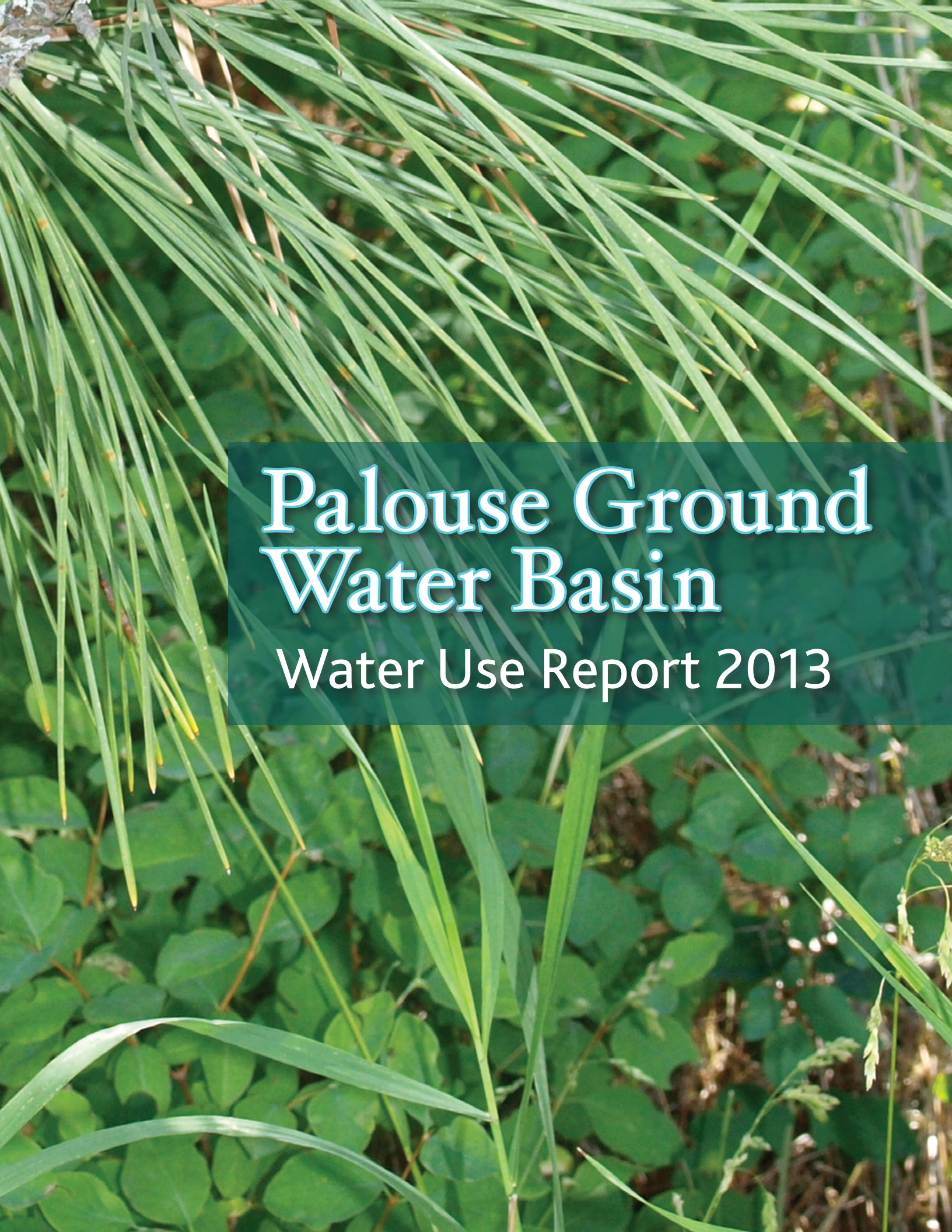
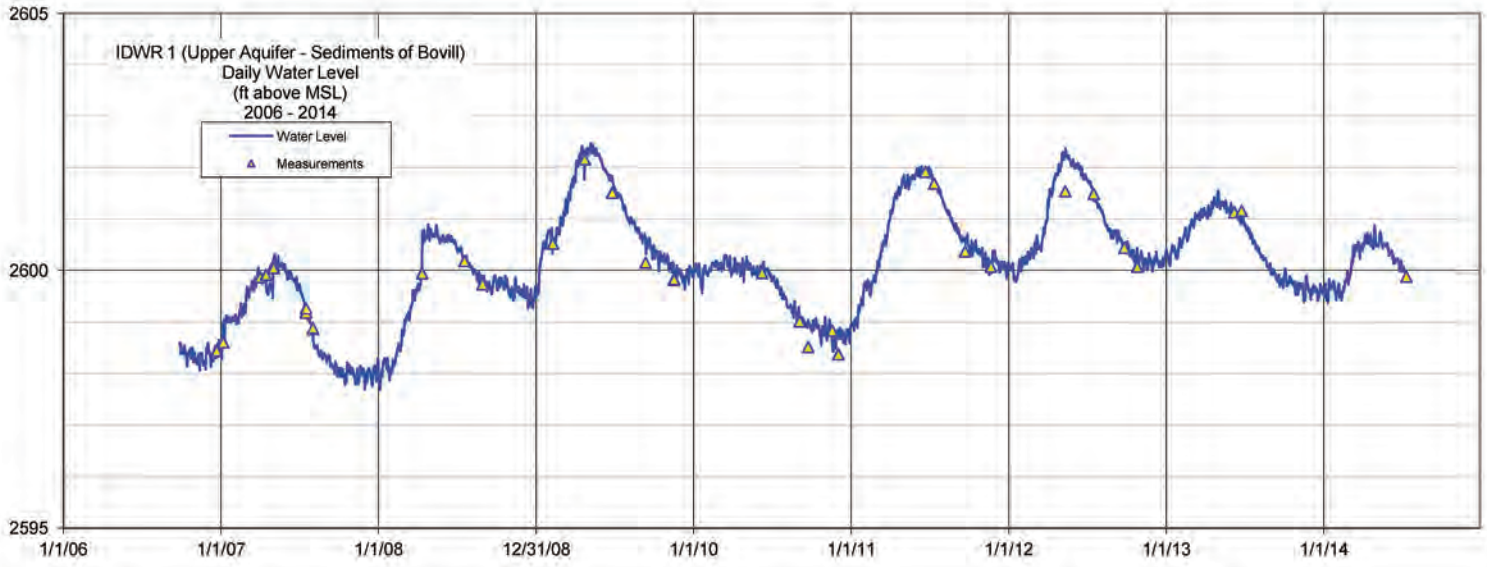
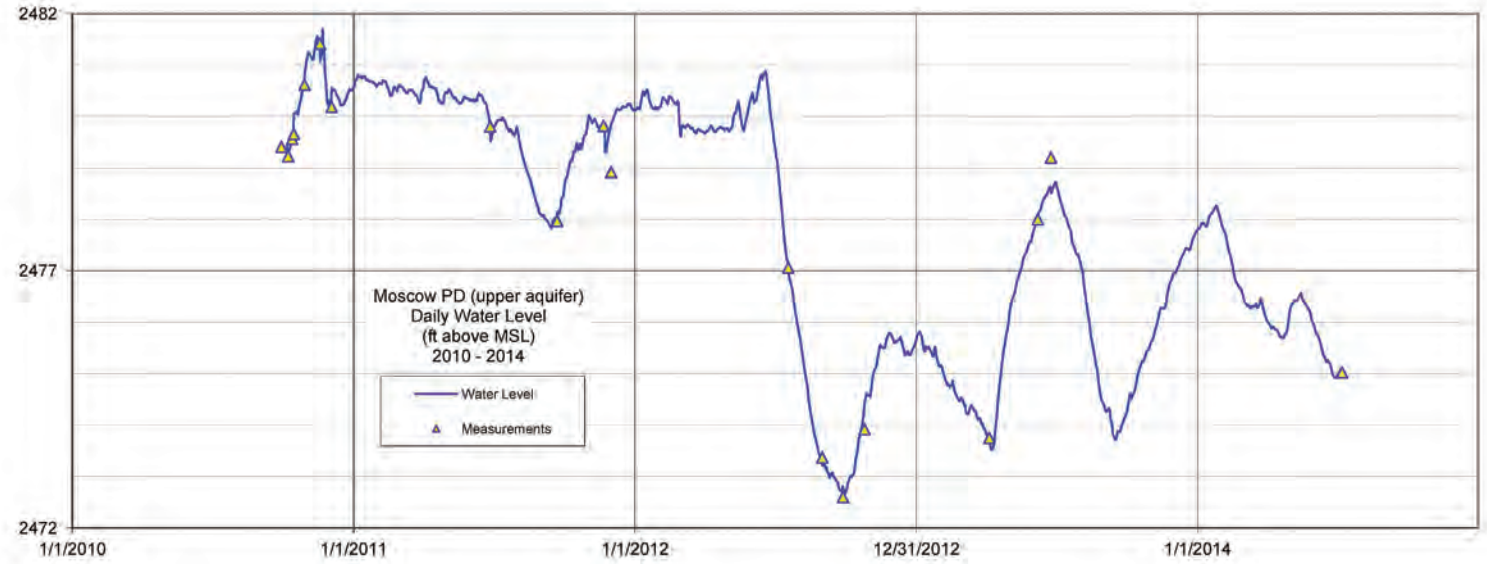


Palouse Ground Water Basin

Water Use Report 2013





Water level hydrographs for 3 Palouse Basin monitoring wells

EXECUTIVE SUMMARY

Ground water is the drinking water supply for over 60,000 residents of Whitman County (Washington) and Latah County (Idaho) within the Palouse Ground Water Basin.

