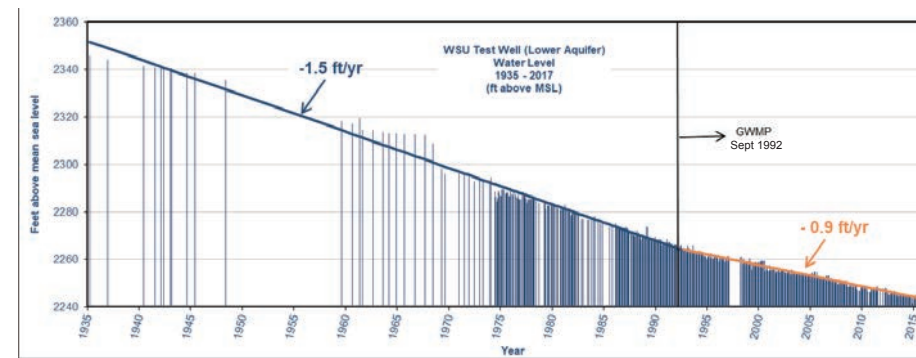


Figure 3: Static water level, WSU test well (lower aquifer), 1935-2017

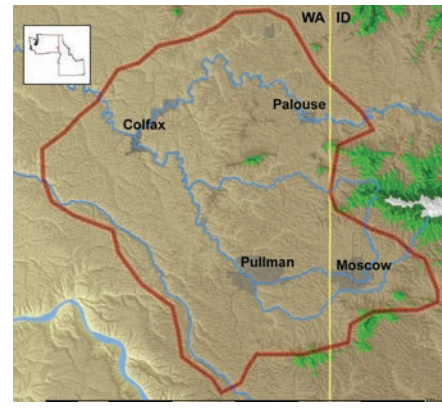


Figure 2: Working Boundary for the Palouse Groundwater Basin

Thus, although absolute values are still uncertain, there is some recharge to the Wanapum and the Grande Ronde aquifers.

The City of Moscow decreased pumping out of the Wanapum significantly over the past several years. The City of Moscow used to obtain over a quarter of its annual water from the Wanapum, but in 2019, the City of Moscow only pumped 2% of its annual water from the Wanapum. To supplement the water pumped from the Wanapum, the City of Moscow increased their pumping out of the Grande Ronde. The Moscow Police Department well showed a 7-foot recovery, similar to the recovery seen in the mid to late 1960s when Moscow and UI drilled their first wells into the lower aquifer and curtailed pumping from the upper aquifer (Figure 7).

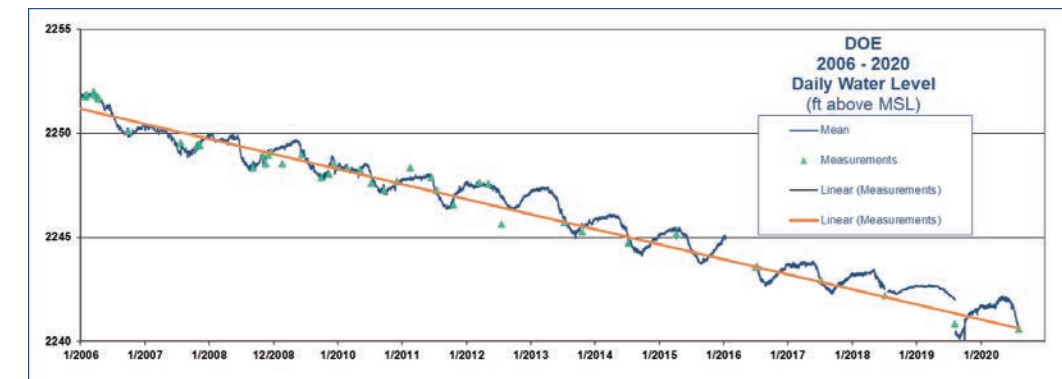


Figure 4: Hydrograph record, WA DOE Pullman test well

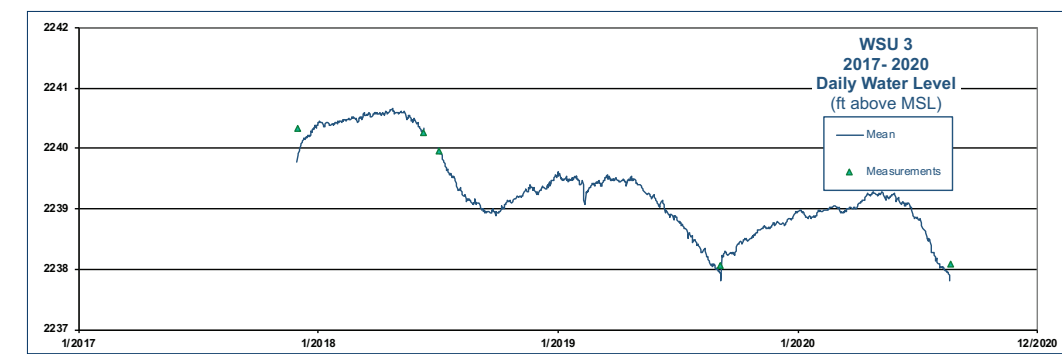


Figure 5: Hydrograph record, WSU Well 3 (lower aquifer)

