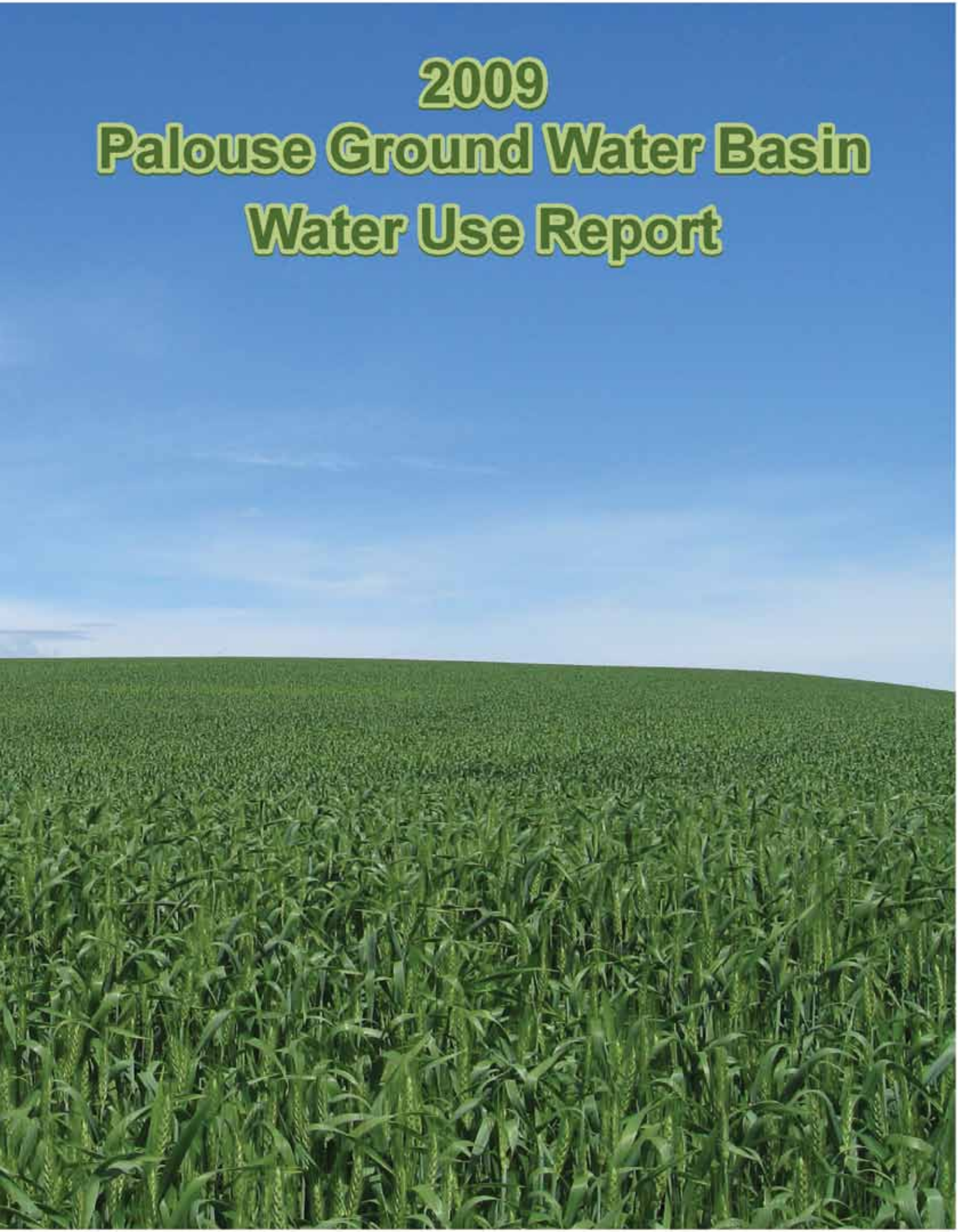
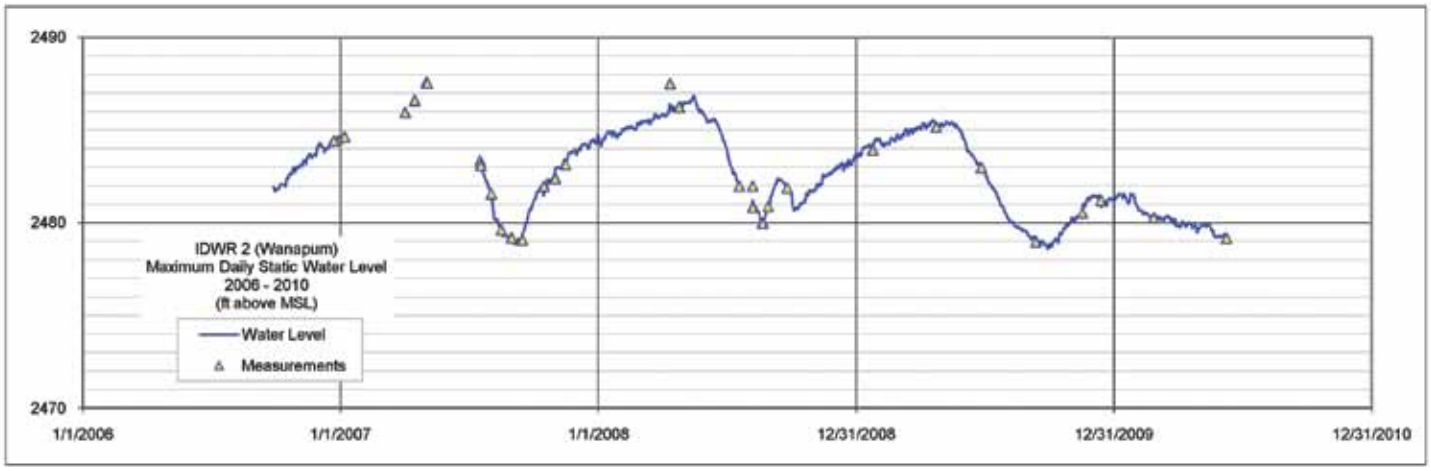
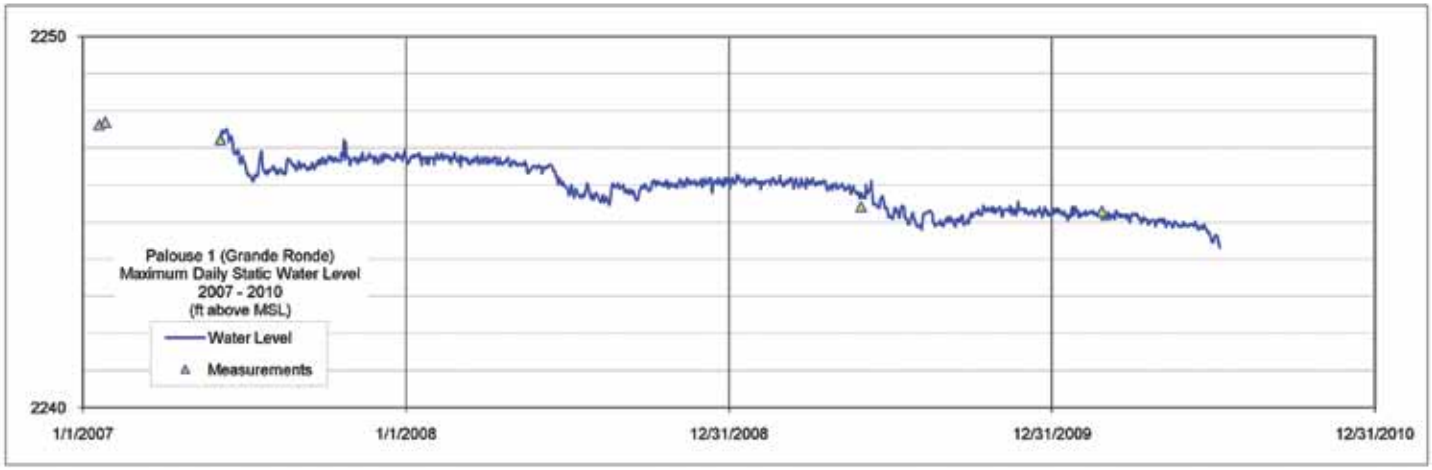
