PALOUSE BASIN
AQUIFER
committee

ANNUAL WATER USE REPORT

2018

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

Phone: *(208) 885-6429*
Email: *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 residents of Whitman County (Washington) and Latah County (Idaho). Within the basin there are two major aquifers, the Wanapum (upper aquifer) and Grande Ronde (lower aquifer), which are 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. While we pump water out of our confined aquifers, water is not reentering the aquifers at the rate that we are pumping water out. 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 cities, counties, and universities within the basin. PBAC is charged with ensuring a long-term, quality water supply for the Palouse basin region. This task is to be accomplished through the implementation of 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. The purpose of this report is to review groundwater pumpage, summarize aquifer water levels, and review research accomplishments during 2018. In order to lower the environmental impact of printing, some of the graphs and figures seen in previous reports are now located on our website, palousebasin.org.

The 2018 total combined groundwater pumpage by the reporting pumping entities within the basin was 2.37 billion gallons (Figure 1). In aggregate (Pullman, Moscow, WSU, UI, Palouse), pumpage for 2018 was approximately 3.1% less than in 2017, and 13.6% less than in 1992, the first year the GWMP took effect.

Photo by Katherine M. Watts

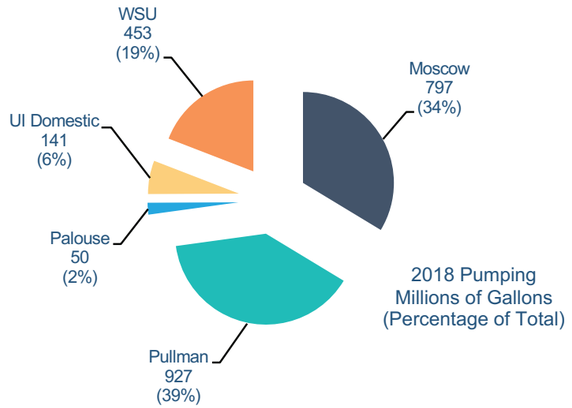


Figure 1: 2018 groundwater pumping

A network of deep and shallow monitoring wells has been instrumented and are recording information that provide a useful long-term record of groundwater levels throughout the basin. Hydrograph records for representative wells in both the upper and lower aquifers are located on our website under the information tab (palousebasin.org). The 2018 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 Wanapum Moscow Police Department well there was a 7-foot rise in water levels from 2017 to 2018 due to a 54% decrease in Wanapum pumping from the City of Moscow (figure 6). The City of Moscow pumped 21% more water from the Grande Ronde aquifer in 2018 as compared to 2017.

The GWMP consists of a set of goals that are pursued by PBAC. PBAC's primary goal is to develop and begin to implement a balanced, basin-wide, water supply and use program by the year 2025. As a step toward reaching that goal, in 2018 PBAC continued work on the Palouse Groundwater Basin Water Supply Alternatives project to further analyze the four alternatives and developed a survey with University of Idaho researchers to seek community feedback.

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 2018. To provide up to date information where available, data are included for portions of 2019. Water use reports for earlier years can be viewed at the PBAC website (www.palousebasin.org). If you are having trouble finding information on our new website, please contact us at pbac@uidaho.edu.

Photo by Katherine M. Watts

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 1950's, a serious decline in water levels was recognized by the cities, state institutions, and regulatory agencies. Concerns 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 in 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 back cover 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 boundary 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 municipal 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, 15% of the 2018 supply came from the Wanapum which is significantly less than the 32% that was pumped from the Wanapum in 2017. Many of the rural residents in Latah County also tap the Wanapum. In general, the Grande Ronde wells

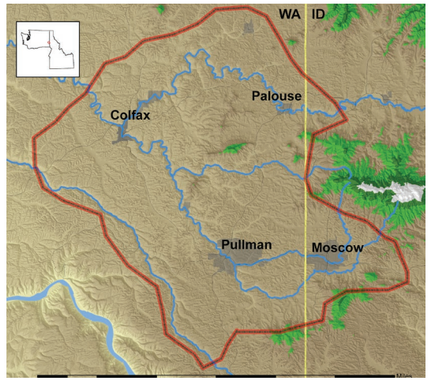


Figure 2: Working Boundary for the Palouse Groundwater Basin

are more productive and contain higher 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)*.