The Palouse Basin Aquifer Committee (PBAC) is a voluntary, co-operative, multijurisdictional group with representatives from the cities, counties and universities in 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 a Ground Water Management Plan (GWMP), first enacted in 1992.

The Ground Water Management Plan and an associated Intergovernmental Agreement include requirements to report accomplishments, pumpage and water level information. The purpose of this report is to review ground water pumpage and summarize aquifer water levels and research accomplishments during 2013.

The 2013 total combined ground water pumpage by the primary pumping entities within the basin was 2.61 billion gallons (Figure 1). In aggregate (Pullman, Moscow, WSU, UI, Colfax, Palouse), pumping for 2013 was approximately 1% less than in 2012, and 15.5% less than in 1992, the first year the Ground Water Management Plan took effect.

Water level data from deep production wells for 2013 reveals a reasonably consistent decline in static water level of less than 1 foot. A network of deep and shallow monitoring wells have been instrumented and are collecting information that will provide a useful long term record of the ground water levels throughout the basin. Hydrograph records for wells in both the upper and lower aquifers are illustrated on the inside front and back covers of this report.

In 2013, PBAC participated in several projects. Sponsored research activities included a ground water/surface water interaction project near the margins of the Moscow Mountain front and an effort aimed at compiling electronic versions of well log information from throughout the basin.

The foundation of the 1992 Ground Water Management Plan is a set of goals. As of 2013, PBAC's primary goal is to develop and implement a balanced, basin-wide, water supply and use program by the year 2025.

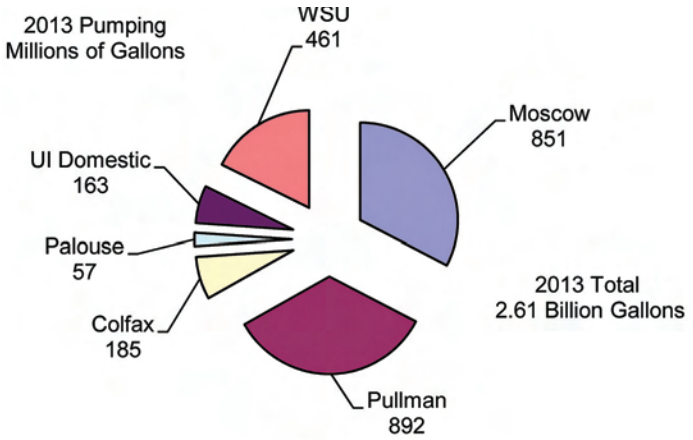


Figure 1: 2013 Ground Water Pumping

Annual Water Use Report

The report that follows includes water use and water level information for the period from 1992 through 2013. To provide up to date information where available, data are included for portions of 2014. Water use reports for earlier years can be viewed at the PBAC web site (http://www.webpages.uidaho.edu/PBAC).

INTRODUCTION

The Palouse Basin Aquifer Committee

Ground water 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. Ground water levels in the deep 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 and then Colfax, Washington. And although not a formal PBAC member, since 2006 the City of Palouse has at times contributed funding toward the administration of the Committee. 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). PBAC member contact information is detailed on page 9.

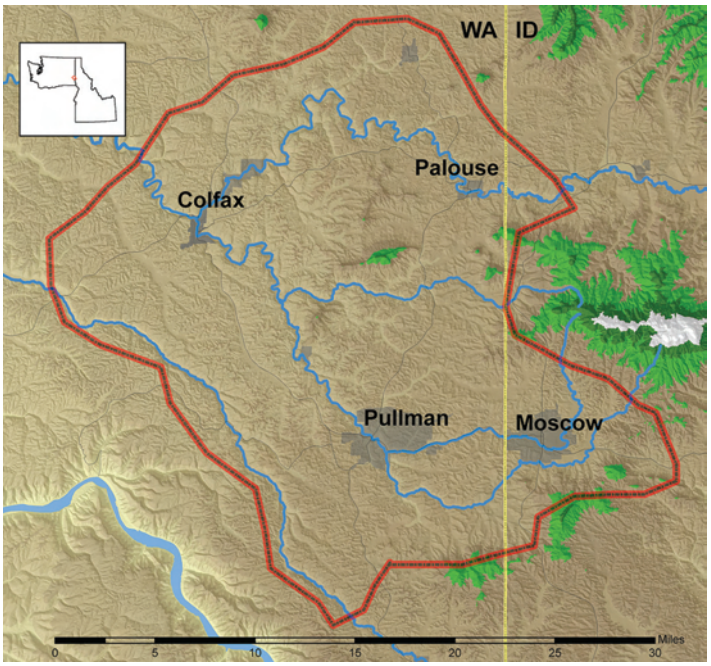


Figure 2: Working Boundary for the Palouse Ground Water Basin

The Ground Water Management Plan

In 1992, the PMWRC, with the support of Washington and Idaho state regulatory agencies, enacted a Ground Water Management Plan (GWMP) for the basin. The Plan is authorized by an Intergovernmental Agreement between the (then 4 - now 7) 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.

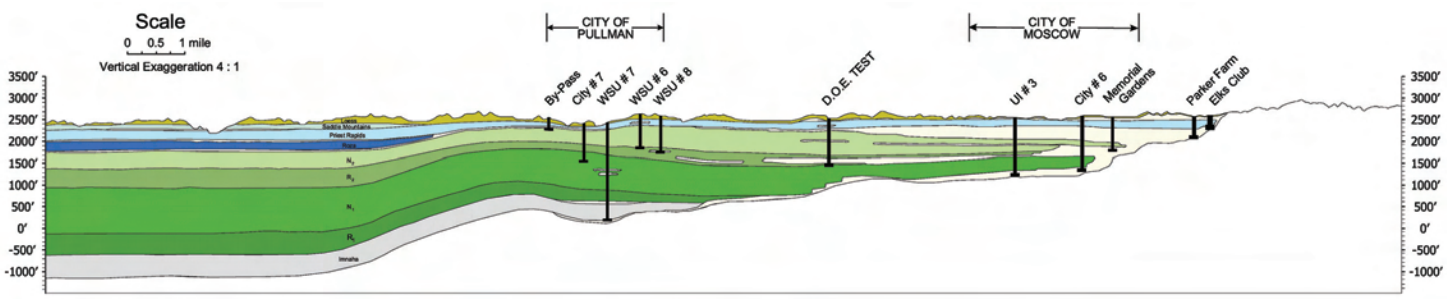


Figure 3: E-W Schematic Cross Section (Bush, Garwood, 2005)