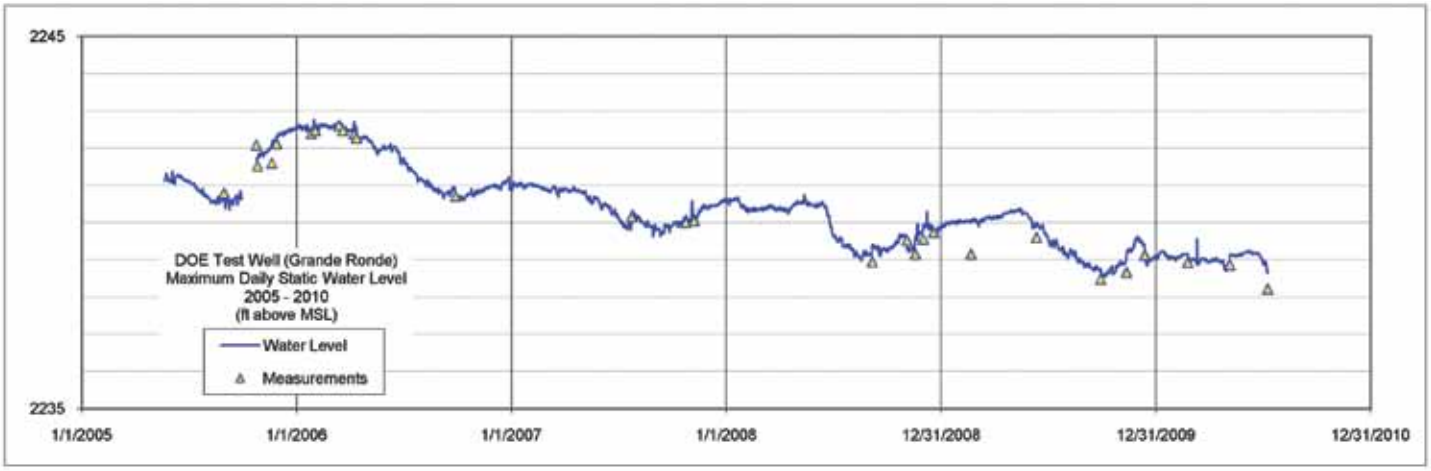
2009
Palouse Ground Water Basin
Water Use Report