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 5)*. Although absolute values are still uncertain, it is thought that there is limited recharge to both the Wanapum and the Grande Ronde aquifer system.

The City of Moscow decreased its pumping out of the Wanapum by 54% in 2018 as comparted to 2017. In order to supplement the water once pumped from the Wanapum, they increased their pumping out of the Grande Ronde by 21%. The Moscow Police Department well showed a 7-foot recovery, which is similar to the recovery seen in the mid to late 1960's when Moscow and UI drilled their first wells into the lower aquifer and curtailed pumping from the upper aquifer *(figure 6)*.

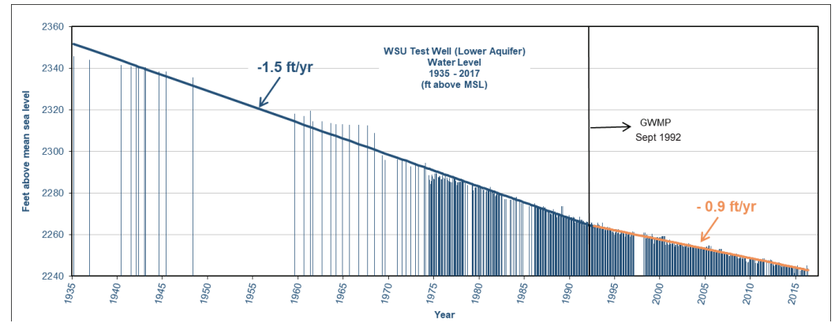


Figure 3: Static water level, WSU test well (lower aquifer), 1935-2017

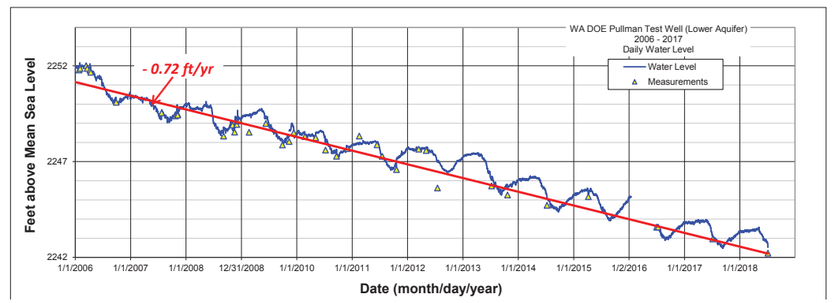


Figure 4: Hydrograph record, WA DOE Pullman test well

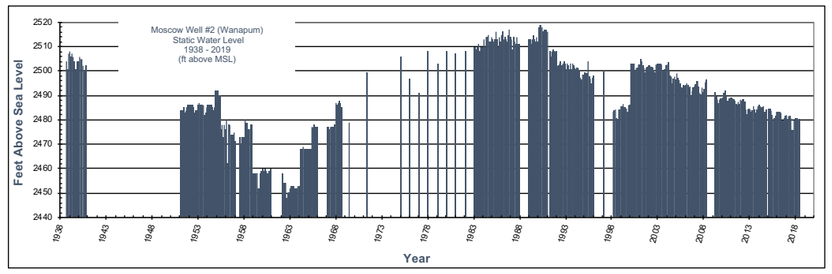


Figure 5: Static water level, Moscow well #2 (upper aquifer), 1938-2019

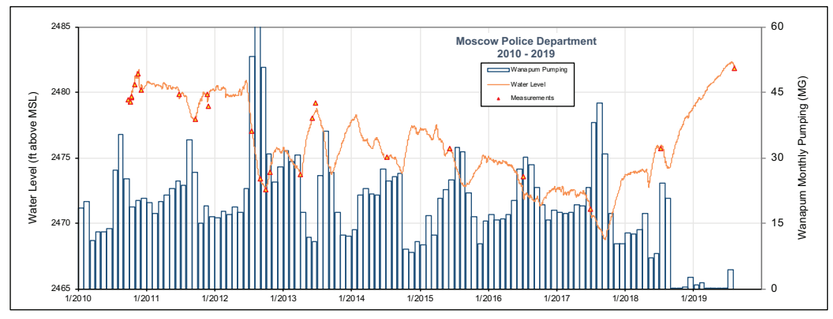


Figure 6: Static water level, WSU test well (lower aquifer), 1935-2017

GROUNDWATER PUMPAGE AND WATER LEVELS

The total combined groundwater pumpage by the three cities (Pullman, Moscow, Palouse) and two universities (WSU and UI) for year 2018 was 2.37 billion gallons (7,273 acre-feet). In aggregate, this was 3.1% less than was pumped in 2017 (2.44 billion gallons), and 13.6% 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 7.