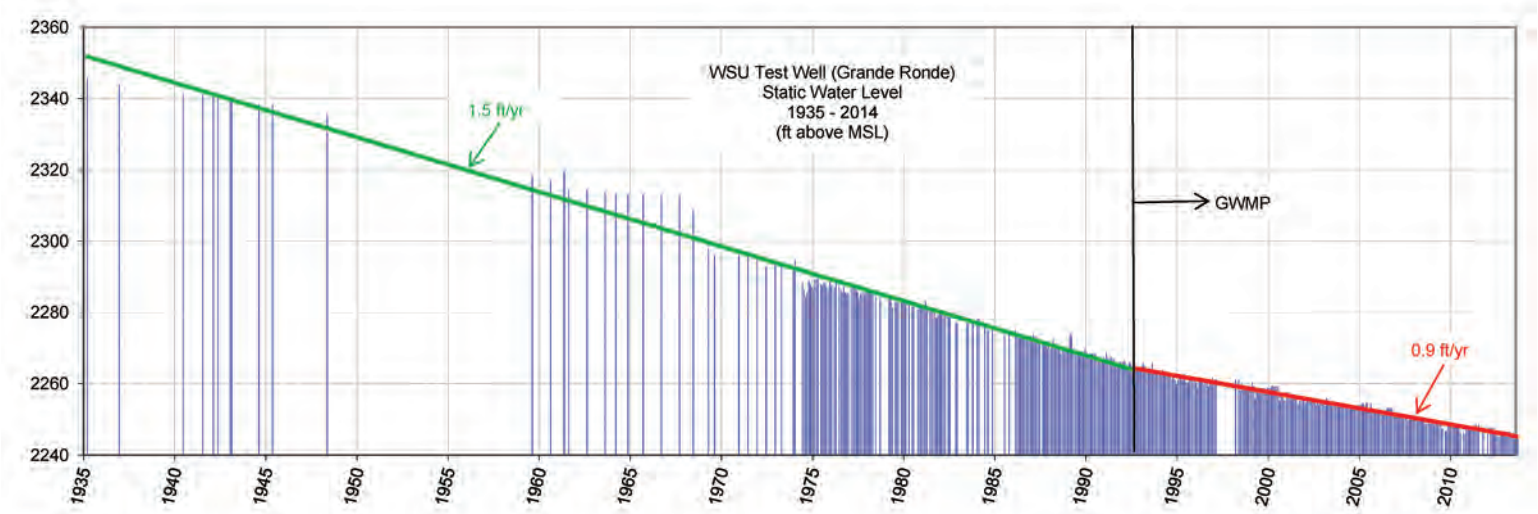


Figure 4: Static Water Level, WSU Test Well (Lower Aquifer), 1935 - 2014

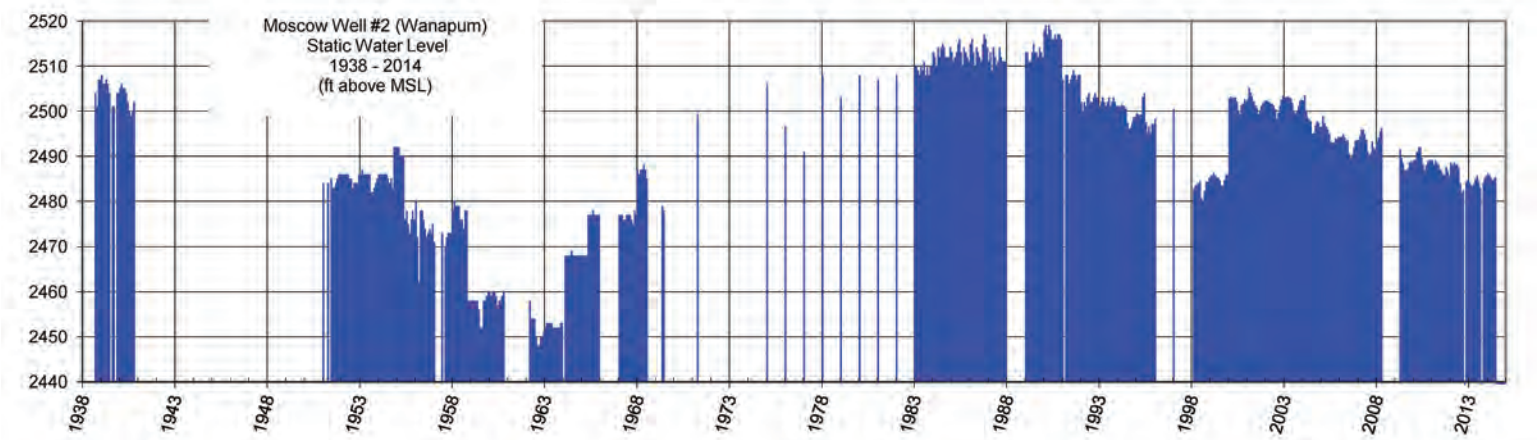


Figure 5: Static Water Level, Moscow Well #2 (Upper Aquifer), 1938 - 2014

Basin Description

The precise boundaries of the basin have not been delineated, but the current working boundary appears as shown in Figure 2. Ground water in the basin is pumped primarily from two aquifer systems: 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 nature of the emplacement of the basalts over time resulted in significant differences in geology from west to east across the basin. The eastern end of the basin is characterized by thick sedimentary interbeds that thin west of Moscow. The Grande Ronde basalts are thicker beneath Pullman. An exaggerated schematic east-west cross section of the basin is shown in Figure 3.

The primary municipal drinking water source in the basin is the lower Grande Ronde aquifer system. In Pullman, all of 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, 31% of the 2013 supply came from the upper 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 0.6 and 1.5 feet per year for 70 or more years (Figure 4). Water levels in the upper aquifer dropped drastically in the late 1950s and early '60s, but recovered in the 1970s and '80s when much of the pumping switched to the lower 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 systems.

Ground Water Pumpage and Water Levels

The total combined ground water pumpage by the four cities and two universities for the year 2013 was 2.61 billion gallons (8,007 acre-feet). In aggregate, this was 1% less than was pumped in 2012 (2.64 billion gallons), and 15.5% less than was pumped in 1992 (3.09 billion gallons), the first year the Ground Water Management Plan took effect.

In 2013, Pullman and Moscow each pumped approximately 1/3 of the total (34% and 33% respectively), followed by WSU at 18%. Colfax and UI pumped 7% and 6%, respectively, and Palouse pumping accounted for 2% of the combined total (Figure 6). By entity, comparisons to 2012 pumping are shown in Figure 7.

Moscow pumped 31% (262 million gallons) of its water from the upper Wanapum aquifer system in 2013. The other pumping entities all pump solely from the lower Grande Ronde system. As a percentage of the combined pumping total, the 2013 Moscow Wanapum contribution amounted to 10%.

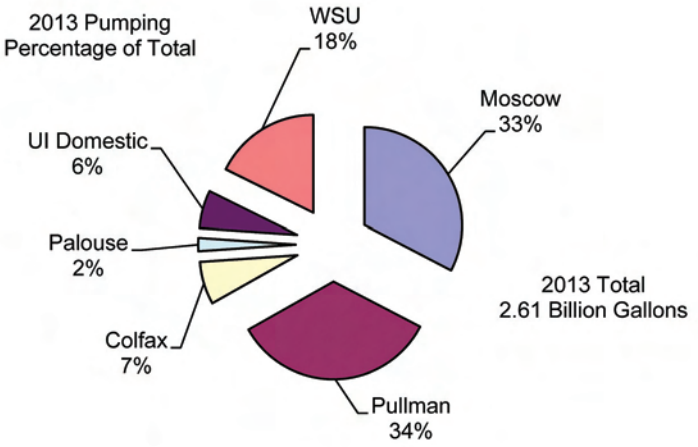


Figure 6: Ground Water Pumping – Percentage of Total - 2013

Pumping increases significantly in the summer months, primarily due to increased irrigation demand. For 2013, 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 2013 non-baseline usage for the five largest pumping entities ranged from 24.3% for UI to 43.6% for Palouse (Figure 8).
(Note: In the figure the UI non-baseline use is presented both with and without inclusion of the 74 million gallons of reclaimed water utilized in 2013).

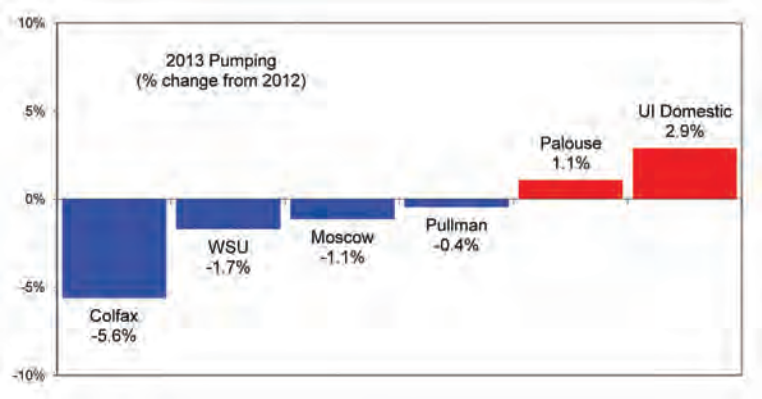


Figure 7: 2013 Pumping – Change from 2012

Non-baseline usage varies with the weather conditions experienced during the year. In 2013, with the exception of September, the irrigation season was significantly warmer than average. Precipitation in the area is generally quite low during the irrigation season, but in September 2013 the area received over 2 inches more rain than is normal. Compared to 2012, warmer-drier conditions early in the irrigation season were offset by the cooler-wetter September, resulting in the small annual pumping decline detailed earlier. Charts of 2013 and first half 2014 monthly pumping compared to the 2008-2012 averages are shown in Figures 10-15. Figures 20-25 illustrate monthly pumping for the period between 2009 and mid 2014.

As part of the Ground Water Management Plan, each pumping entity has agreed to voluntary pumping limitation goals. Pullman, Moscow, and the universities have agreed to 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 9. The limitation goals for individual GWMP pumping entities are illustrated in Figures 16-19. Note that no charts are shown for Colfax or Palouse as they were not original signatories to the Ground Water Management Plan, and are not subject to the pumping targets.

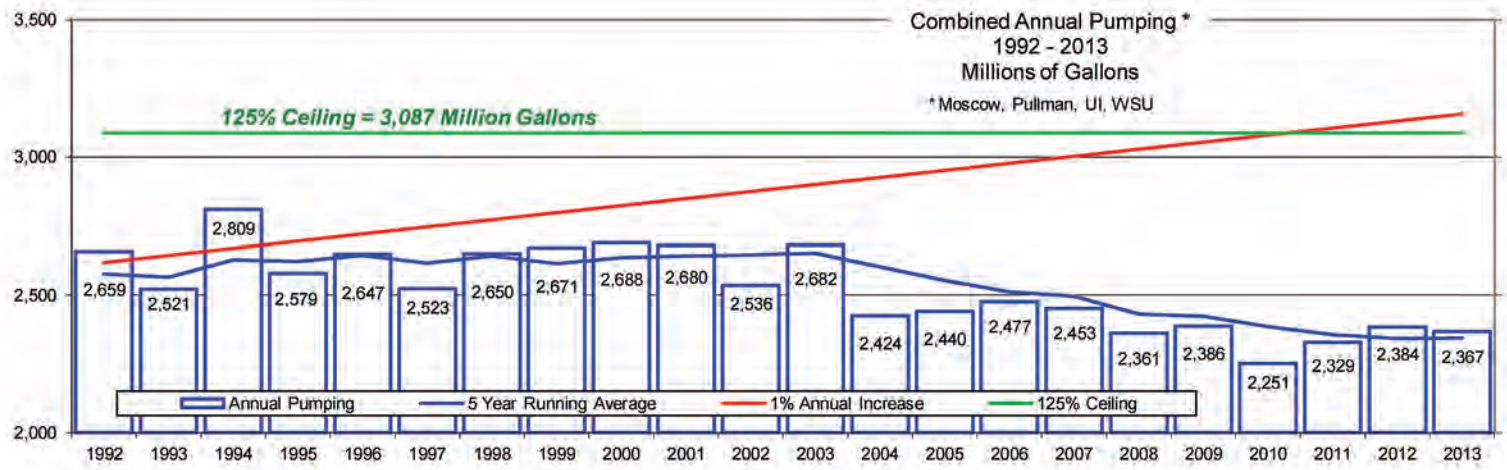


Figure 9: Pumping Limitation Goals, 4 Major Entities Combined

PBAC maintains a network of monitoring wells throughout the basin. A map illustrating monitoring well locations and hydrographs is included on the inside back cover of this report. Water level hydrographs for 3 of the wells in the monitoring network are presented on the inside front cover of this report.