Water level hydrographs for 3 Palouse Basin monitoring wells.

Cover: Wheat field fills the Palouse horizon in late spring

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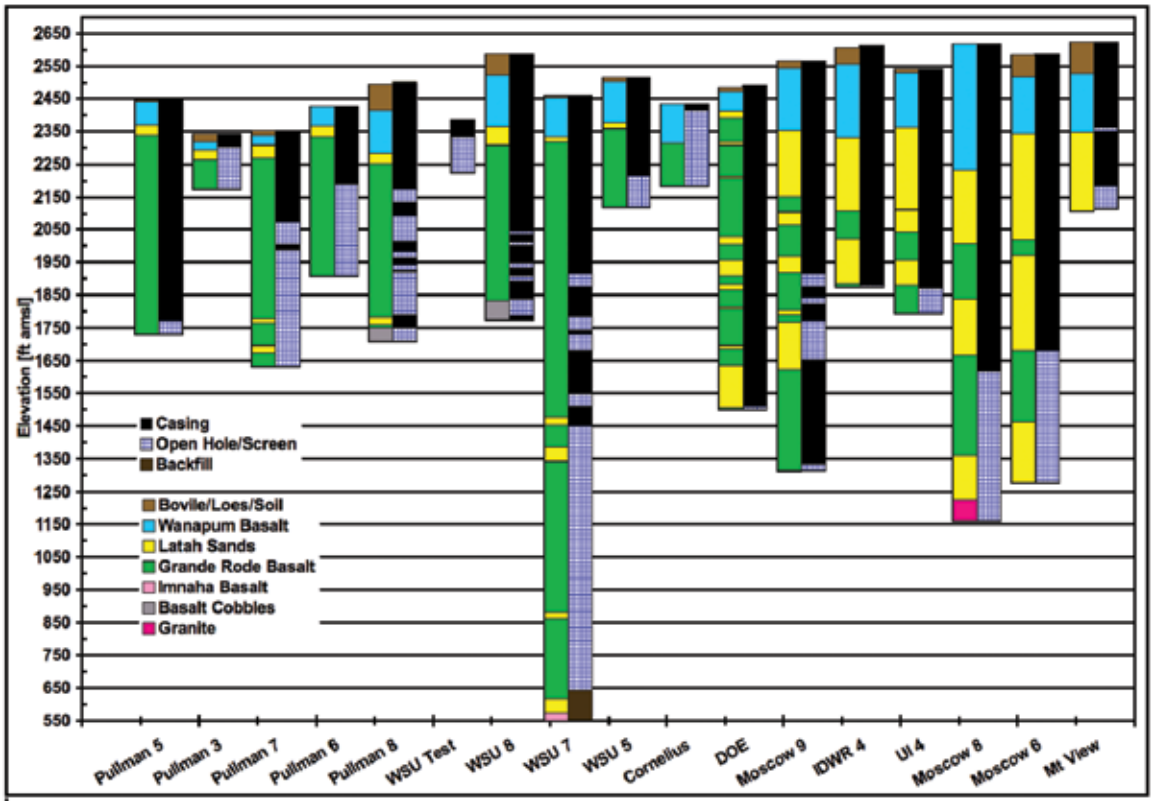

Stratigraphy and Well Construction of Palouse Basin Municipal Wells (Fiedler, 2009)

PBAC Representative

Barney Waldrop
Pullman City Councilor

PBAC Representative

Andy Rogers
Colfax Public Works Supervisor

PBAC Representative

Carl Thompson
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Executive Summary

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

The Palouse Basin Aquifer Committee (PBAC) is a voluntary, cooperative, 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 2009.

