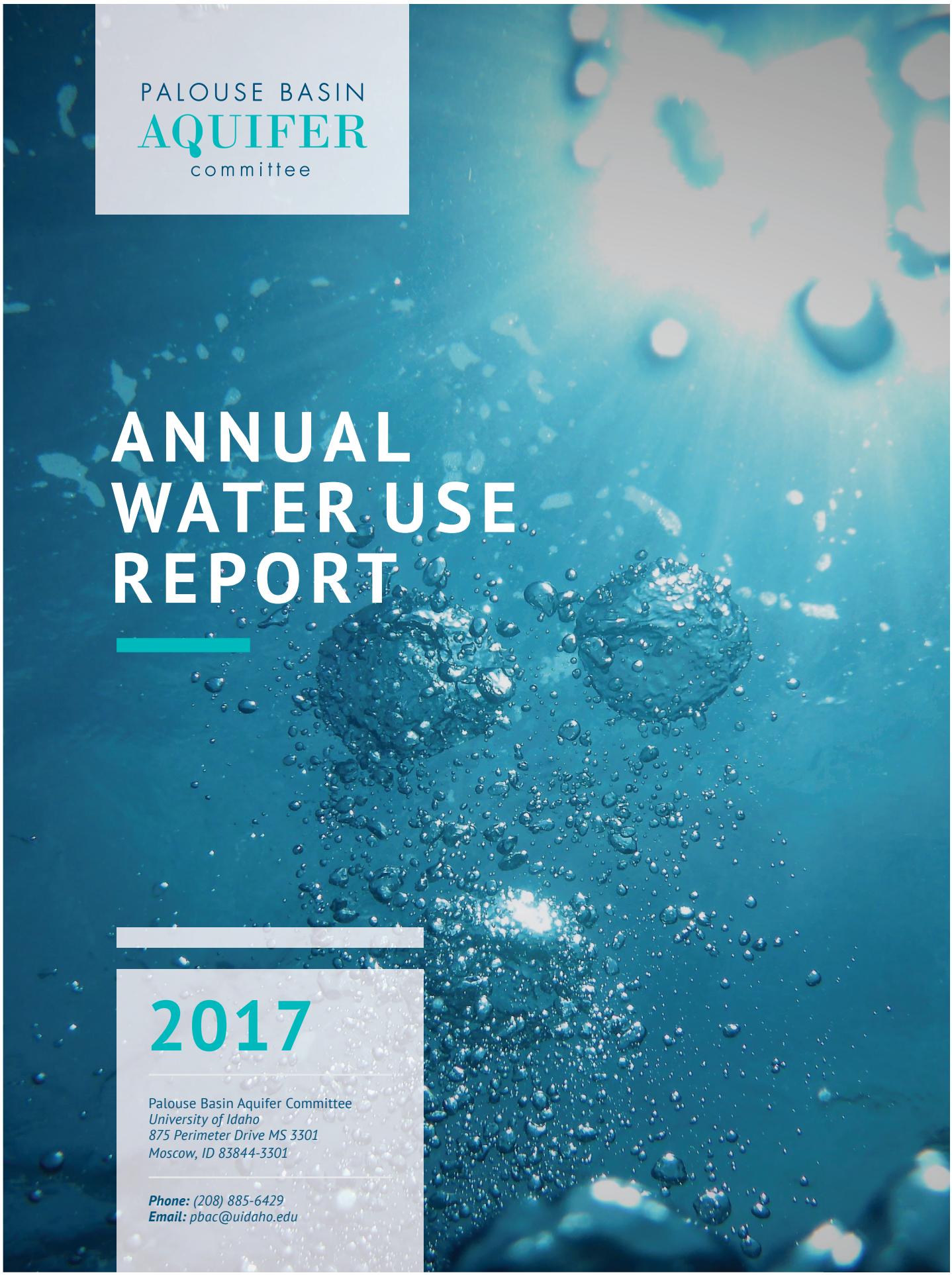
PALOUSE BASIN
AQUIFER
committee

ANNUAL WATER USE REPORT



2017

Palouse Basin Aquifer Committee
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WATER IS ESSENTIAL

The Palouse Groundwater Basin provides the sole drinking water supply for over 60,000 residents

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), first 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 2017. Some of the graphs and figures in our previous reports are now located on our website, palousebasin.org.