Pumping increases significantly in the summer months, primarily due to increased municipal irrigation demand and other outdoor water use. For 2018, an estimate of the baseline pumping was calculated as the average of the pumping levels for the months of January, February, November, and December. Pumping above this average level can be considered non-baseline usage. As a percentage of total pumping, the 2018 non-baseline (outdoor water use for irrigation/activities) usage for the five pumping entities are shown in Figure 8. (Note: In the figure the UI non-baseline use is presented both with and without inclusion of the 86 million gallons of reclaimed water utilized in 2018). By entity, 2018 comparisons to 2017 pumping are shown in *Figure 9*.

Figure 7: Groundwater pumping–percentage of totals–2018

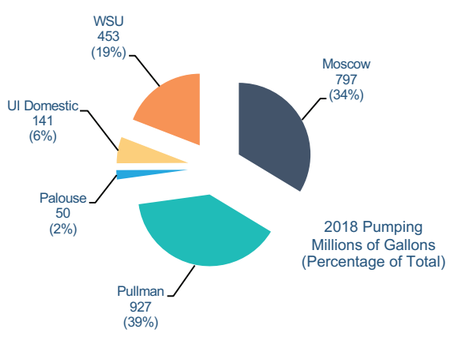
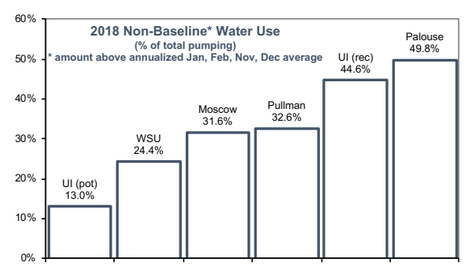


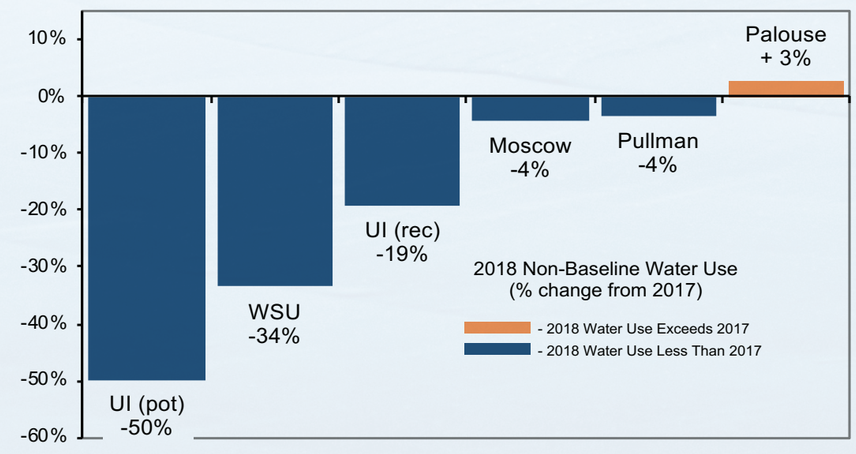
Figure 8: Non-baseline water use, percentage of total pumping, 2018



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 water use would decrease. If temperatures are warmer and drier it can be expected that non-baseline water use would increase. This is simply because people will increase irrigation and other outdoor water use when conditions are warmer and drier. There are also many other variables to consider when trying to determine why pumping has increased or decreased over time. It is important 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 page you will find graphs for monthly pumping graphs compared to the 5-year average, *Figures 10-14*. More graphs including monthly pumping totals by entity are now on our website under the information tab (palousebasin.org).