The 2009 total combined ground water pumpage by the primary pumping entities within the Basin was 2.68 billion gallons (Figure 1). In aggregate (Pullman, Moscow, WSU, UI, Colfax, Palouse), pumping for 2009 was approximately 2% more than in 2008 and 13% less than in 1992, the first year the Ground Water Management Plan took effect.

Water level data from deep production wells for 2009 reveal a reasonably consistent decline in static water level of somewhat less than 1 foot per year. 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. Records from three representative wells are illustrated on the inside front cover of this report.

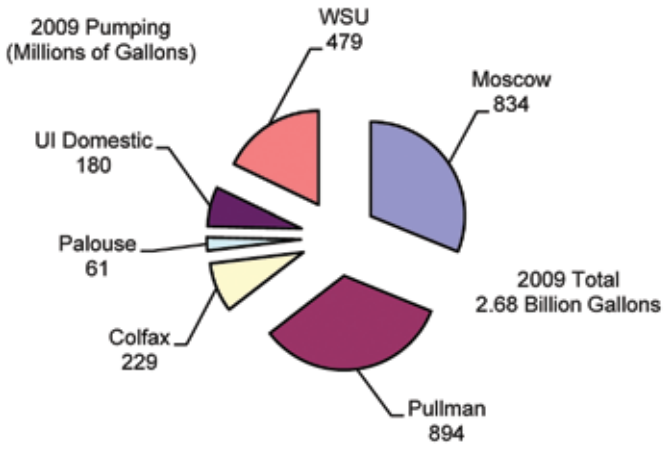


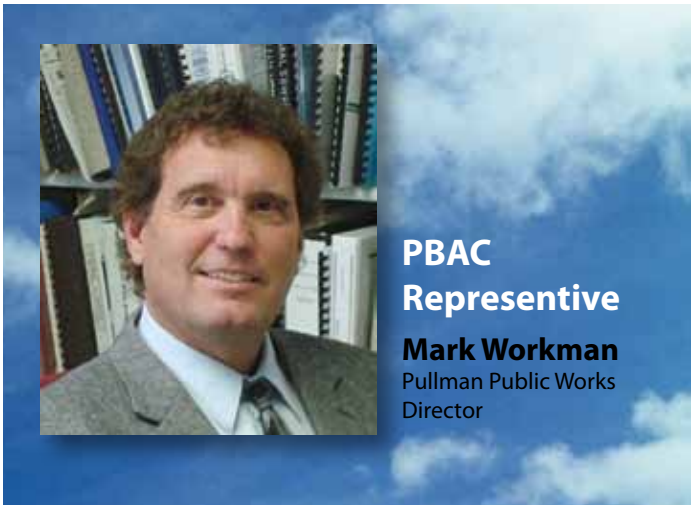
Figure 1: 2009 Ground Water Pumpage

In 2009, PBAC participated in several projects. Sponsored research activities included a deep aquifer basinwide testing project and a tritium study involving sampling of deep and shallow wells throughout the basin

The foundation of the 1992 Ground Water Management Plan is a set of goals. As of 2009, PBAC's primary goal is to develop and implement a balanced, basin-wide, water supply and use program by the year 2020. In order to accomplish this goal, PBAC will work toward the creation of an action plan for aquifer system enhancement and alternate water supply development by 2010.

Annual Water Use Report

The report that follows includes water use and water level information for the period from 1992 through 2009. To provide up to date information where possible, in some instances data are included for portions of 2010. Water use reports for earlier years can be viewed at the PBAC web site (*http://www.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 the water levels was being 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. As time progressed, membership in the committee was expanded to include Whitman and Latah counties and then Colfax, Washington. And although not a PBAC member, since 2006 the City of Palouse has also contributed to the management of the Committee. In 1998, to reflect its expanded membership, the committee name was changed to the Palouse Basin Aquifer Committee (PBAC). In 2005, a Citizens Advisory Group (CAG) was formed to enhance ground water management by providing a forum for dialogue among a broader range of parties. Photographs of active PBAC members appear throughout the report, and PBAC and CAG contact information is detailed on page 16.

The Ground Water Management Plan

In 1992, the PMWRC, with the support of Washington and Idaho state regulatory agencies, drafted and 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.