Photo by Katherine M. Watts

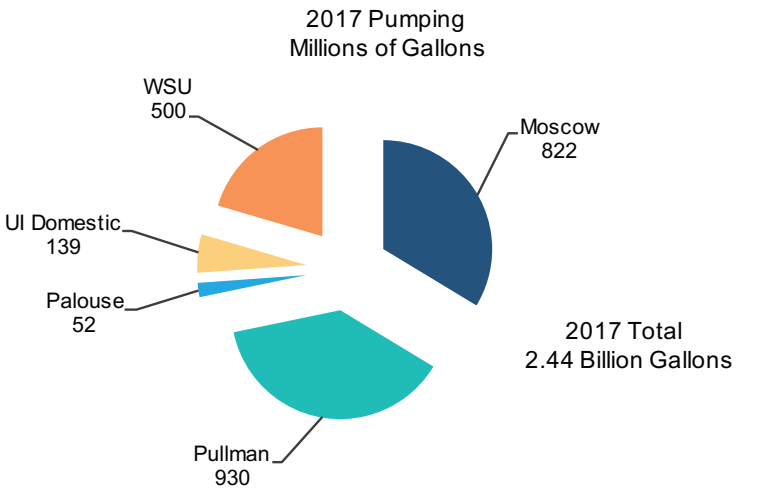


Figure 1: 2017 groundwater pumping

The 2017 total combined groundwater pumpage by the reporting pumping entities within the basin was 2.44 billion gallons *(Figure 1)*. In aggregate (Pullman, Moscow, WSU, UI, Palouse), pumpage for 2017 was approximately 1.9% more than in 2016, but 10.9% less than in 1992, the first year the GWMP took effect.

The 2017 water level data from several lower aquifer wells exhibits a reasonably consistent decline in maximum water level of slightly less than 1 foot from 2016 levels. A network of deep and shallow monitoring wells has been instrumented and are recording information that will 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 GWMP consists of a set of goals that are pursued by PBAC. PBAC's primary goal is to develop and implement a balanced, basin-wide, water supply and use program by the year 2025. As a step toward reaching that goal, in 2017 PBAC continued work on the Palouse Groundwater Basin Water Supply Alternatives project to further analyze the four alternatives.

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 2017. To provide up to date information where available, data are included for portions of 2018. Water use reports for earlier years can be viewed at the PBAC web site (www.palousebasin.org). Please note our webpage has been redesigned to be more user friendly and interactive. If you are having trouble finding information on our new webpage, please email 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, and 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 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 current approximate boundary is illustrated in *Figure 2*. An exaggerated schematic east-west cross section of the basin is shown in *Figure 3*. Groundwater in the basin is pumped primarily from the upper Wanapum and the lower Grande Ronde. 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, 32% of the 2017 supply came from the upper

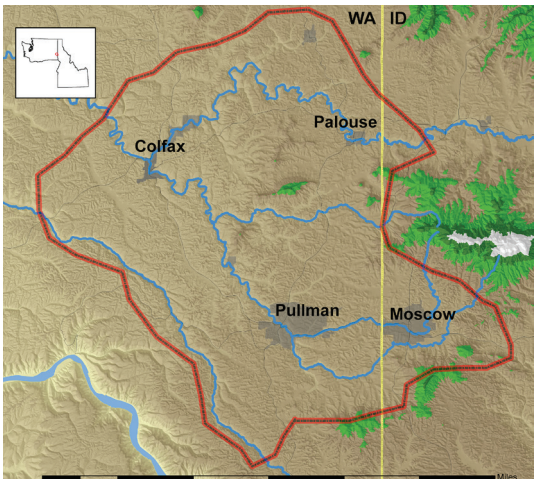


Figure 2: Working Boundary for the Palouse Groundwater Basin

Wanapum, and many of the rural residents in Latah County also tap the upper aquifer. In general, the Grande Ronde wells 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 4)*. More recent data (since 2006) indicate the average annual rate of decline has decreased to 0.72 feet per year *(Figure 5)*.