Inspection of the hydrograph for the DOE Pullman Test monitoring well (bottom figure on inside front cover) reveals that the maximum water level in 2013 appears to have declined by only 0.3 feet from that of 2012. The decline in annual maximum between 2013 and 2014 however, was 1.2 feet. A regression line for the years 2006 through mid 2014 indicates an average annual decline over the period of approximately 0.6 ft/yr.

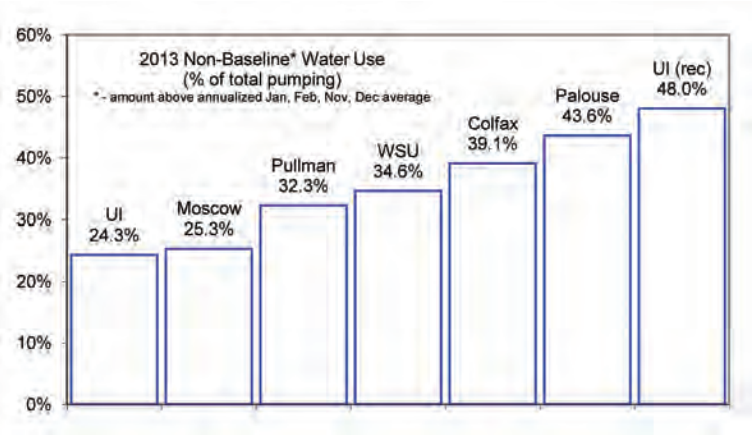


Figure 8: Non-Baseline Water Use – 2013

In the upper Wanapum aquifer, a marked decline in water level in 2012 can be seen in the hydrograph of the Moscow PD well (middle figure, inside front cover). This was the result of increased pumping of the upper aquifer by the City of Moscow to meet summer demand while working to repair the main lower aquifer production Well 9. When Well 9 was brought back on line in early 2013, the City reduced pumping in the upper aquifer and much of the decline has since been recovered.

Comparing the Moscow PD hydrograph to that of the IDWR 1 monitoring well (upper figure, inside front cover), which is completed above the Wanapum basalt in the Sediments of Bovill, it appears that water levels in the IDWR well exhibit seasonal variation but were not impacted by the increased pumping by the City in 2012.