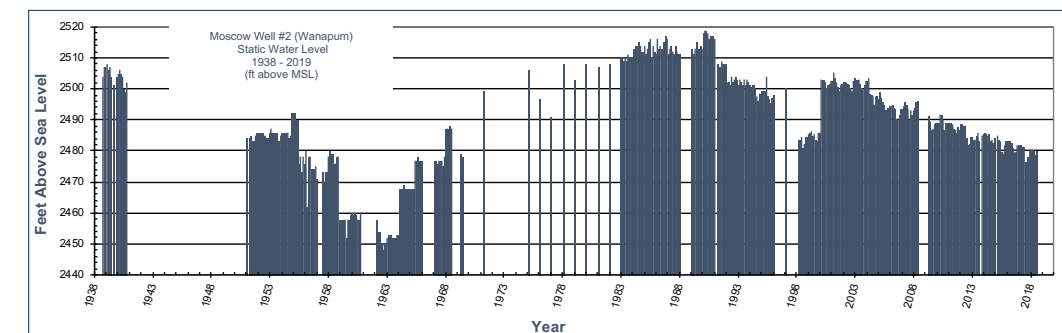


Figure 6: Static water level, Moscow well #2 (upper aquifer), 1938-2018

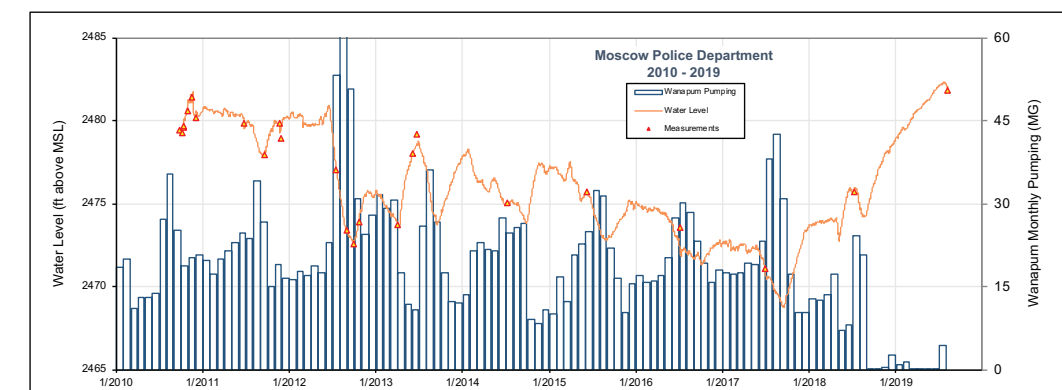


Figure 7: Wanapum pumping, water level, Moscow PD well (upper aquifer), 2010-2019



# GROUNDWATER PUMPAGE AND WATER LEVELS

The total combined groundwater pumpage by the three cities (Pullman, Moscow, Palouse) and two universities (WSU and UI) for the year 2019 was 2.35 billion gallons. In aggregate, this was .9% less than was pumped in 2018 (2.37 billion gallons), and 16.6% less than was pumped in 1992 (2.74 billion gallons), the first year the GWMP took effect. Groundwater pumpage percentage totals are illustrated in Figure 8.

Pumping increases significantly in the summer months, primarily due to increased municipal irrigation demand and other outdoor water use. Water used regularly throughout the year for showers, toilets, drinking, laundry, or any other daily need is considered baseline water use. Non-baseline water use is anything used seasonally for irrigation or other temporary outdoor uses. An estimate of the baseline pumping can be calculated as the average pumping levels for January, February, November, and December because these months,

we don't expect people to use water outdoors for irrigation, pools, or other non-baseline water uses. Therefore, pumping above this average level can be considered non-baseline usage. As a percentage of total pumping, the 2019 non-baseline (outdoor water use for irrigation/activities) usage for the five pumping entities are shown in Figure 9 (Note: In the figure, the UI non-baseline use is presented both with and without the inclusion of the 86 million gallons of reclaimed water utilized in 2019). By entity, 2019 comparisons to 2018 pumping are shown in Figure 10.