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

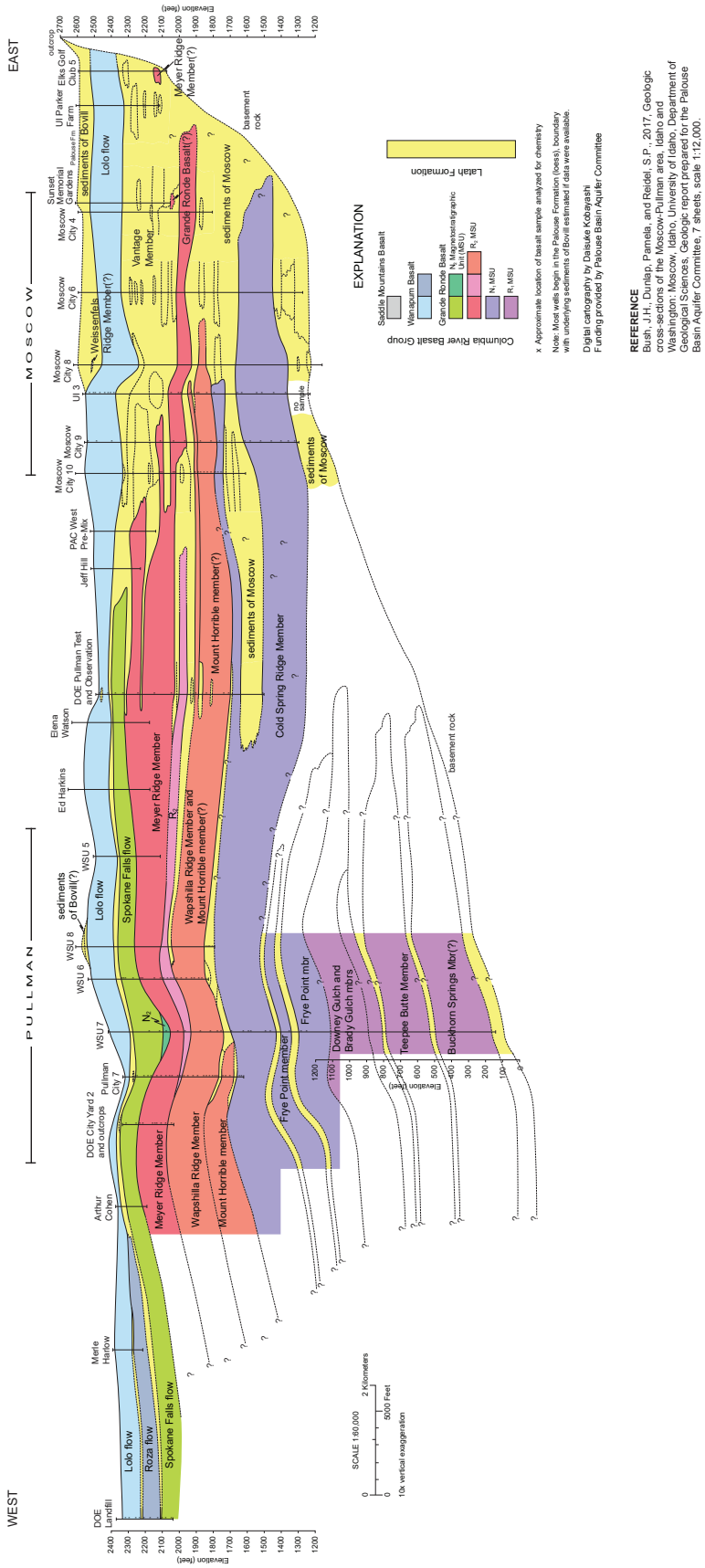


Figure 3: E-W Schematic Cross Section (Bush, J.H., Dunlap, P., and Reidel, S.P., 2017)