Monthly Pumping Compared to 5 Year Average

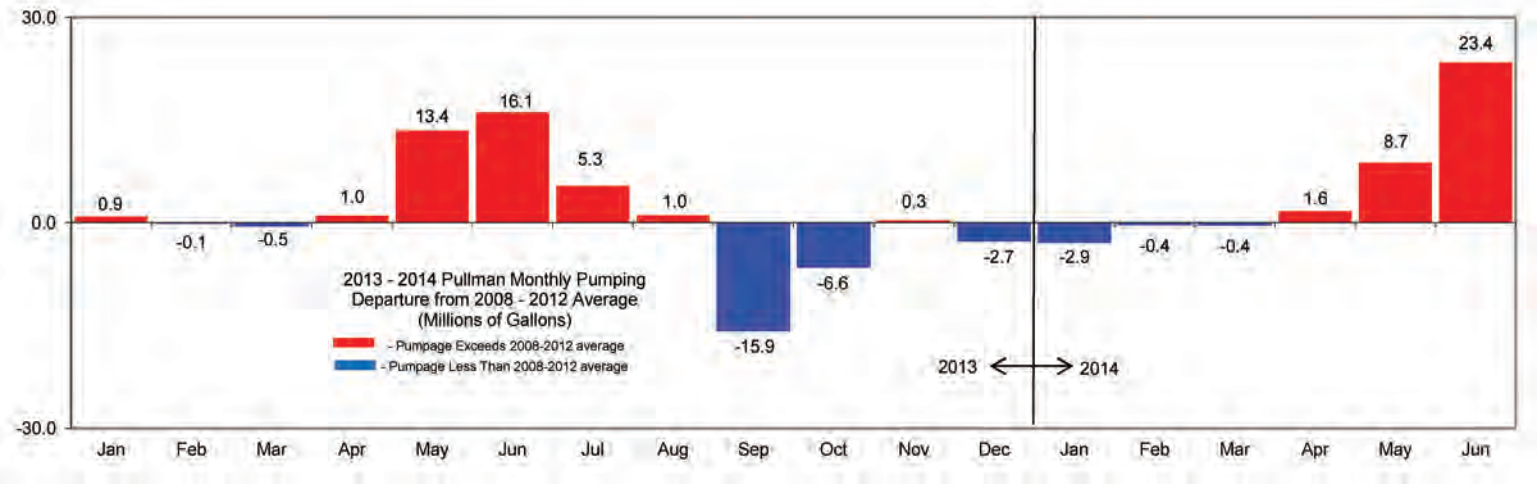


Figure 10: Pullman Monthly Pumping, Departure from 5-year Average, 2013-2014

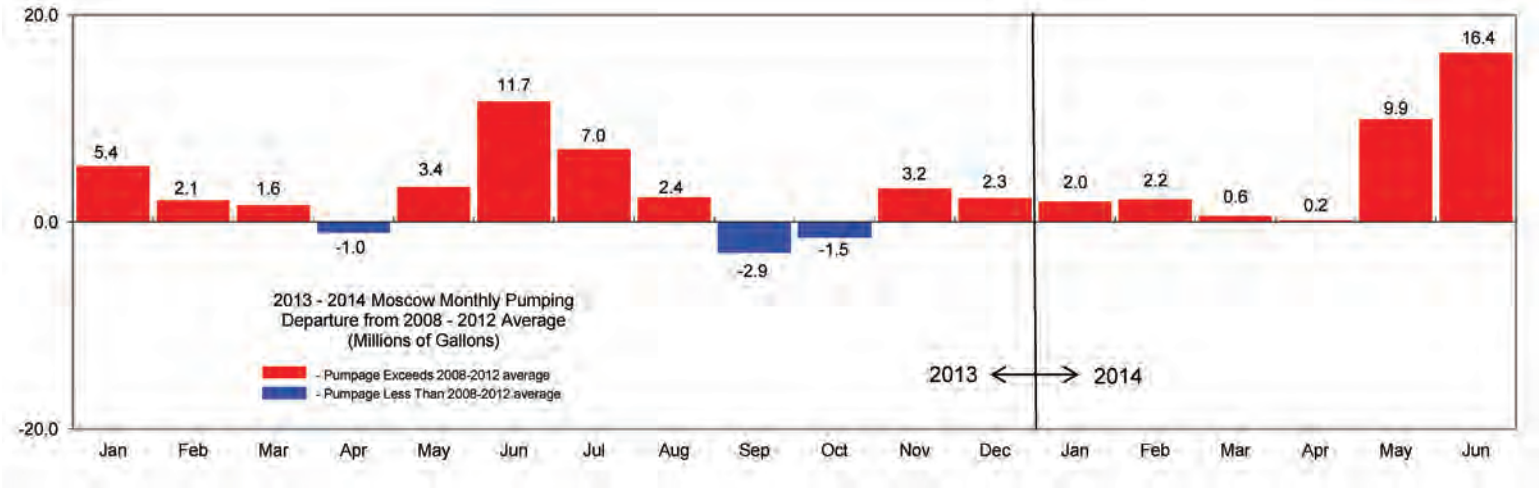


Figure 11: Moscow Monthly Pumping, Departure from 5-year Average, 2013-2014

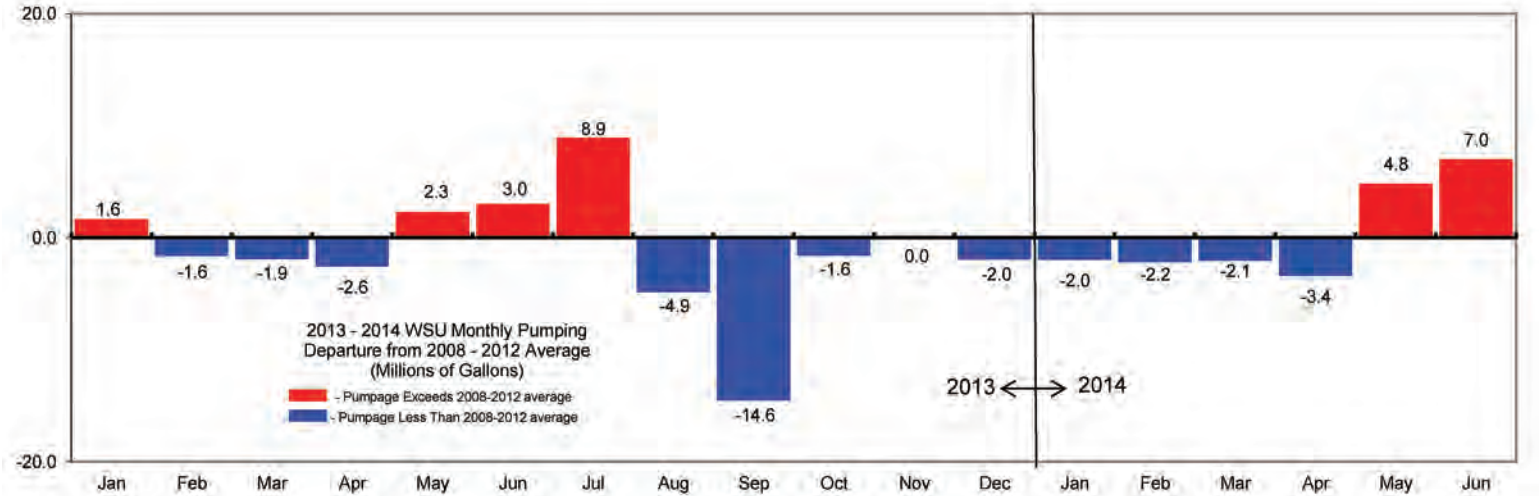


Figure 12: WSU Monthly Pumping, Departure from 5-year Average, 2013-2014

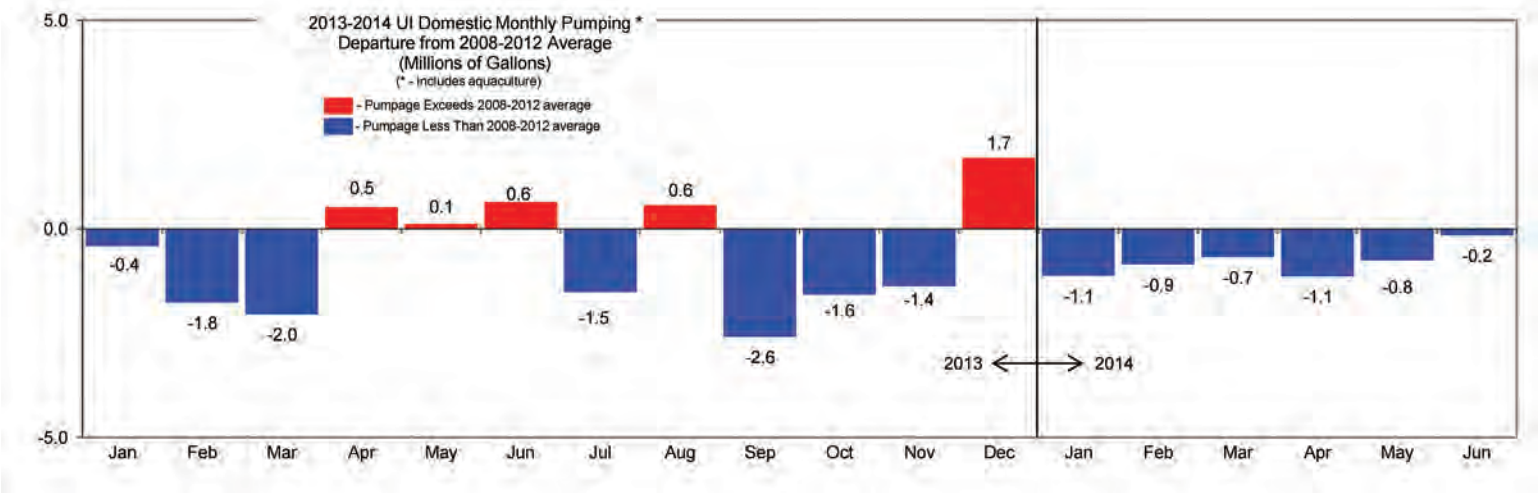


Figure 13: UI Monthly Pumping, Departure from 5-year Average, 2013-2014

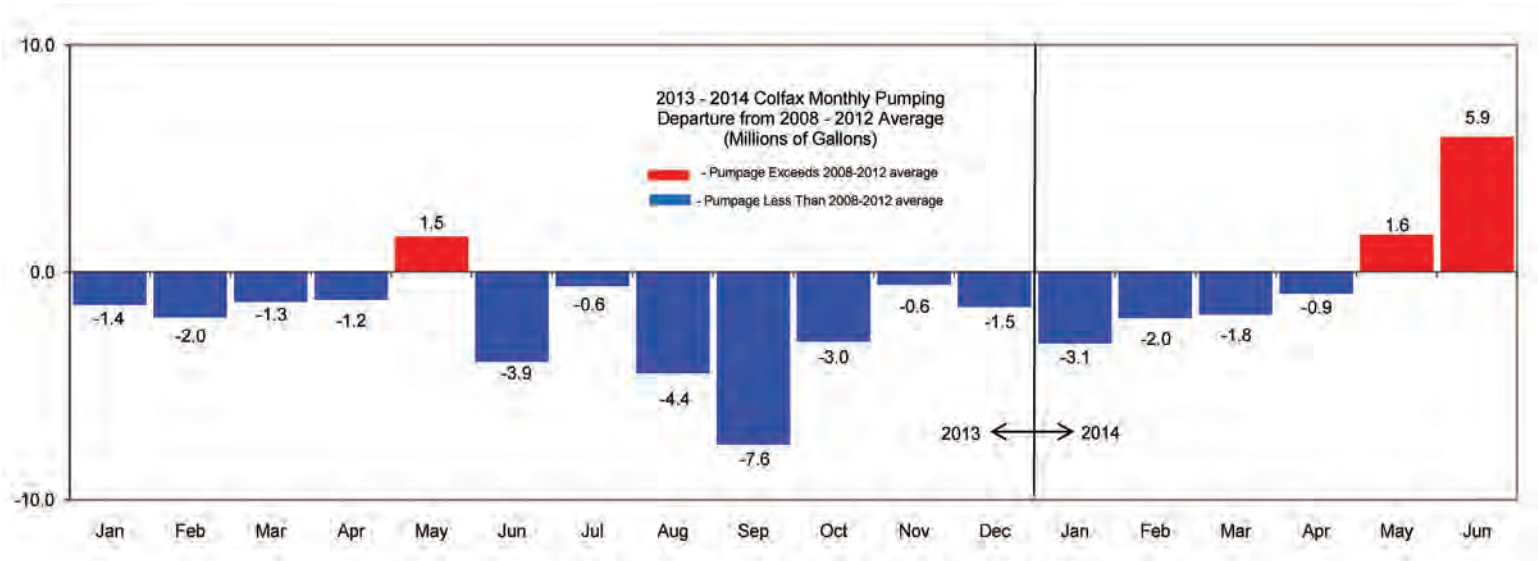


Figure 14: Colfax Monthly Pumping, Departure from 5-year Average, 2013-2014

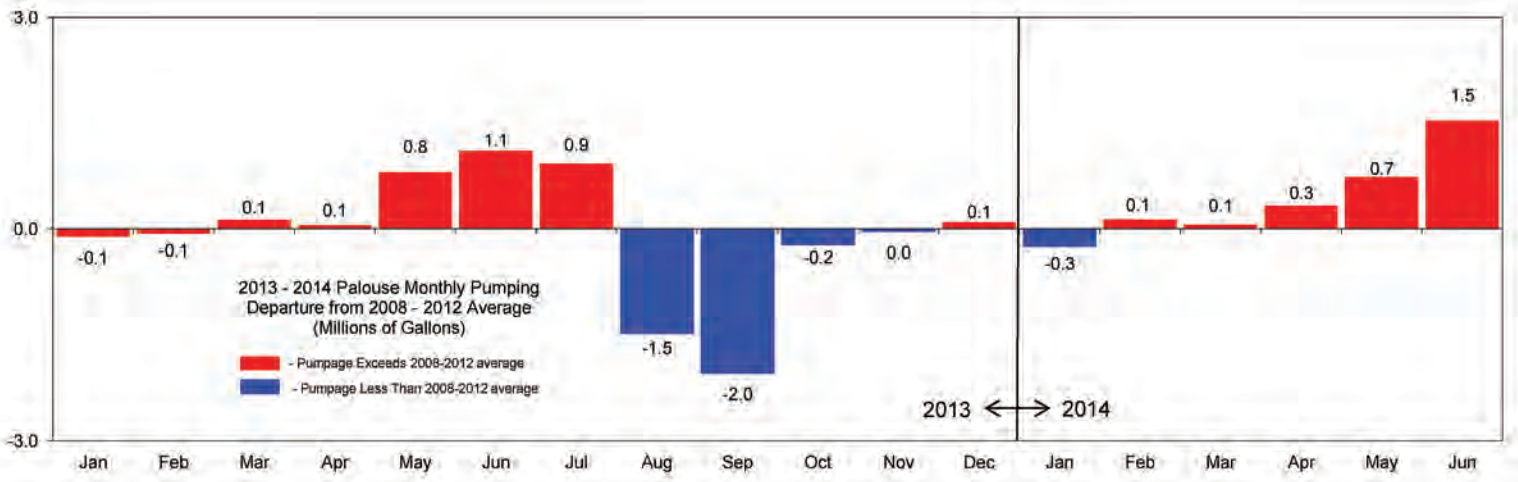


Figure 15: Palouse Monthly Pumping, Departure from 5-year Average, 2013-2014

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Research Accomplishments 2013

PBAC initiated a new 2-year research project during 2012, lead by UI principal investigator Erin Brooks. The project will compare time-based light stable isotope signatures (18O and 2H) from ground water wells and surface water at several locations near the margins of the Moscow Mountain front. Wells exhibiting signatures similar to those of the surface water could be evidence of the presence of a hydrologic connection.

PBAC also continued to support an ongoing project aimed at compiling electronic copies of all wells logs in the basin and creating a "clickable" well log map. The output of this project will serve as a supplement to a portion of the 2011 Framework project that compiled electronic versions of nearly 400 technical documents into a searchable database. These two products will enable future researchers to more effectively access hydrogeologic information about the basin.

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 2013, PBAC continued to review the GWMP with the intent of incorporating information gathered since its 1992 creation. Each PBAC entity is now charged with reviewing and updating its individual action plan(s) to better reflect current conditions in the basin.

In 2013, PBAC participated in the ninth (modern) Palouse Water Summit. The 2013 Summit continued to provide information and avenues for dialogue through networking opportunities and presentations related to the basin's common ground water resource. PBAC will support and participate in the tenth Summit, scheduled for October 2014.