Figure 8: Groundwater pumping—percentage of totals—2019

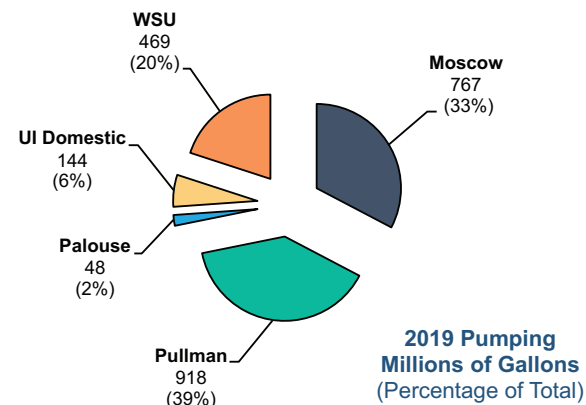
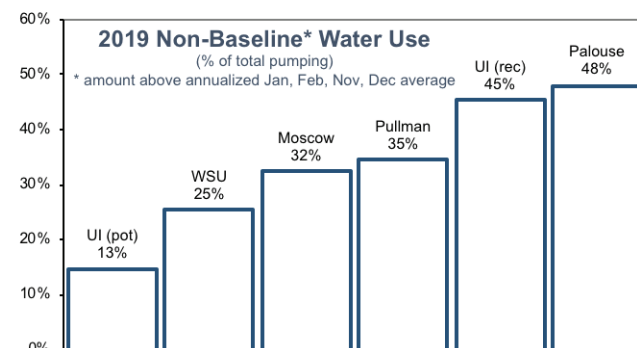


Figure 9: Non-baseline water use, percentage of total pumping, 2019

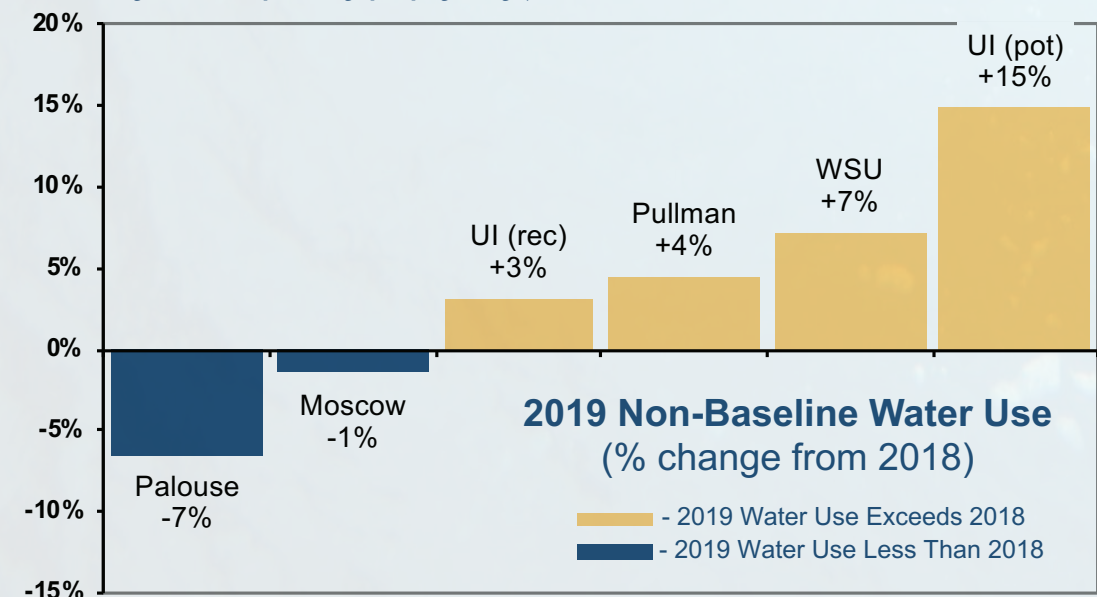


Non-baseline usage varies with annual weather conditions. If temperatures are cooler and wetter than in the previous year, it can be expected that non-baseline use water would decrease. If temperatures are warmer and drier, it can be expected that non-baseline water use would increase. This is because people will increase irrigation and other outdoor water use with warmer and drier conditions. There are also many other variables to consider when determining why pumping has increased or decreased in a given year. It is essential to consider when precipitation occurs, what type of precipitation, soil moisture storage,

infrastructure updates or leaks, and human behavior, just to list a few!

On the following pages, you will find monthly pumping graphs compared to the 5-year average, Figures 11-15. Monthly pumping graphs, including monthly pumping totals by entity, are now on our website under the information tab ([palousebasin.org](http://palousebasin.org)).