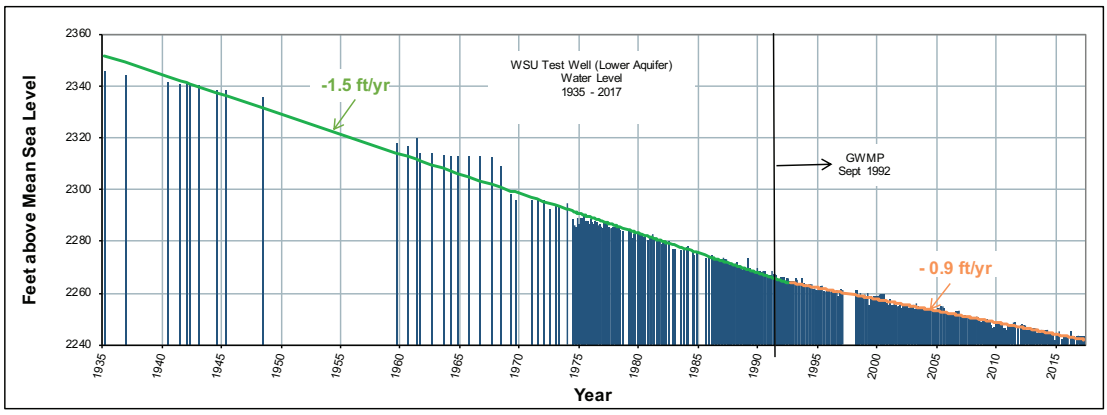


Figure 4: Static water level, WSU test well (lower aquifer), 1935-2017

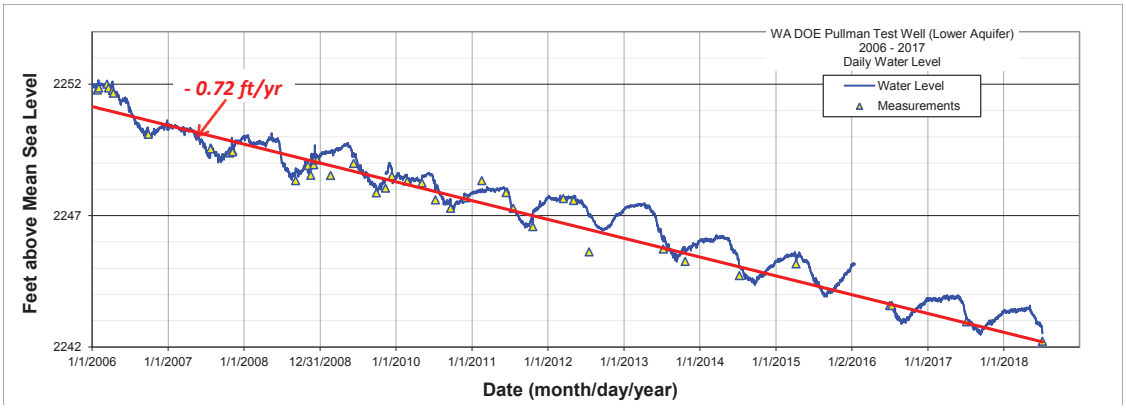


Figure 5: Hydrograph record, WA DOE Pullman test well

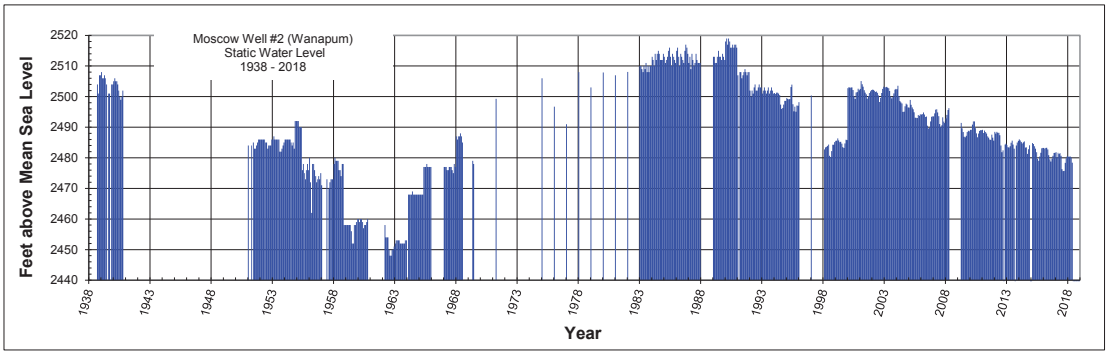


Figure 6: Static water level, Moscow well #2 (upper aquifer), 1938-2018

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 2017 was 2.44 billion gallons (7,488 acre-feet). In aggregate, this was 1.9% more than was pumped in 2016 (2.40 billion gallons), and 10.9% 