Pumping Limitation Goals

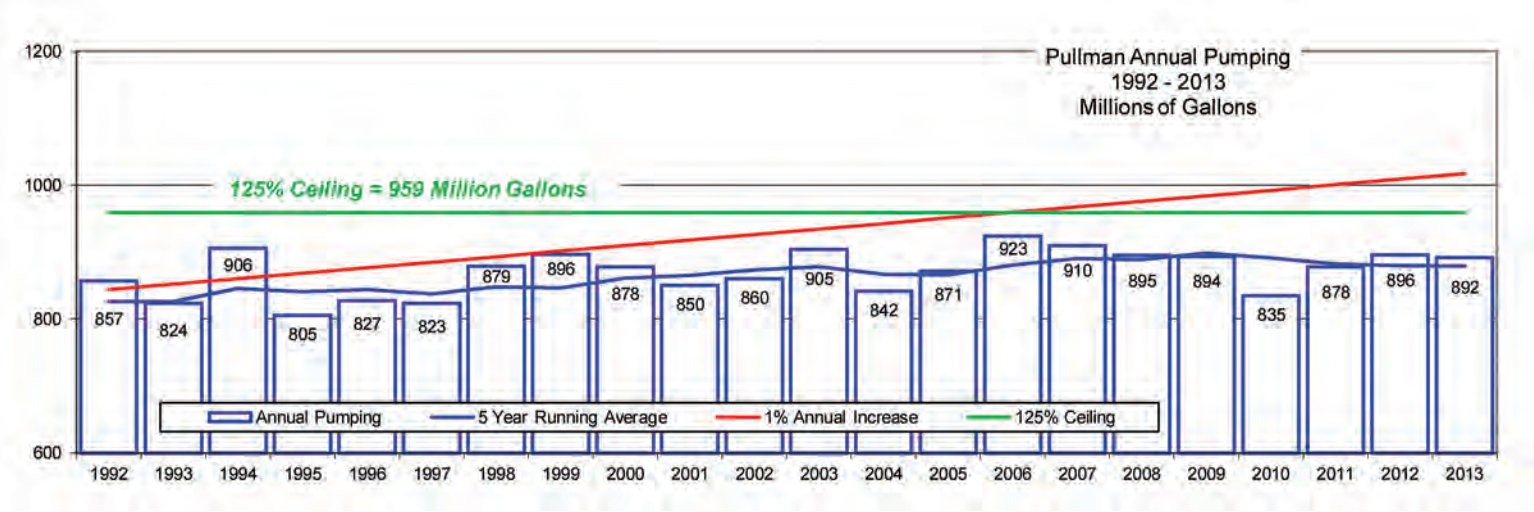


Figure 16: Pumping Limitation Goals, Pullman, 1992 - 2013

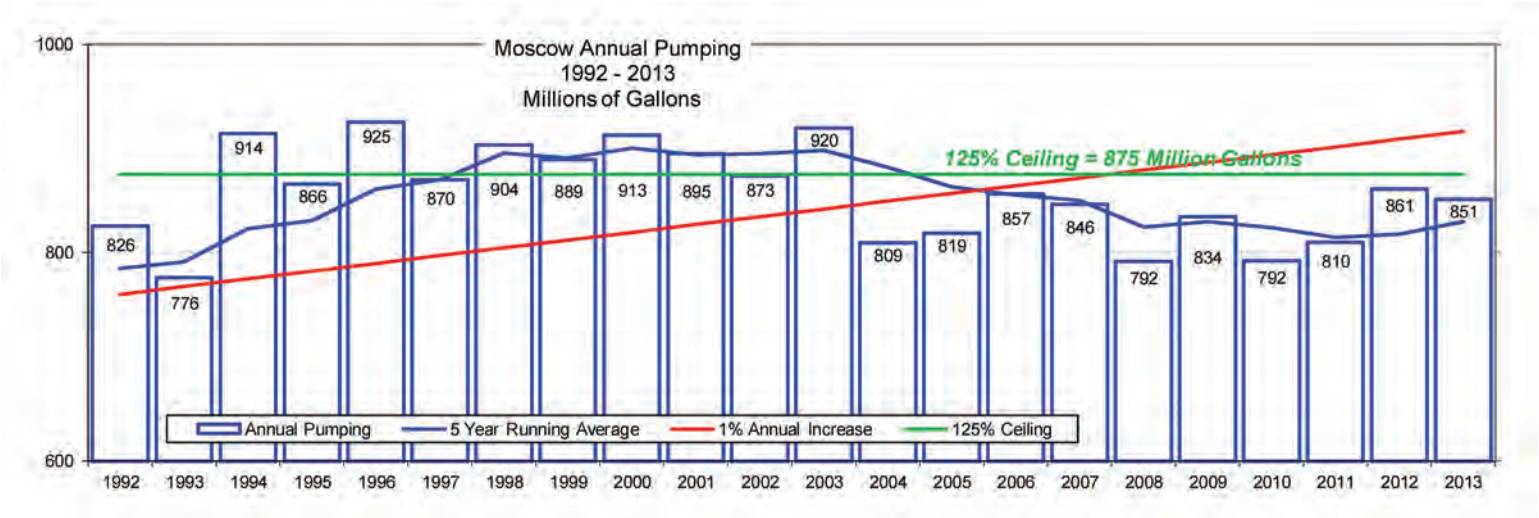


Figure 17: Pumping Limitation Goals, Moscow, 1992 - 2013

Pumping Limitation Goals

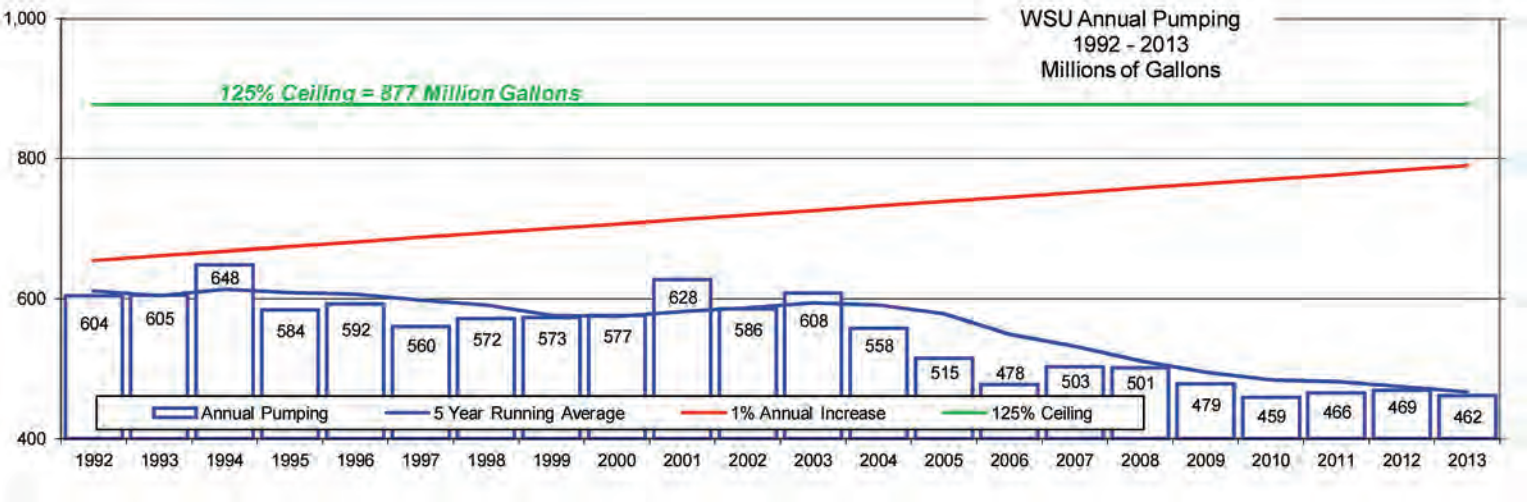


Figure 18: Pumping Limitation Goals, WSU, 1992 - 2013

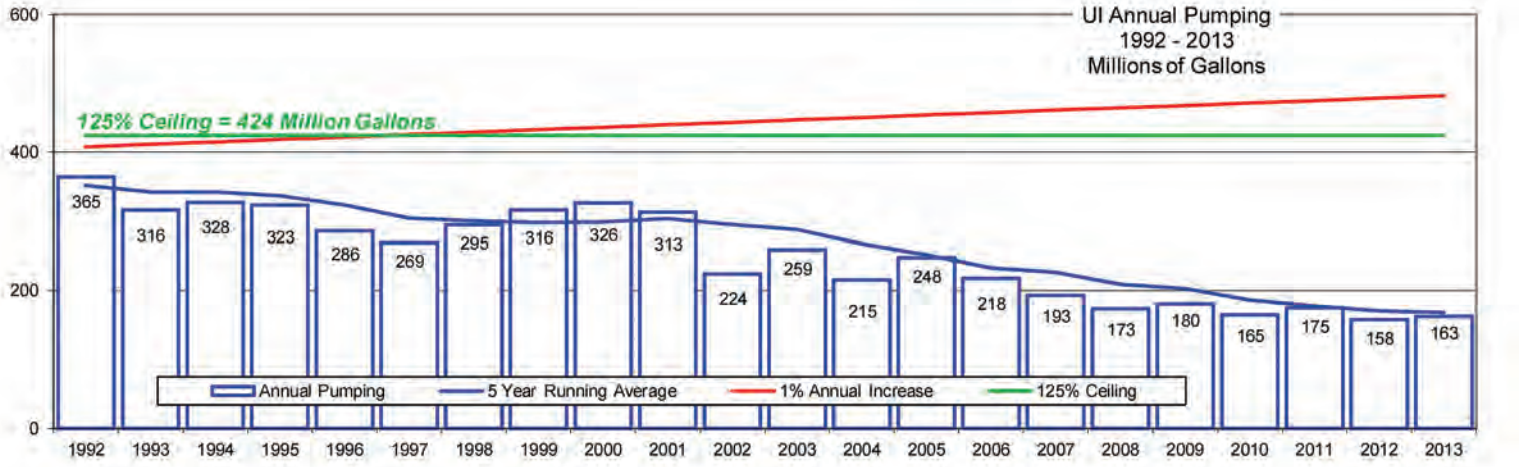