Figure 10: 2019 percentage pumping change from 2018





# MONTHLY PUMPING

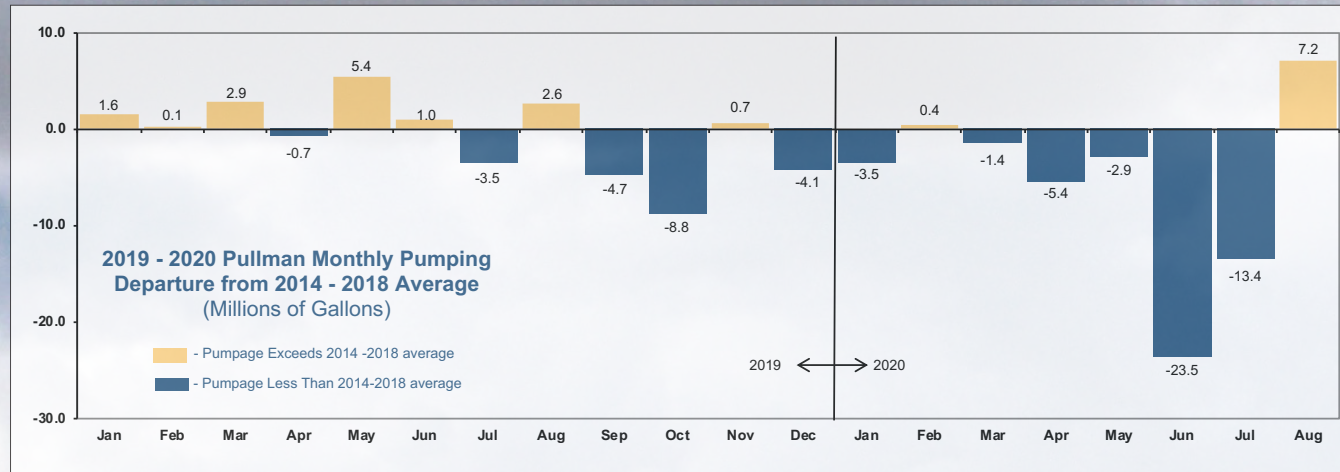


Figure 11: Pullman monthly pumping compared to five-year average

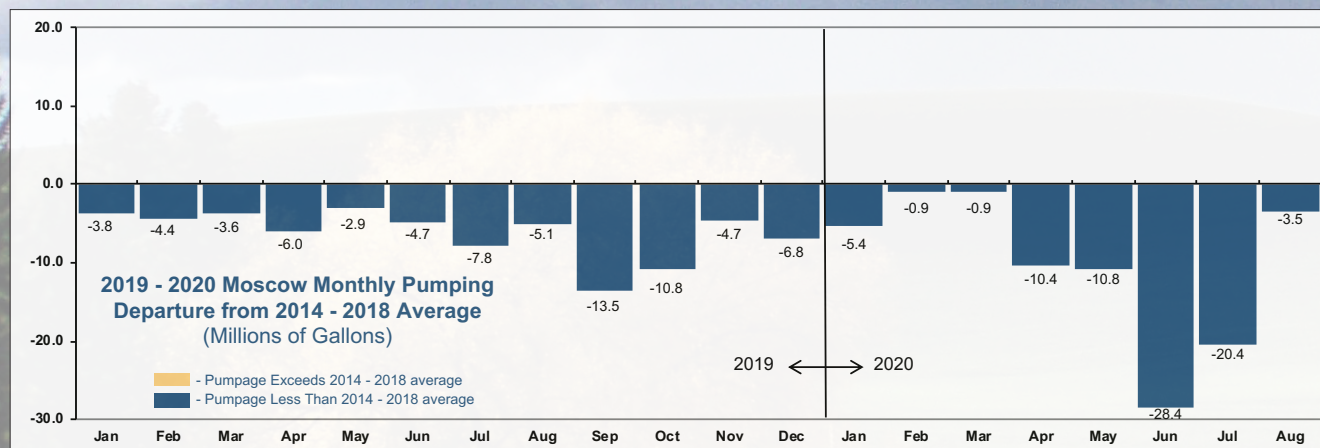


Figure 12: Moscow monthly pumping compared to five-year average

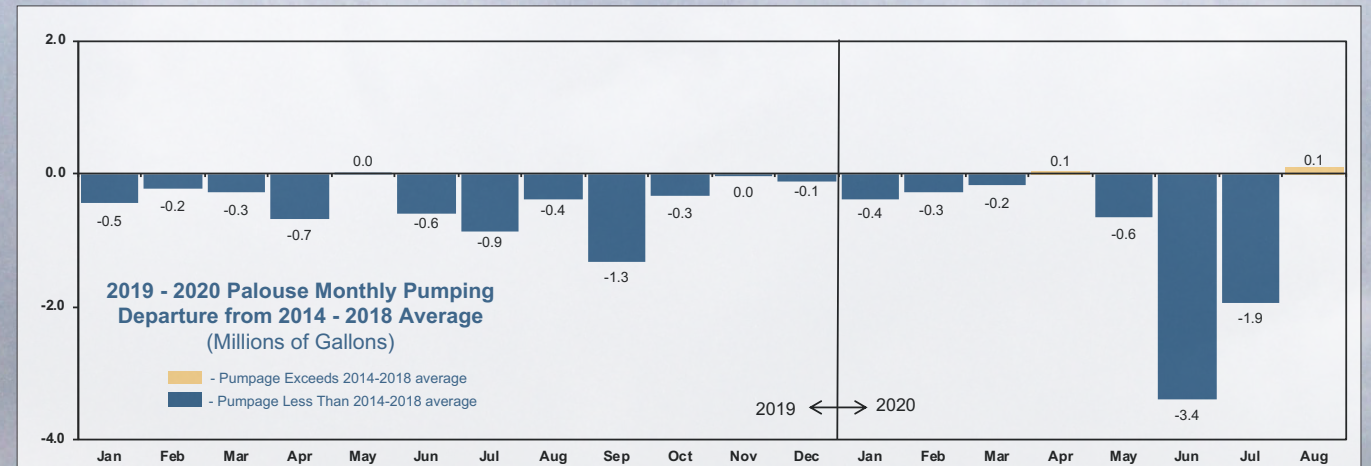


Figure 13: Palouse monthly pumping compared to five-year average

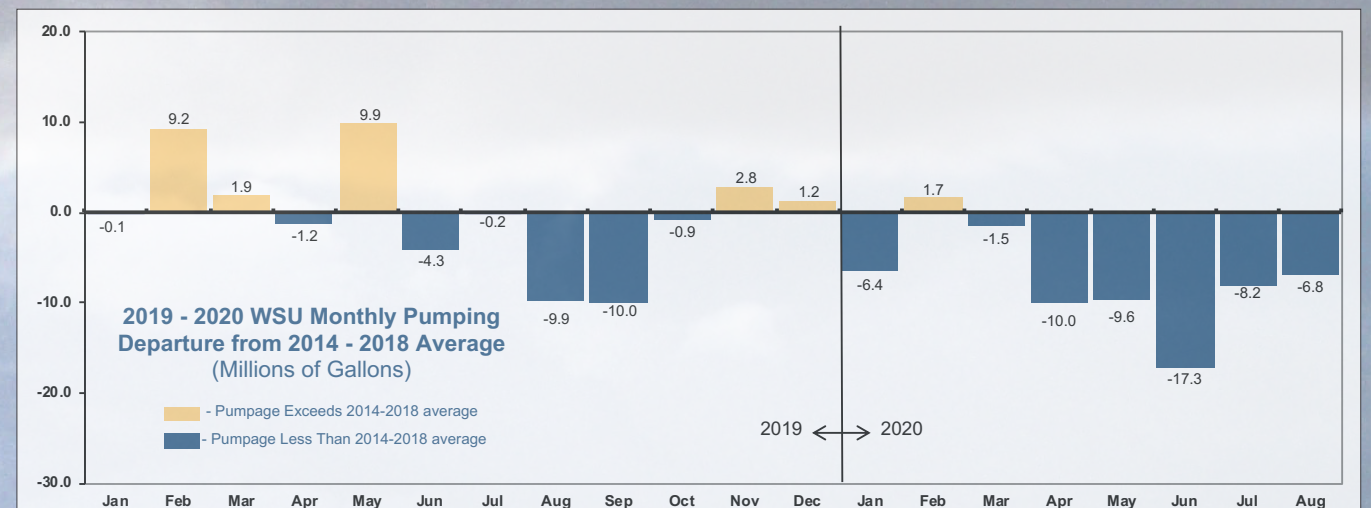


Figure 14: WSU monthly pumping compared to five-year average

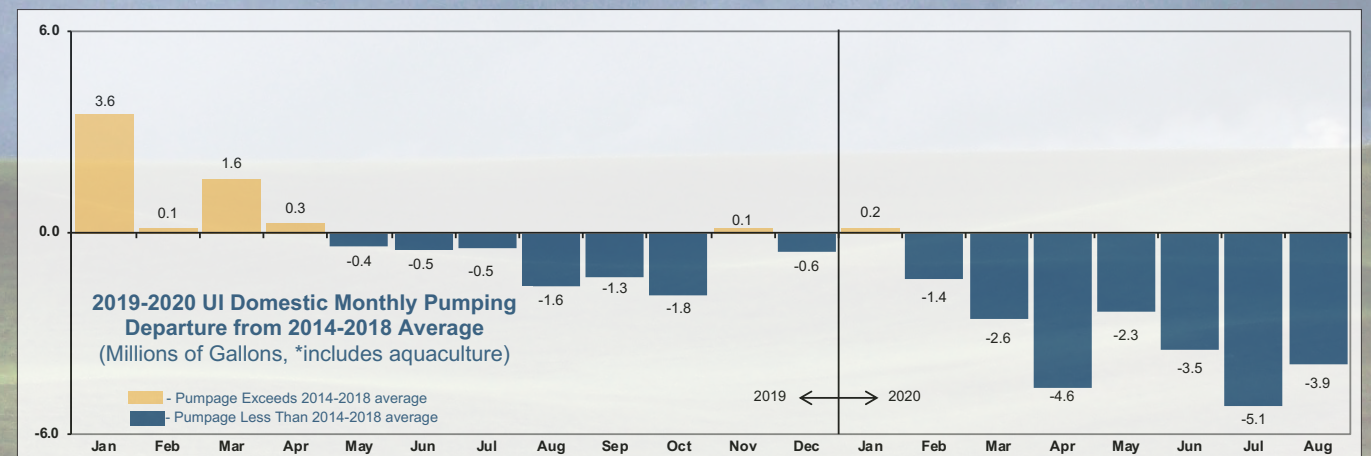