Figure 9: 2018 percentage pumping change from 2017



MONTHLY PUMPING

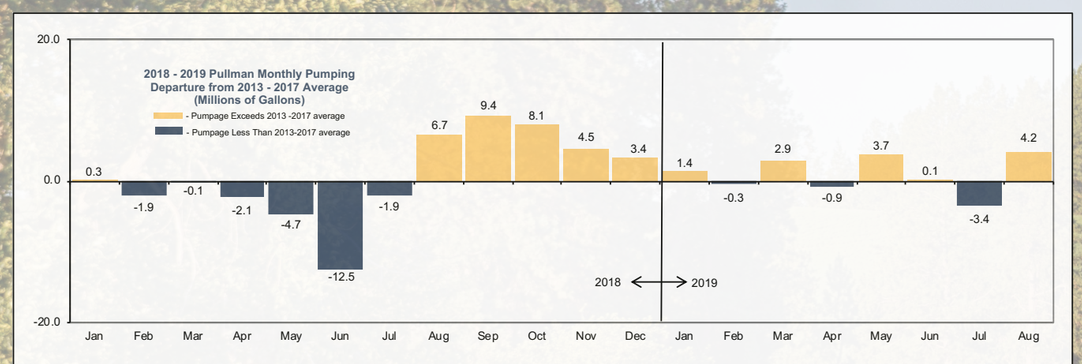


Figure 10: Pullman monthly pumping compared to five-year average

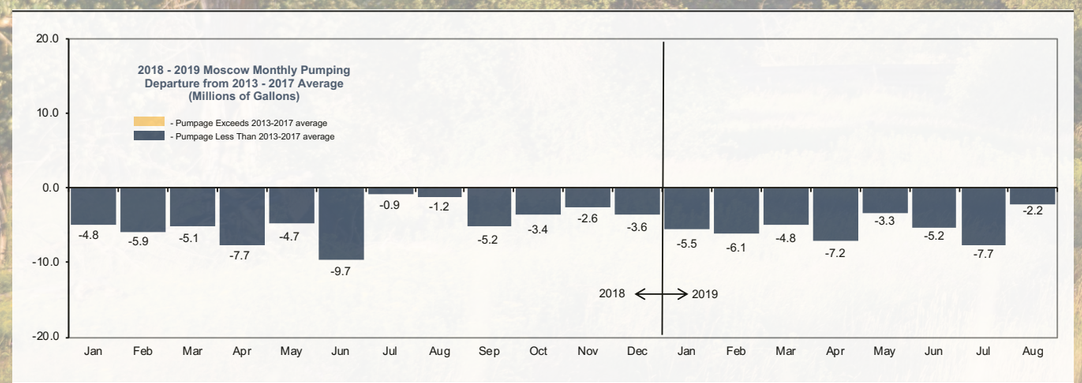


Figure 11: Moscow monthly pumping compared to five-year average

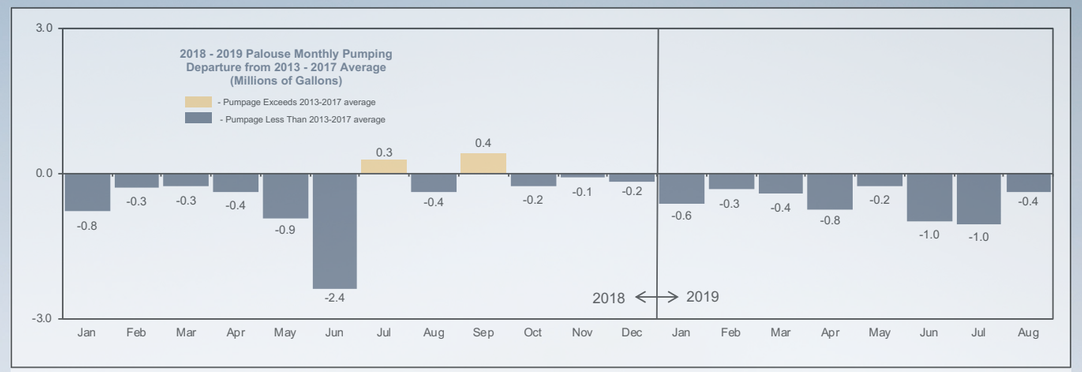


Figure 12: Palouse monthly pumping compared to five-year average

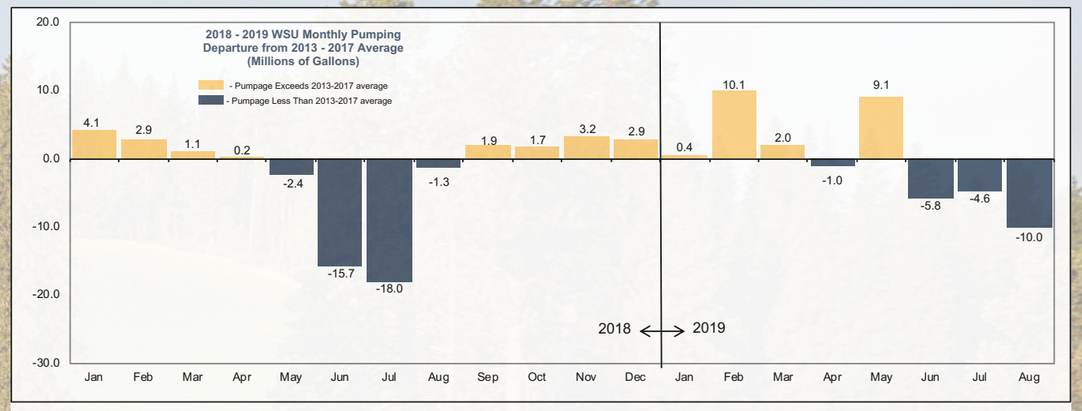


Figure 13: WSU monthly pumping compared to five-year average