Figure 19: Pumping Limitation Goals, UI, 1992 - 2013

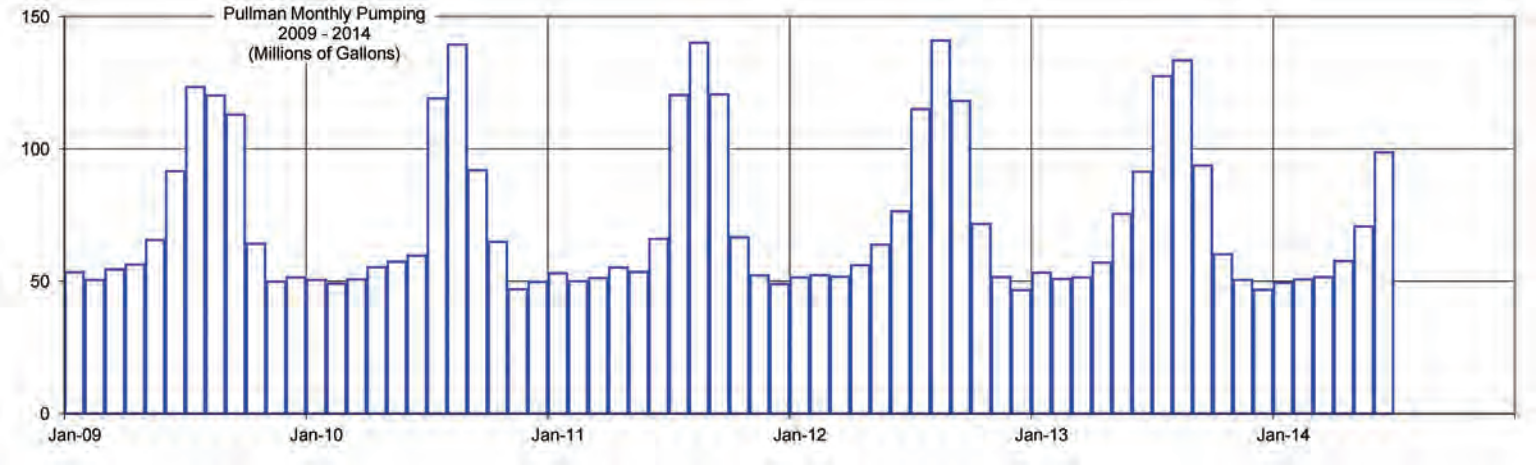


Figure 20: Monthly Pumping, Pullman, 2009 - 2014

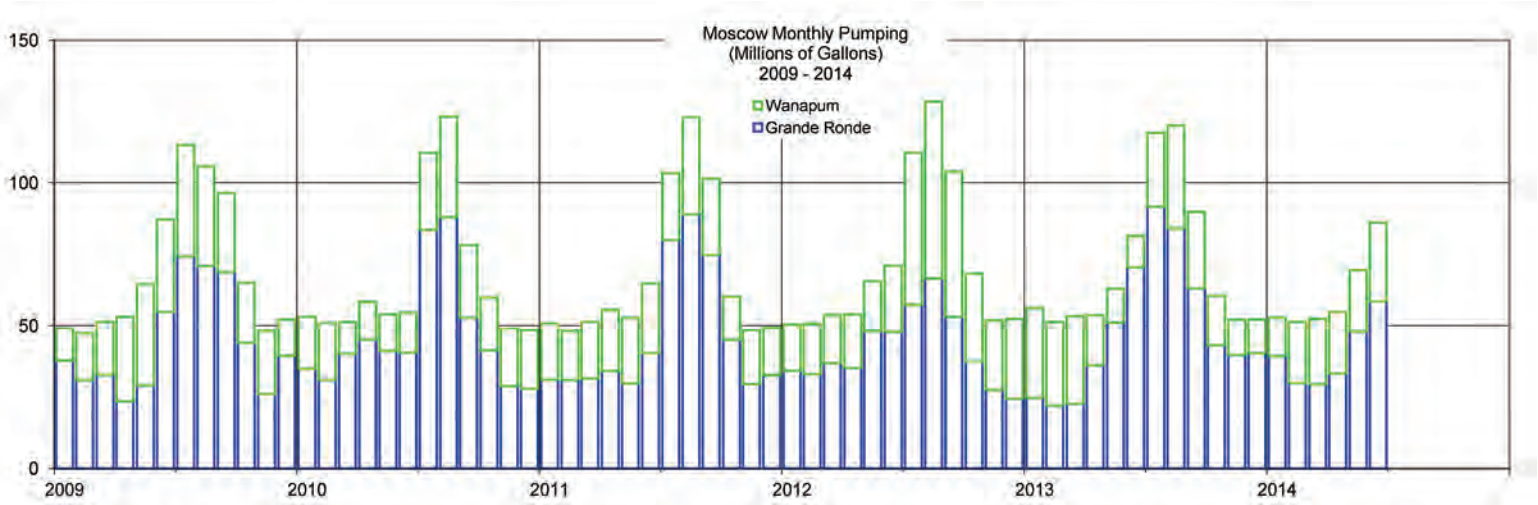


Figure 21: Monthly Pumping, Moscow, 2009 - 2014

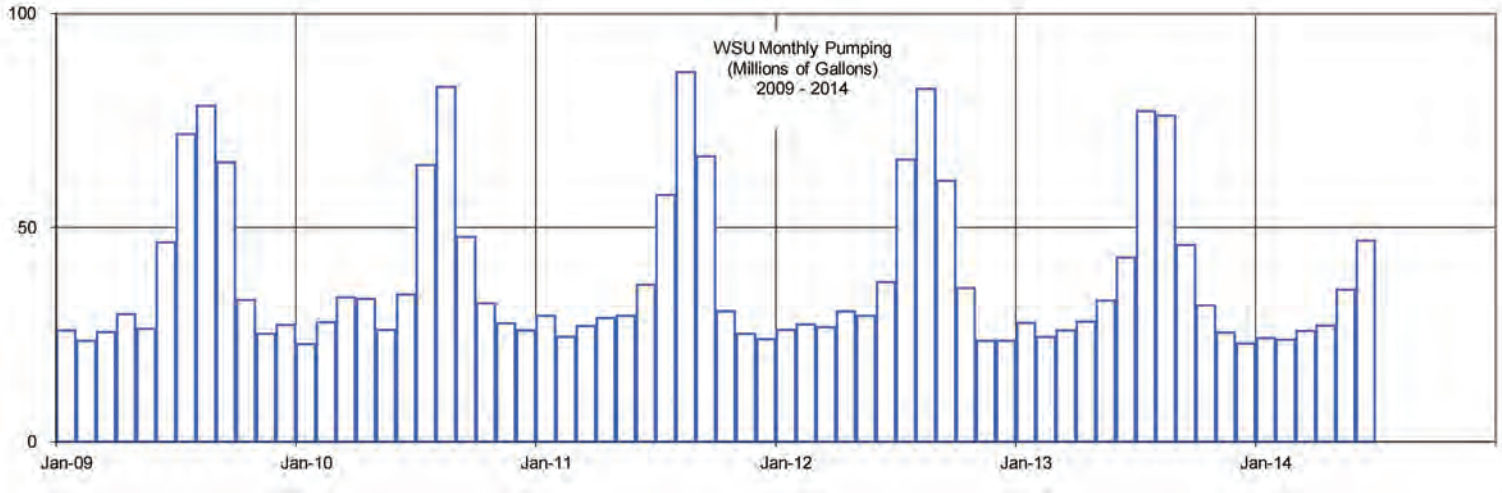


Figure 22: Monthly Pumping, WSU, 2009 - 2014

Monthly Pumping

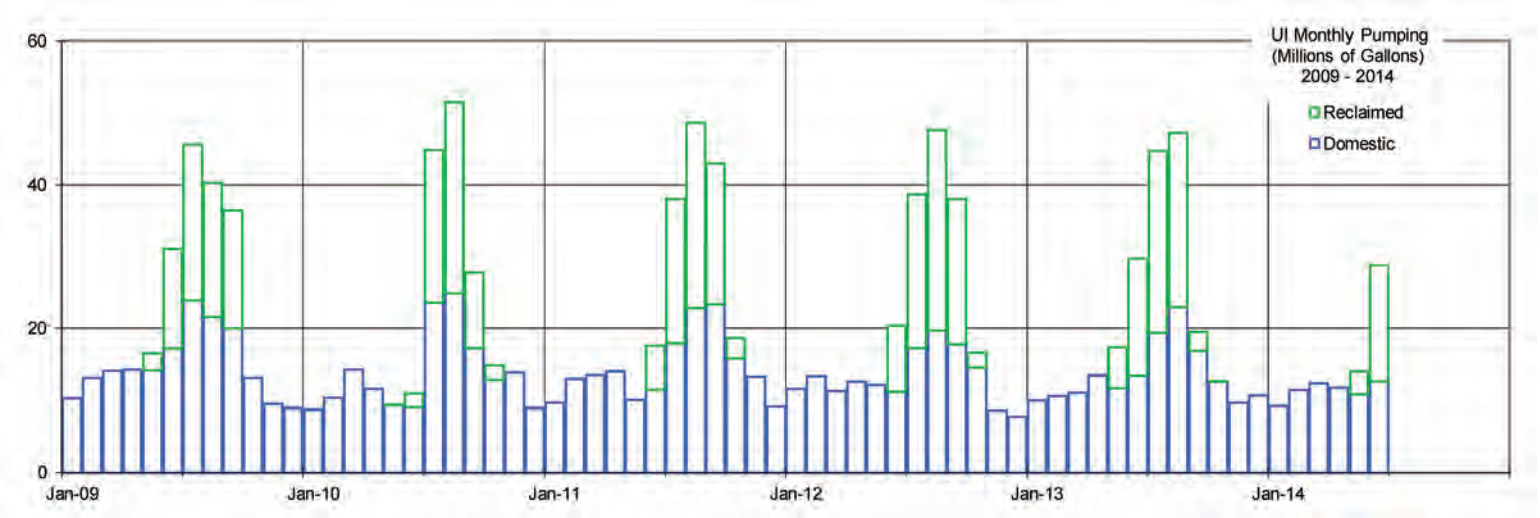


Figure 23: Monthly Pumping, UI, 2009 - 2014