Figure 15: UI monthly pumping compared to five-year average



# LIMITING WATER USAGE

As part of the GWMP, each pumping entity has agreed to voluntary pumping limitation goals. Pullman, Moscow, and the universities attempt to limit annual pumping increases to 1% of the 1986-1990 average pumping amount. In addition, Pullman, Moscow and the universities agreed to keep total pumping below 125% of the 1981-1985 average pumping amount. An aggregation of the limitation goals for the GWMP pumping entities (Pullman, Moscow, WSU, UI) is shown in [Figure 16](#). The goal graphs for individual pumping entities are shown in [Figures 17, 18, 19, and 20](#). Please note that the University of Idaho pumping numbers do not include the 48 million gallon per year allotment for UI well 5.

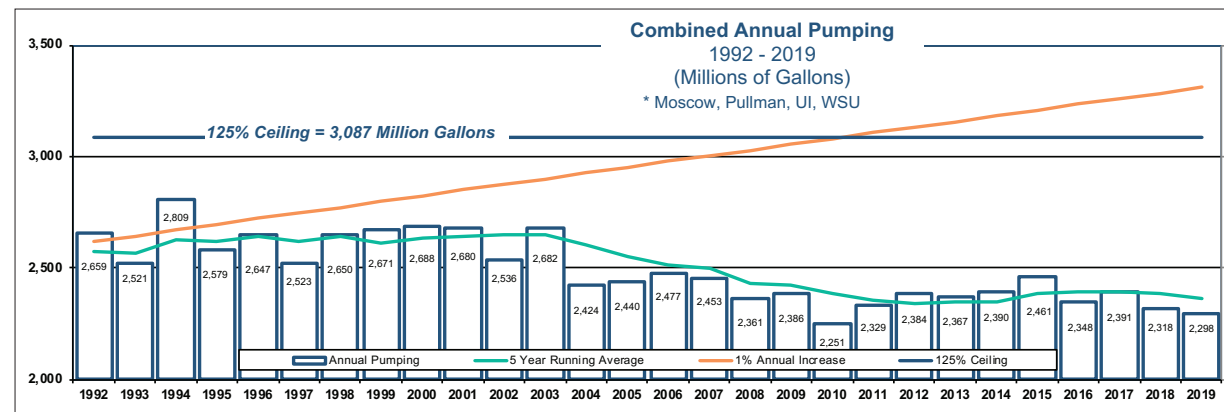


Figure 16: Combined annual pumping

PBAC maintains a network of monitoring wells throughout the basin. A map illustrating monitoring well locations and hydrographs can be accessed on the PBAC website. Individual hydrographs can be accessed by request.