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. For 2017, 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 2017 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

Figure 7: Groundwater pumping–percentage of totals–2017

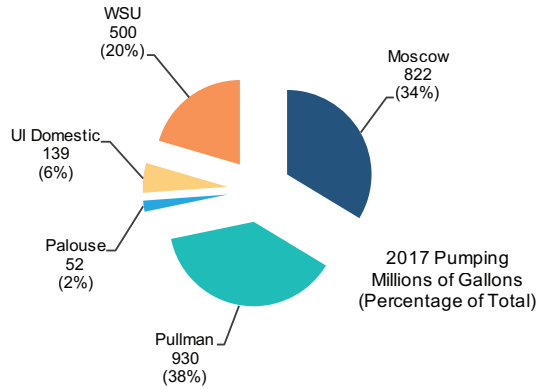
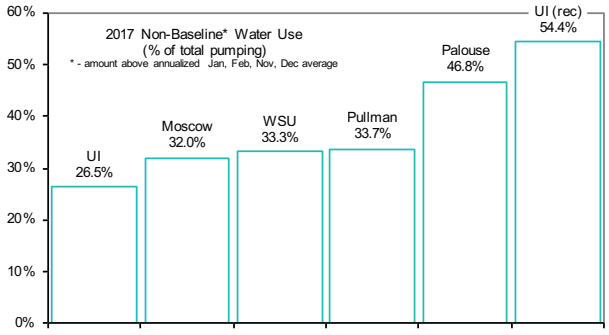


Figure 8: Non-baseline water use, percentage of total pumping, 2017



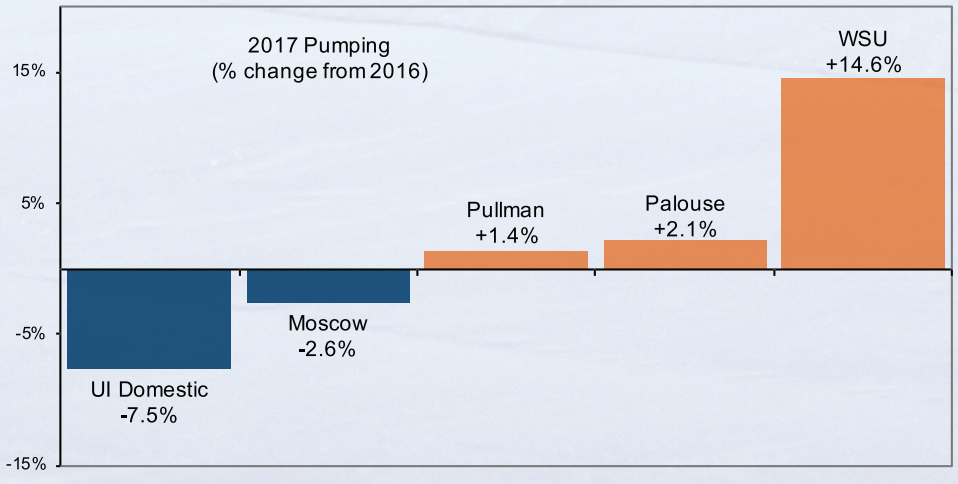
inclusion of the 85 million gallons of reclaimed water utilized in 2017). By entity, 2017 comparisons to 2016 pumping are shown in *Figure 9*.