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 shallower Wanapum and the deeper 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, northeastern Oregon, and small portions of western Idaho during eruptions that occurred between 17 and 6 million years ago.

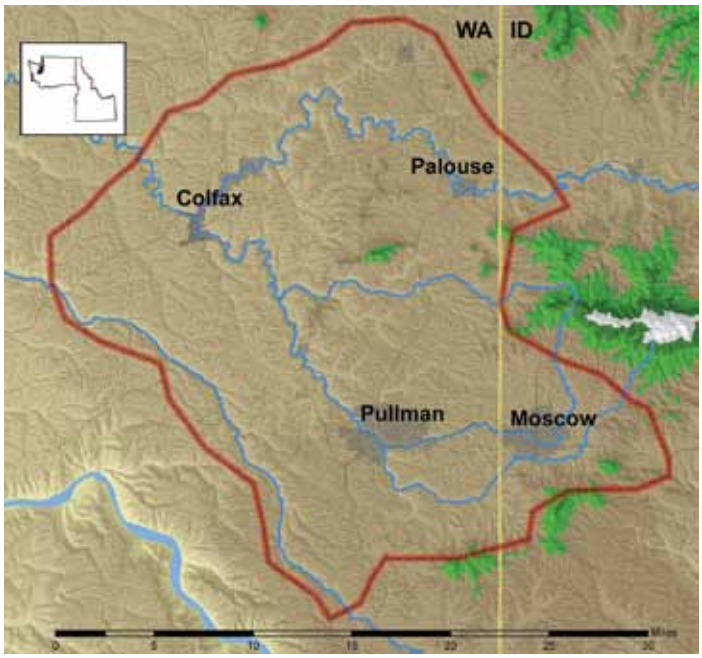


Figure 2: Working Boundary for the Palouse Ground Water Basin

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.

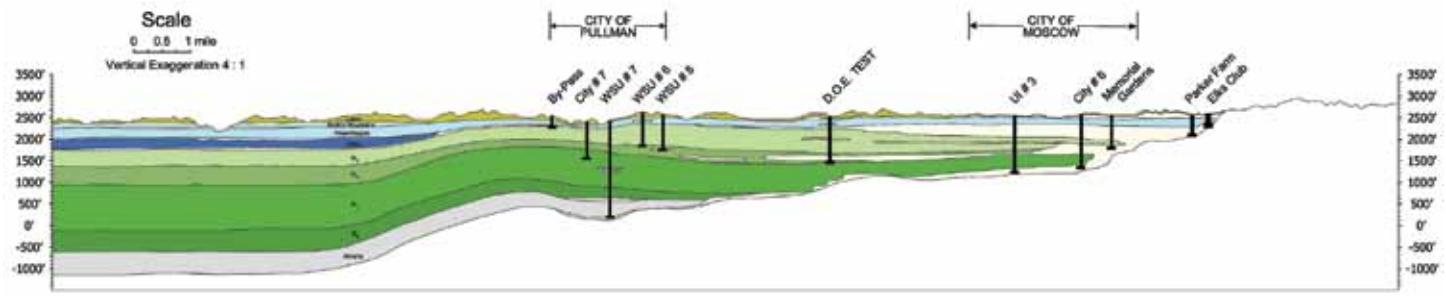


Figure 3: E-W Schematic Cross Section (Bush, Garwood)

The primary municipal drinking water source in the Basin is the Grande Ronde aquifer system. In Pullman, all of the municipal and many of the rural residents obtain their drinking water from the Grande Ronde. In Moscow, in 2009 nearly 36% of the supply came from the Wanapum, and many of the rural residents in Latah County also tap the shallower 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). Water levels in the Wanapum dropped drastically in the 1950s and early '60s, but recovered in the 1970s and '80s when much of the pumping switched to the deeper Grand Ronde (Figure 5). Although absolute values are still uncertain, it is thought that there is limited recharge to the Wanapum and very little recharge to the Grande Ronde.