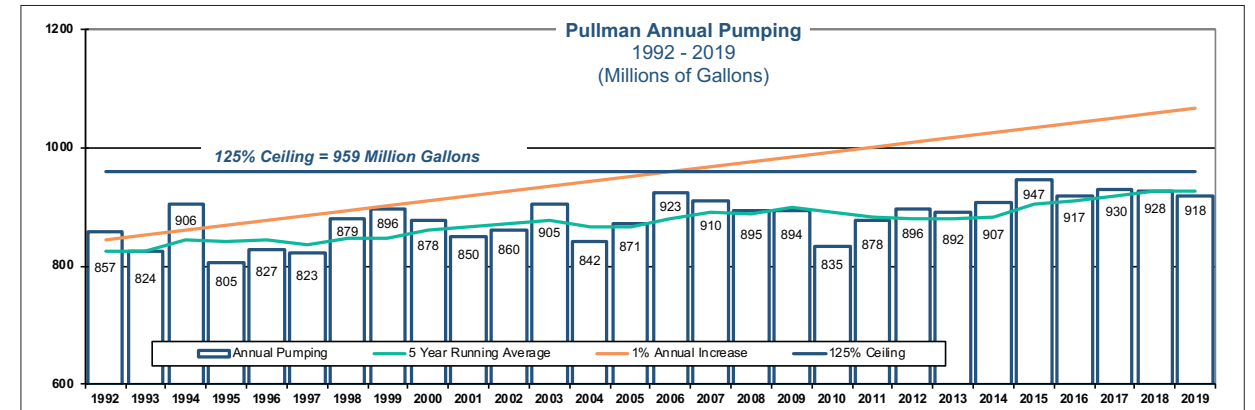


Figure 17: Pullman annual pumping

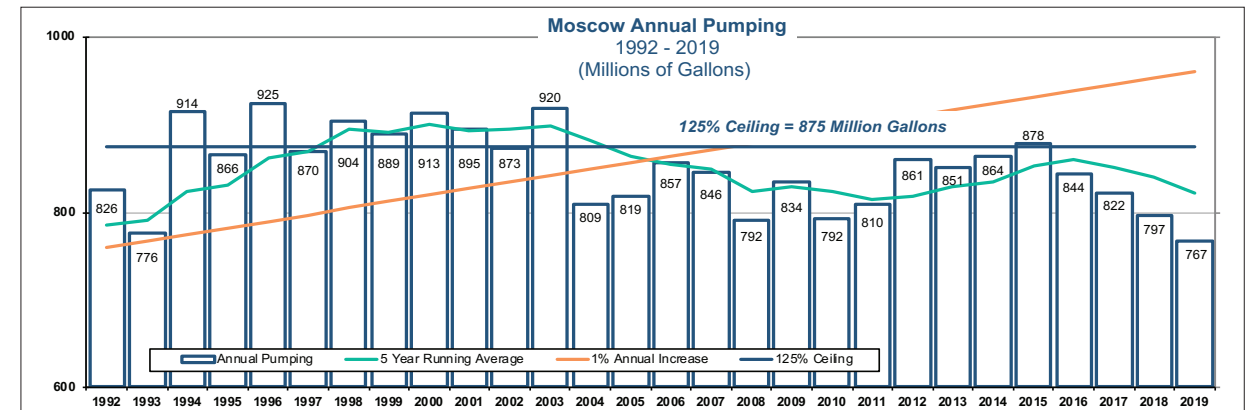


Figure 18: Moscow annual pumping

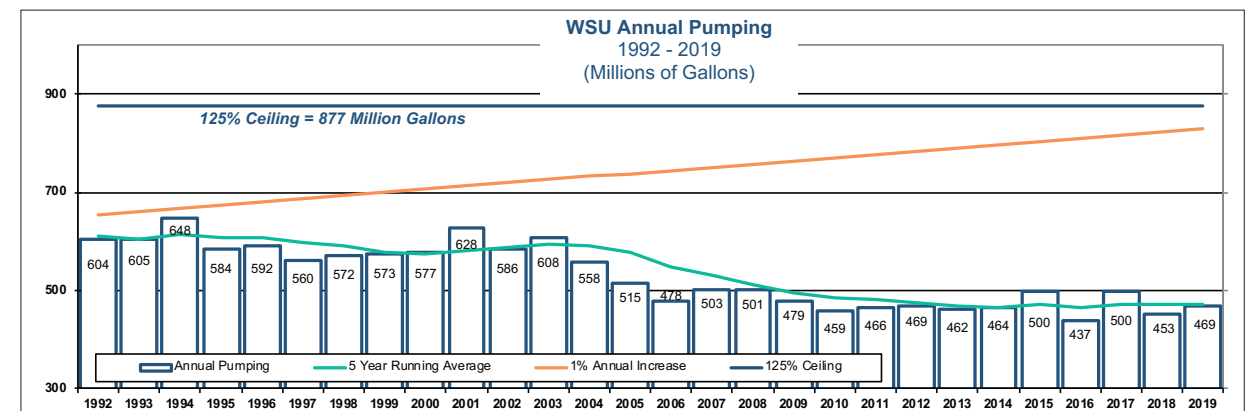


Figure 19: WSU annual pumping

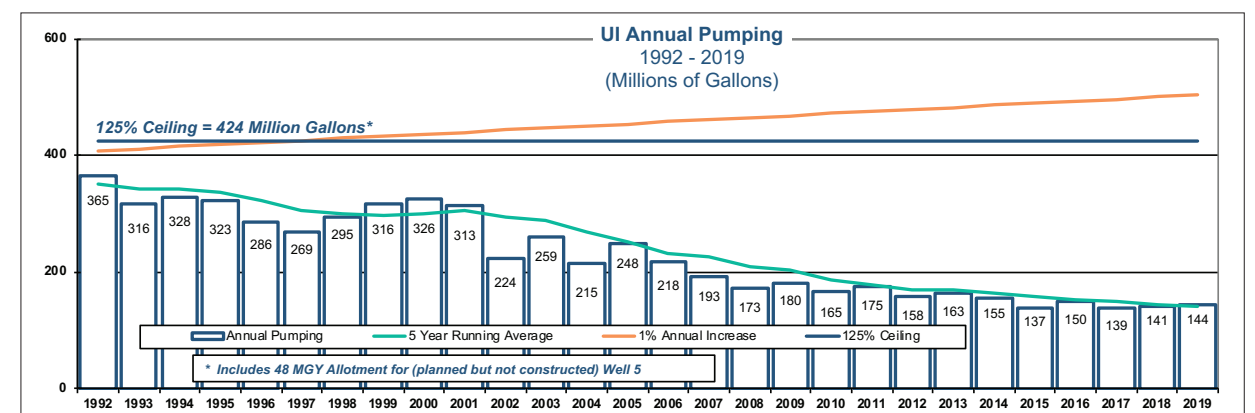


Figure 20: UI annual pumping



# 2019 ACCOMPLISHMENTS

In 2019, PBAC continued to make progress on the Palouse Water Alternatives Project by expanding on feasibility studies, refining timelines and dates and goals, and engaging with the community. The Palouse Water Alternatives report compiles previously identified alternatives and summarizes the four most feasible options that include consideration of 13 (quantitative as well as qualitative) evaluation criteria. The project was funded by a generous grant provided by the State of Idaho through the Idaho Water Resource Board and the Idaho Department of Water Resources as well as PBAC. PBAC hired Alta Science and Engineering to lead the project management for the Palouse Water Alternatives Project.

In 2019, PBAC funded a project by Jeff Langman, Assistant Professor in the Department of Geological Sciences, to examine the recharge zone through an analysis of isotope data and collection of seismic field data. The goal of this research is to quantify

recharge in the Moscow Mountain recharge zone and help guide variables being used for the WSU Groundwater Model project.

In 2019, PBAC also funded a research project through Jeff Langman at the University of Idaho which will help quantify recharge using seismometers (a continuation of the work completed in 2018). Jeff Langman, Kyle Duckett, John Bush and others published in the Journal of Hydrology that looked at isotopes to gain a better understanding of connectivity and flow patterns between the South Fork Palouse River Basin and subsystems. All of their work greatly contributes to our understanding of connectivity in the Palouse Basin. Researchers at the Water Resource Center at WSU are also working under a PBAC funded grant to complete an updated groundwater model, make sure to come to the 2020 Palouse Basin Water Summit to get updates on these projects!