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 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 in a given year. 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!

In previous reports we had graphics for monthly pumping comparing the previous year's monthly pumping average to current pumping data. We also had monthly pumping graphs for each entity. These graphs are now on our website under the information tab (palousebasin.org).

Figure 9: 2017 percentage pumping change from 2016



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 10*. The limitation goal graphs for individual pumping entities are on our website, www.palousebasin.org.

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.

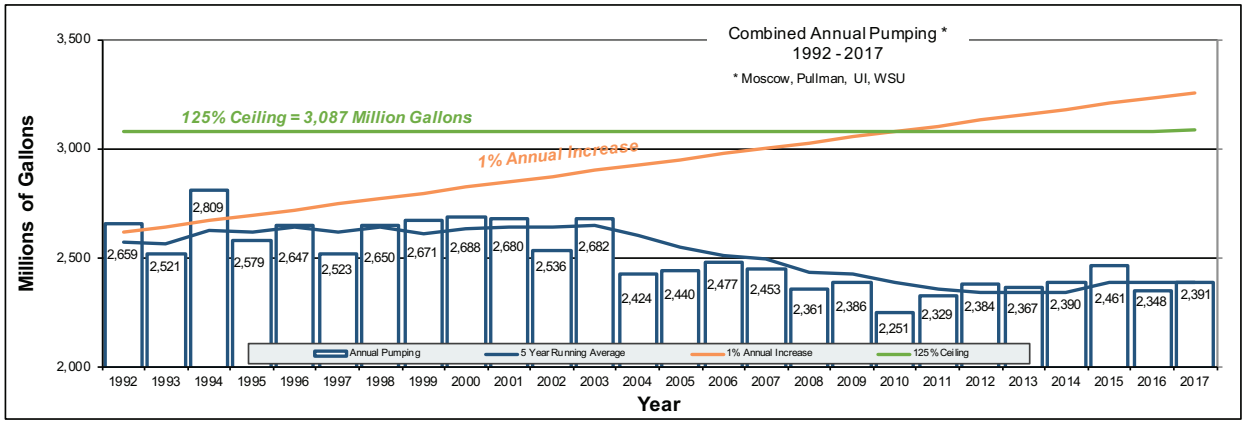


Figure 10: Combined Annual Pumping

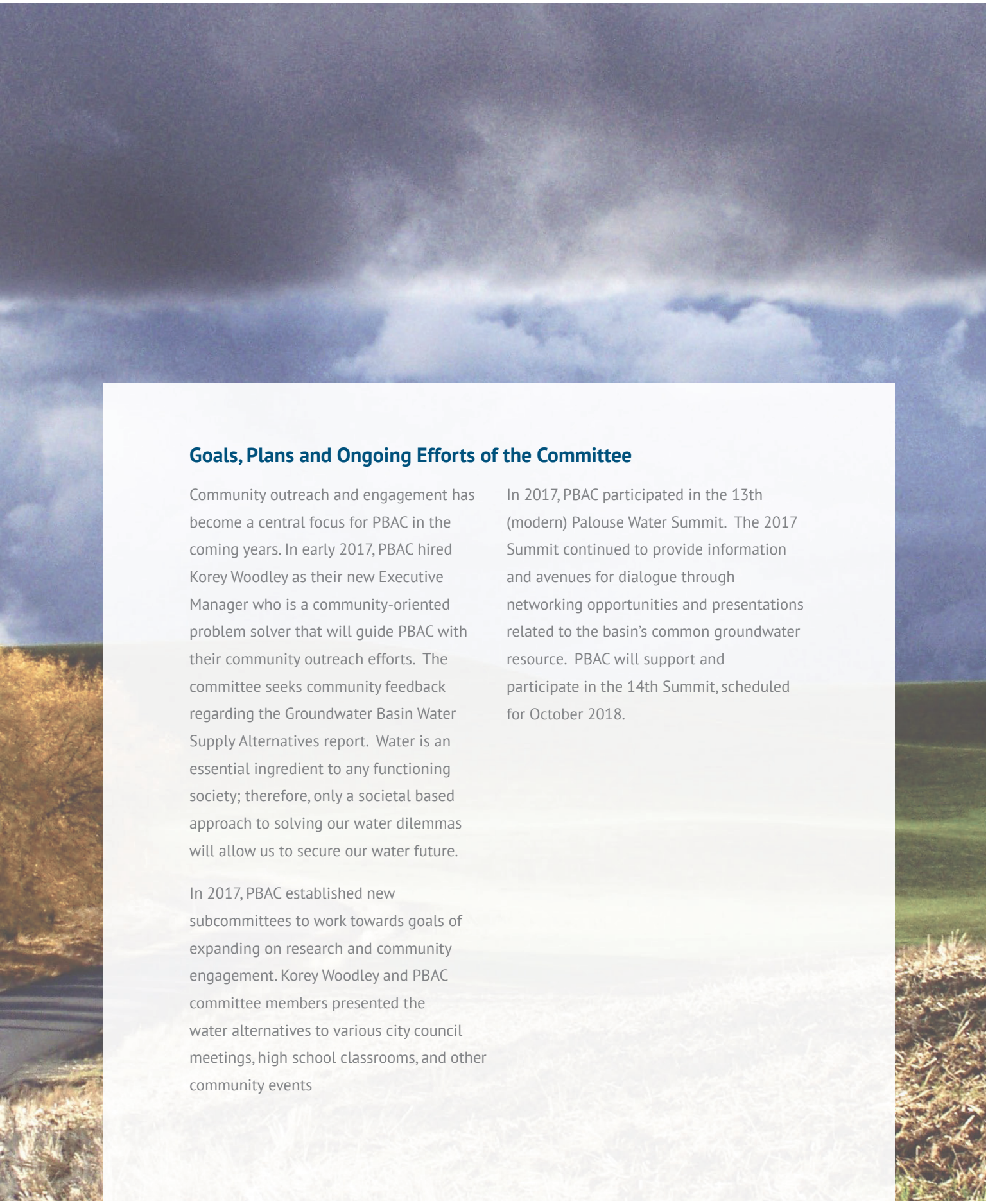
2017 RESEARCH ACCOMPLISHMENTS

In 2017 PBAC expanded on the Palouse Groundwater Basin Water Supply Alternatives report. The 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. This year PBAC started the process of conducting a more detailed feasibility study for the selected water alternative options. A timeline has been established that highlights the goals that will need to be completed to select a water resource alternative. An executive summary of the project is available on our website that includes maps of each alternative.

Another major accomplishment of 2017 is the completion of the Geologic Map Updates for the Palouse Basin project by John Bush and Pamela Dunlap. PBAC funded the project in order to obtain new geologic maps with accompanying cross sections as well as ten new geologic cross sections of the Palouse Basin. The maps reveal a great amount of detailed information *(Figure 11)*. An additional accomplishment of this project was a file of over 100 well logs, located by latitude and longitude, with up-to-date geologic data and interpretations in a geographic information system (GIS) that also is useable in Google Earth.

PBAC is currently funding a tracer project lead by Jeff Langman at the University of Idaho that will contribute to a better understanding of recharge within the basin. The project has had a great deal of progress over the last year. The data collection is completed and by the end of 2018, a paper will be in the process of review.

Photo by Katherine M. Watts



Goals, Plans and Ongoing Efforts of the Committee

Community outreach and engagement has become a central focus for PBAC in the coming years. In early 2017, PBAC hired Korey Woodley as their new Executive Manager who is a community-oriented problem solver that will guide PBAC with their community outreach efforts. The committee seeks community feedback regarding the Groundwater Basin Water Supply Alternatives report. 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 2017, PBAC established new subcommittees to work towards goals of expanding on research and community engagement. Korey Woodley and PBAC committee members presented the water alternatives to various city council meetings, high school classrooms, and other community events

In 2017, PBAC participated in the 13th (modern) Palouse Water Summit. The 2017 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 14th Summit, scheduled for October 2018.