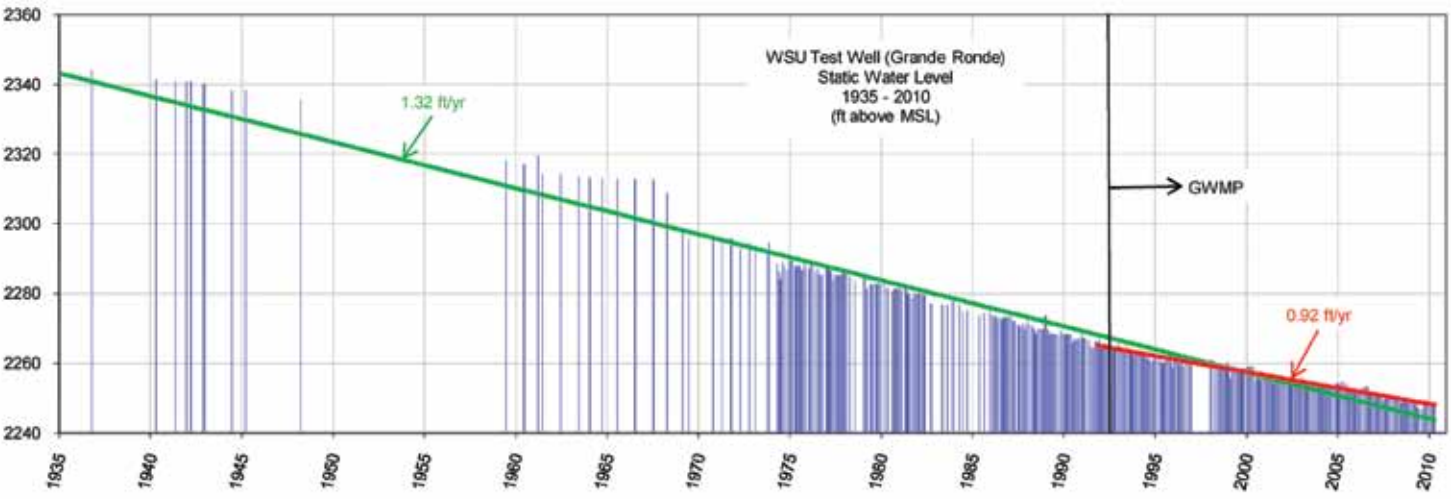


Figure 4: Static Water Level, WSU Test Well (Grande Ronde), 1935-2008

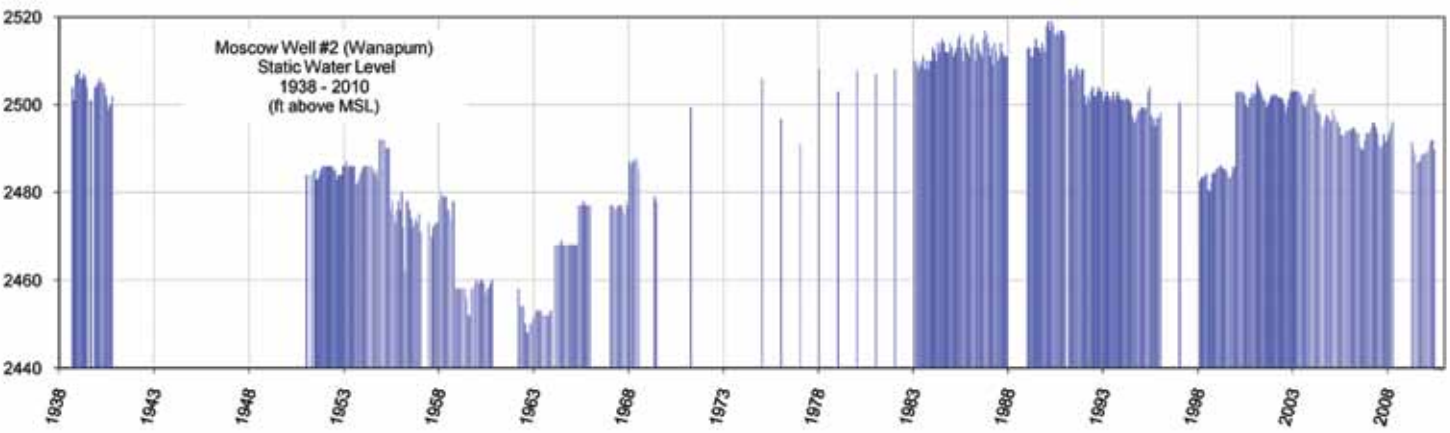


Figure 5: Static Water Level, Moscow Well #2 (Wanapum), 1938 – 2008

Ground Water Pumpage and Water Levels

The total combined ground water pumpage by the four cities and two universities for the year 2009 was 2.68 billion gallons (8,217 acre-feet). In aggregate, this was 1.9% more than was pumped in 2008 (2.63 billion gallons), and 13.3% less than was pumped in 1992 (3.09 billion gallons), the first year the Ground Water Management Plan took effect.

In 2009, Pullman and Moscow each pumped approximately 1/3 of the total (33% and 31%) followed by WSU at 18%. Colfax and UI pumped 9% and 7%, respectively, and Palouse pumping accounted for just over 2% of the combined pumping total (Figure 6). By entity, comparisons to 2008 pumping are shown in (Figure 7).