## Goals, Plans and Ongoing Efforts of the Committee

The foundation of the Ground Water Management Plan (GWMP) consists of a set of goals. Each member entity crafts its water resource management action plan(s) to support the goals. The goals are periodically reviewed and updated by PBAC. In the spring of 2015 PBAC issued a GWMP Informational Update (available on the PBAC website). As part of the update, each PBAC entity reviewed and updated its individual action plan(s) to better reflect current conditions in the basin.

Community outreach and engagement has become a central focus for PBAC in the coming years. In early 2019, PBAC conducted the Palouse Basin Survey with a project led by Alex Maas, Assistant Professor in Agricultural Economics &

Rural Sociology. The survey allowed PBAC to gauge how people of the community viewed the water alternative projects and determine if there are preferences for one type of project or another. The survey was conducted at county fairs, grocery stores, and various other locations. More details can be found on the PBAC website.

In 2019, PBAC participated in the 15th (modern) Palouse Water Summit. The 2019 Summit continued to provide information and avenues for dialogue through networking opportunities and presentations related to the basin's common groundwater resource. PBAC will support and participate in the 16th Summit, scheduled for October 22nd, 2020.



## PBAC Representatives

Name	Email address
Kevin Gardes (Pullman)	kevin.gardes@pullman-wa.gov
Eugene Guessenhoven (UI)	eugeneg@uidaho.edu
Cara Haley (Pullman)	cara.haley@pullman-wa.gov
Alan Kolok (UI)	akolok@uidaho.edu
Paul Kimmell (Latah Co.)	paul.kimmell@avistacorp.com
Tom Lamar (Latah Co.)	tlamar@latah.id.us
Jeff Lannigan (WSU)	lannigan@wsu.edu
Les MacDonald (Moscow)	lmacdonald@ci.moscow.id.us
Eileen Macoll (Pullman)	eileen.macoll@pullman-wa.gov
Tyler Palmer (Moscow)	tpalmer@ci.moscow.id.us
Jason Sampson (WSU)	sampsonj@wsu.edu
Mark Storey (Whitman Co.)	marks@co.whitman.wa.us
Art Swannack (Whitman Co.)	arts@co.whitman.wa.us
Anne Zabala (Moscow)	azabala@ci.moscow.id.us

## PBAC Ex Officio Representatives

Name	Email address
Douglas Jones (IDWR)	doug.jones@idwr.idaho.gov
Patrick Cabbage (WDOE)	PCAB461@ecy.wa.gov

## PBAC Staff

Name	Email address
Korey Woodley	kwoodley@uidaho.edu
Steve Robischon	stever@uidaho.edu

PALOUSE BASIN  
**AQUIFER**  
committee