2017 PBAC Representatives

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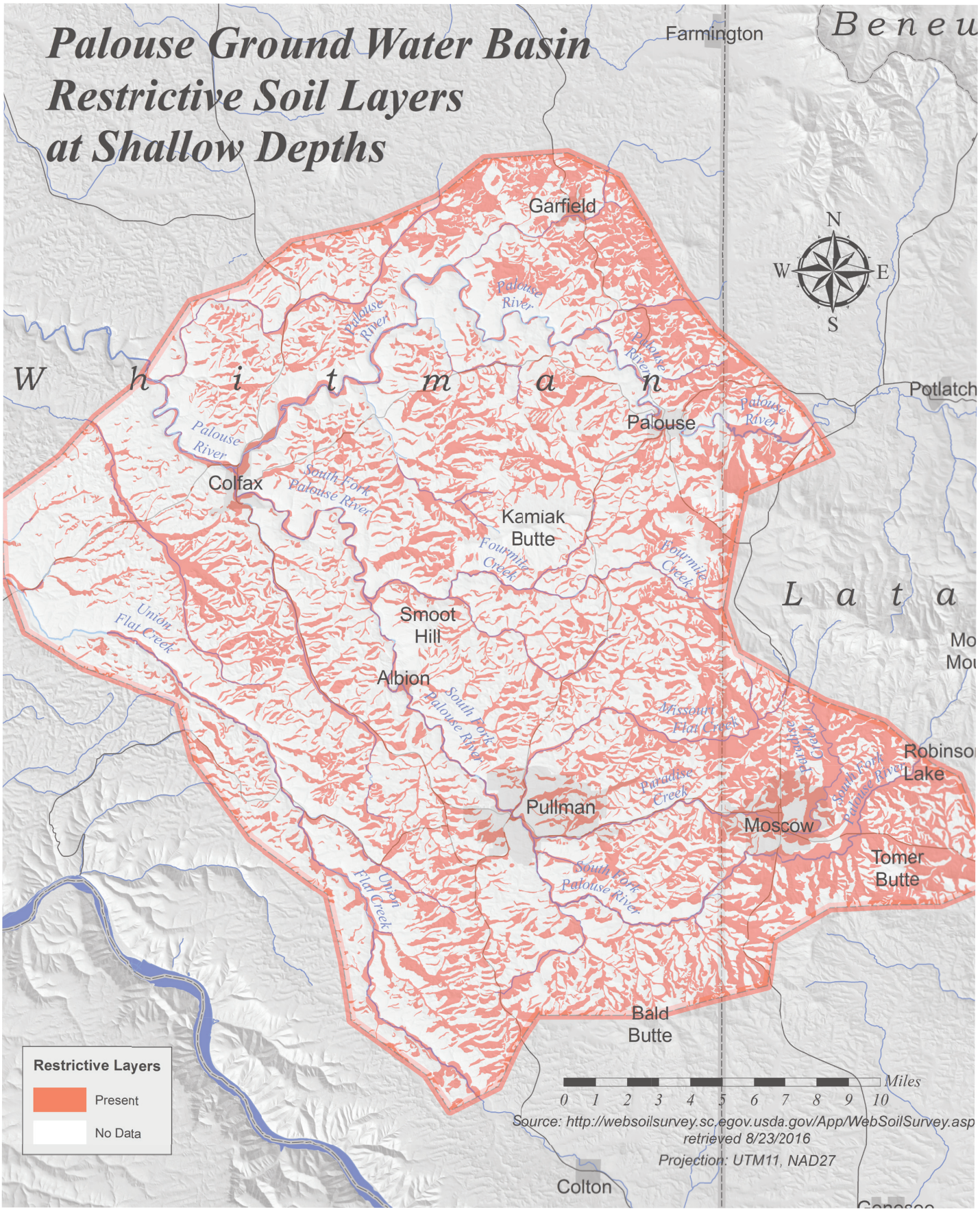

Figure 11: Palouse Ground Water Basin Map


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