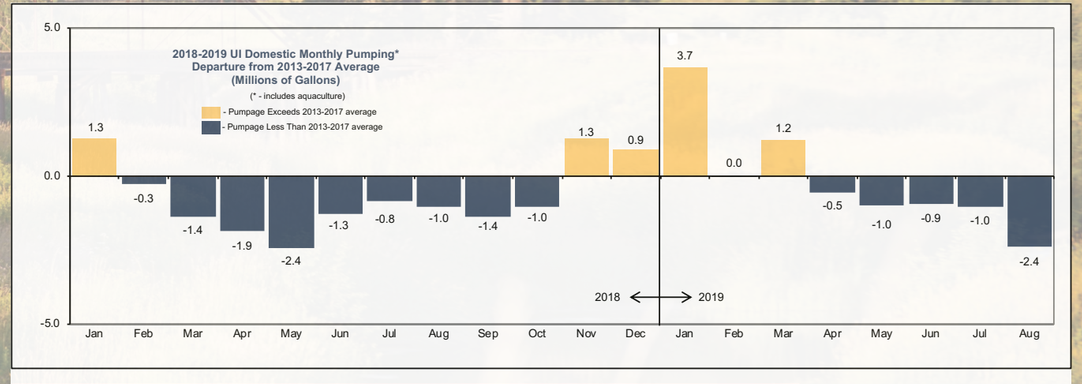


Figure 14: UI monthly pumping compared to five-year average

Photo by Katherine M. Watts

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 15*. The goal graphs for individual pumping entities are shown in *Figures 16, 17, 18 and 19*.

Please note that the University of Idaho pumping numbers do not include the 48 million gallon per year allotment for UI well 5.

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.