Moscow pumped nearly 36% (302 million gallons) of its water from the Wanapum aquifer system in 2009; the other pumping entities all pump solely from the Grande Ronde. Of the combined entity pumping total, in 2009 the Moscow Wanapum contribution amounted to approximately 11%.

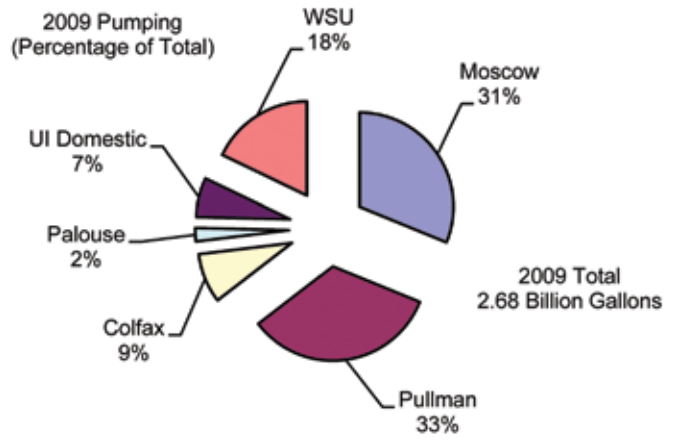


Figure 6: Ground Water Pumpage – Percentage of Total – 2009

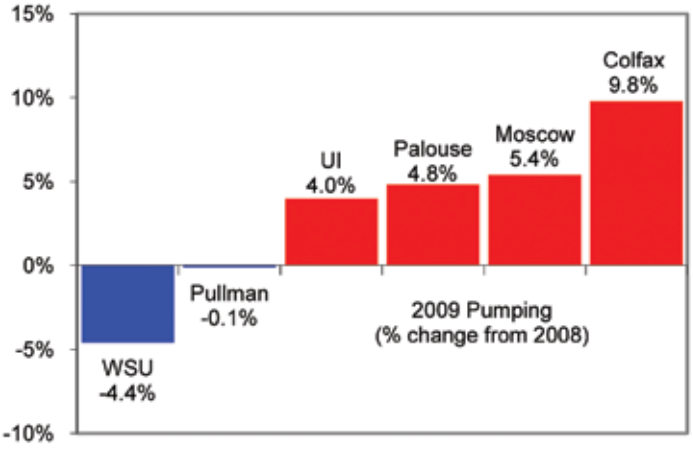


Figure 7: 2009 Pumping – Change from 2008

Pumping increases significantly in the summer months, primarily due to increased irrigation demand. For 2009, 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 non-baseline usage for the five largest pumping entities ranges from 29% for Moscow to 44% for Colfax (Figure 8). (Note: The UI non-baseline use is presented both with and without inclusion of the 73 million gallons of reclaimed water utilized in 2009)

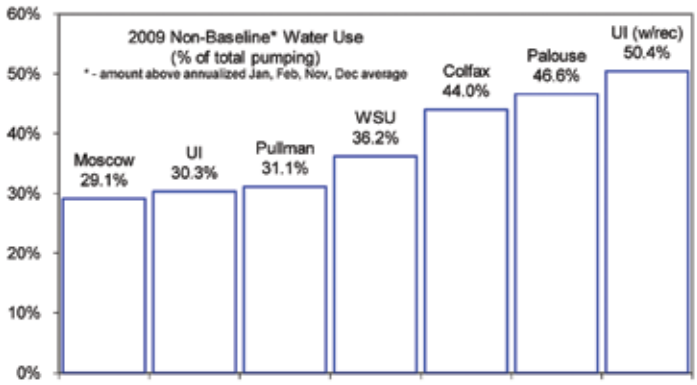


Figure 8: Non-Baseline Water Use – 2009

Non-baseline usage varies with the weather conditions experienced during the year. In aggregate, the 2009 irrigation season was warmer and drier than the five year trailing average, as shown in Figures 9-11. Charts of 2009 and first half 2010 monthly pumping compared to the 2004-2008 averages are shown in Figures 12-16. Figures 27-32 illustrate monthly pumping for the period between 2005 and mid 2010.