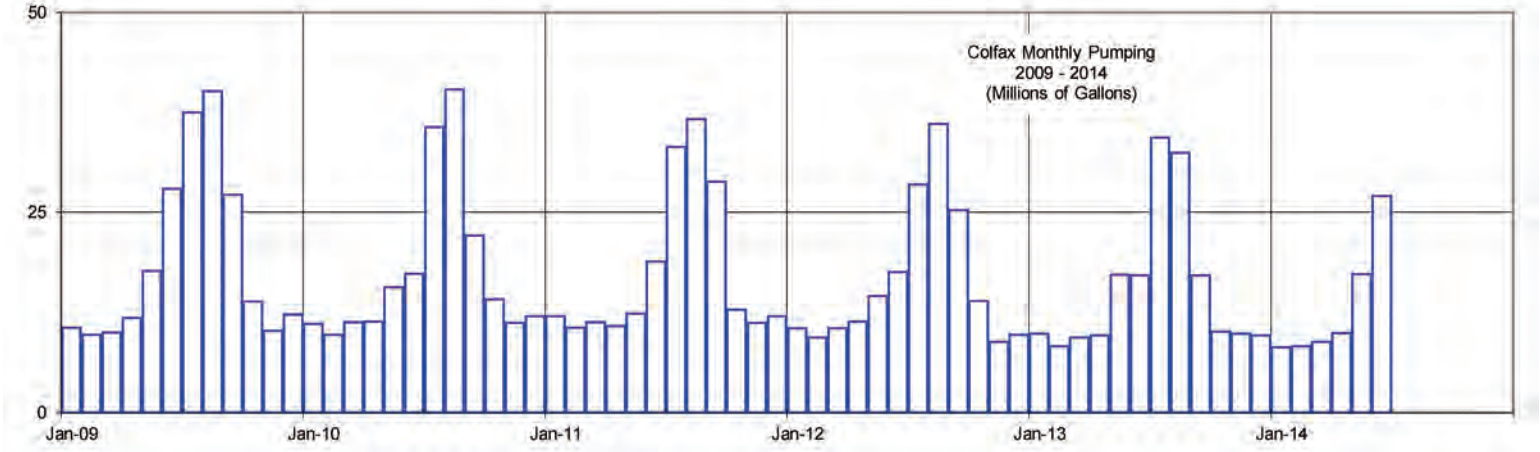


Figure 24: Monthly Pumping, Colfax, 2009 - 2014

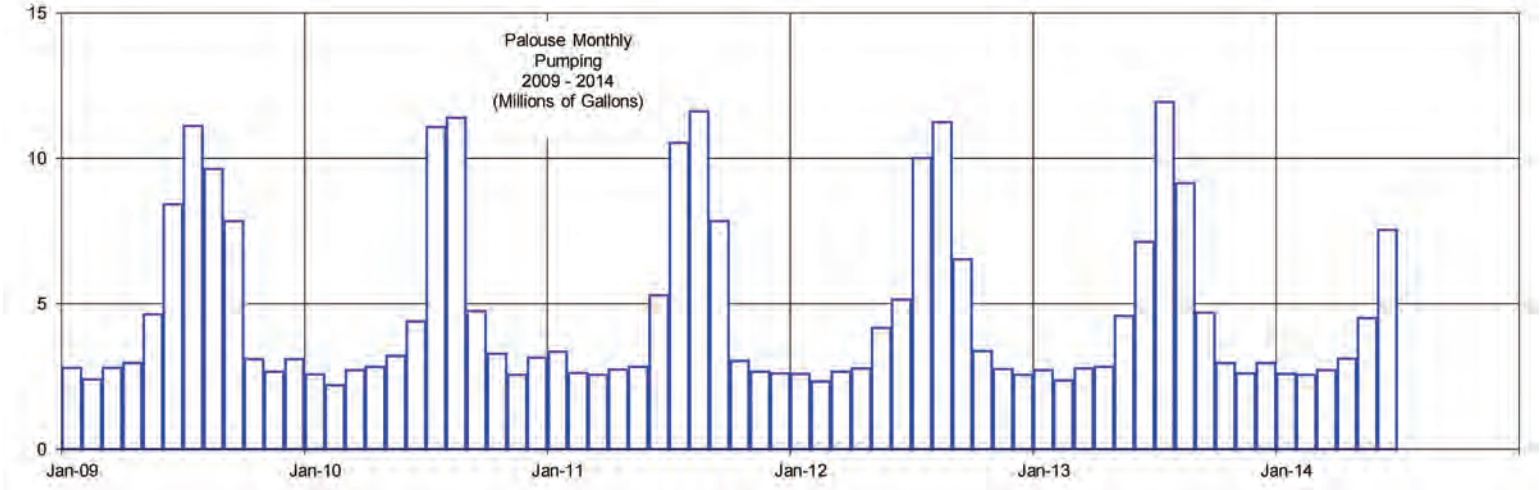
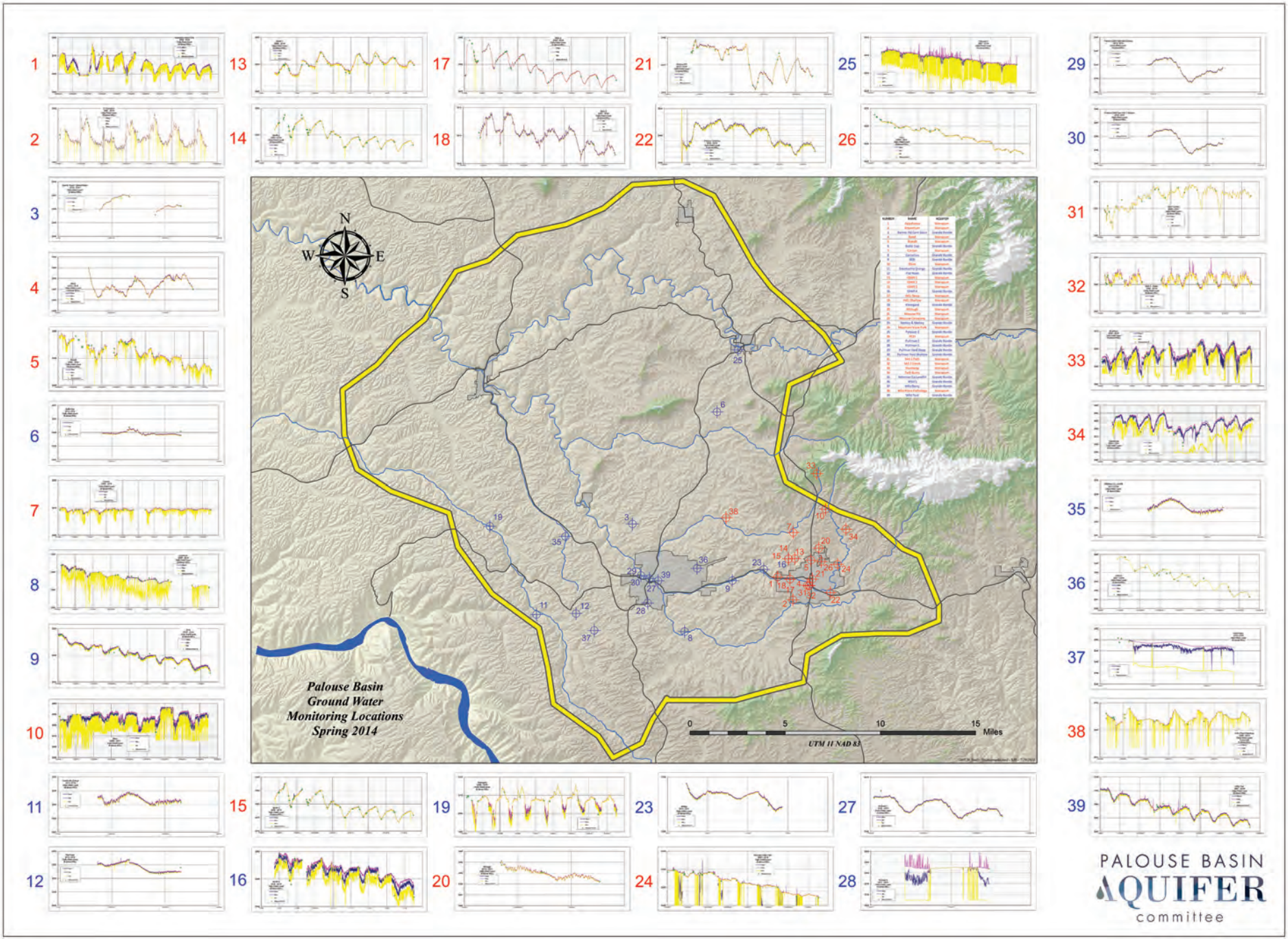


Figure 25: Monthly Pumping, Palouse, 2009 – 2014



For a high-resolution copy of this graphic, visit: www.webpages.uidaho.edu/PBAC/Items/140731_Daily_Hydrographs_600_DPI.pdf

Palouse Basin

Aquifer Committee 2014