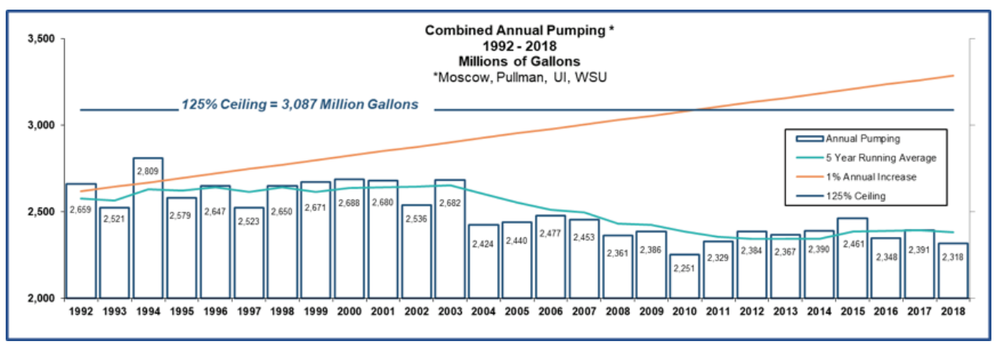


Figure 15: Combined annual pumping

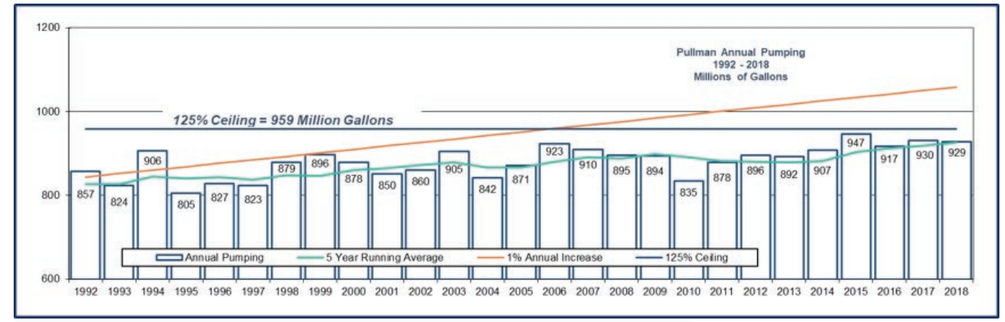


Figure 16: Pullman annual pumping

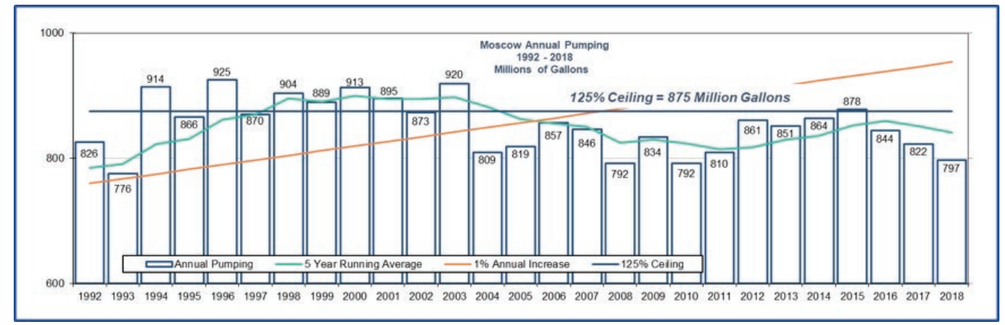


Figure 17: Moscow annual pumping

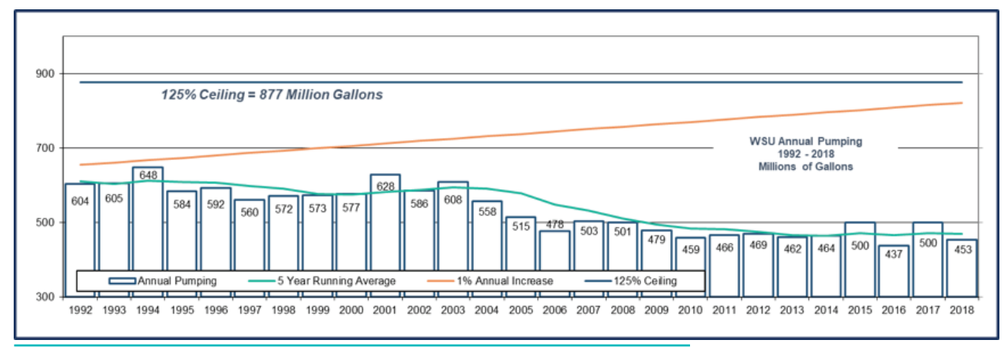


Figure 18: WSU annual pumping

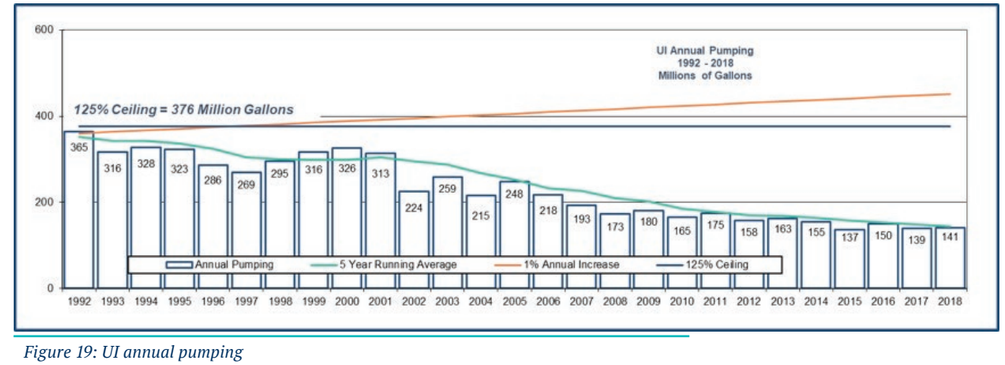


Figure 19: UI annual pumping

2018 ACCOMPLISHMENTS

In 2018, PBAC made progress on the Palouse Water Alternatives Project by continuing feasibility studies, refining timelines 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.

Korey Woodley, and various PBAC committee members attended collaborative meetings with the Idaho Water Resource Board, the Washington Department of Ecology, and the Idaho Department of Water Resources to review the alternatives and identify challenges. Woodley also participated in public presentations at schools, clubs, and regional events to engage with community members and talk about regional water resources. PBAC is working toward plans to greatly expand its outreach efforts. If you would like to invite Woodley or another PBAC committee member to come talk to your organization or have a one-on-one, please contact us at pbac@uidaho.edu.

With the help of researchers from the University of Idaho, PBAC conducted a Palouse Basin Survey to evaluate citizen understanding of the basin water level declines and preferences for alternative water sources. Data was collected summer of 2019 and a report will be published later in 2019. PBAC also funded a Legislative, Executive, Administrative, and Public (LEAP) analysis which will help guide further outreach efforts by identifying stakeholders who wish to be more engaged.

In 2018, PBAC also funded a research project through Jeff Langman at the University of Idaho which will help quantify recharge. Jeff Langman, Kyle Duckett, John Bush and others published a paper in the Journal of Hydrology that reviewed 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!

Photo by Katherine M. Watts

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 2017, PBAC hired Korey Woodley as their Executive Manager who is a community-oriented problem solver that seeks to guide PBAC with their community outreach efforts. The committee seeks community feedback regarding the Palouse Water Alternatives project. Water is an essential ingredient to any functioning society; therefore, only a societal based approach to solving our water dilemmas will allow us to secure our water future.

In 2018, PBAC participated in the 14th (modern) Palouse Water Summit. The 2018 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 15th Summit, scheduled for October 10th, 2019.

2018 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.)	bocc@latah.id.us
Jeff Lannigan (WSU)	lannigan@wsu.edu
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

2018 PBAC Ex Oficio Representatives

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

2018 PBAC Staff

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

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