As part of the Ground Water Management Plan, each pumping entity has agreed to voluntary pumping targets. Pullman, Moscow, and the universities have agreed to attempt to limit annual pumping increases to 1% of the 1986-1990 average pumping level. In addition, Pullman, Moscow and the universities agreed to keep total pumping below 125% of the 1981-1985 average pumping level. An aggregation of the pumping targets for the GWMP pumping entities (Pullman, Moscow, WSU, UI) is shown in Figures 17 and 18. The 1% and 125% targets for the GWMP pumping entities are illustrated in Figures 19-22 and Figures 23-26. Note that no charts are shown for

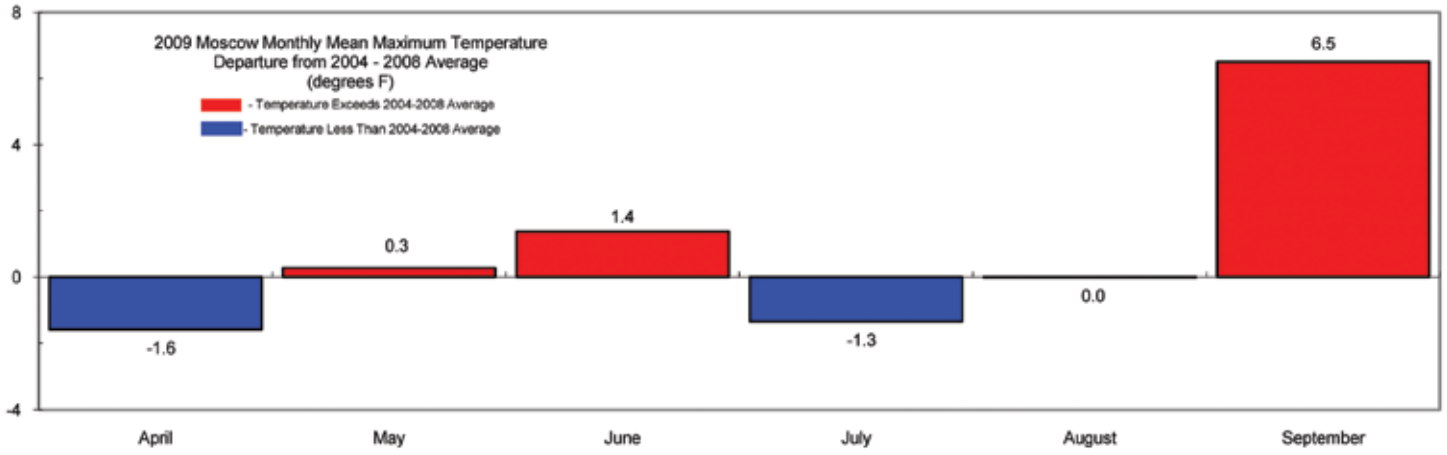


Figure 9: Moscow Mean Maximum Temperature – 2009

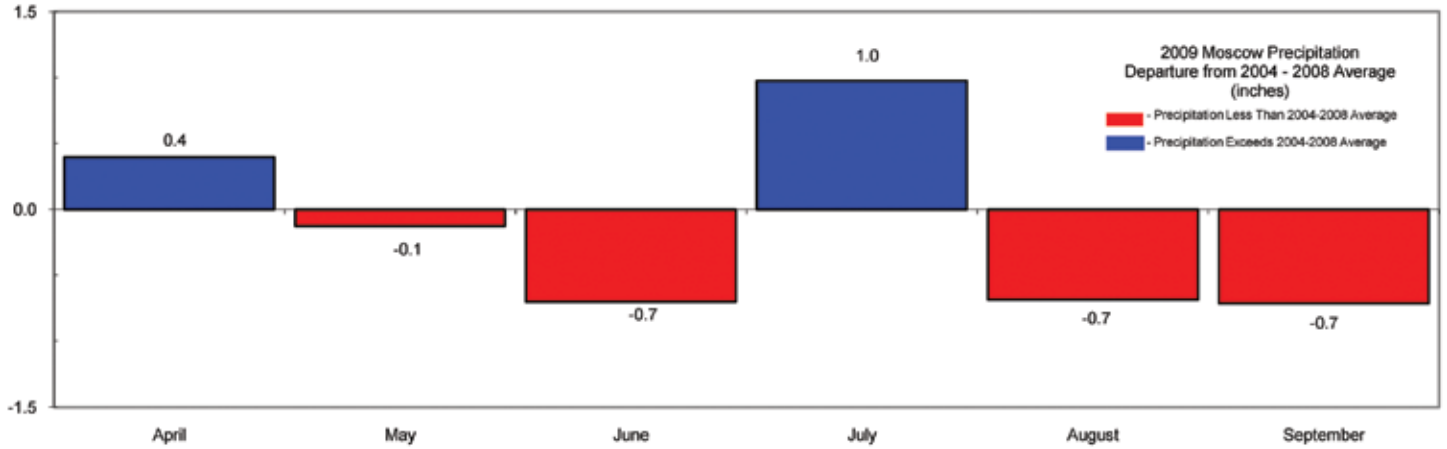


Figure 10: Moscow Precipitation – 2009

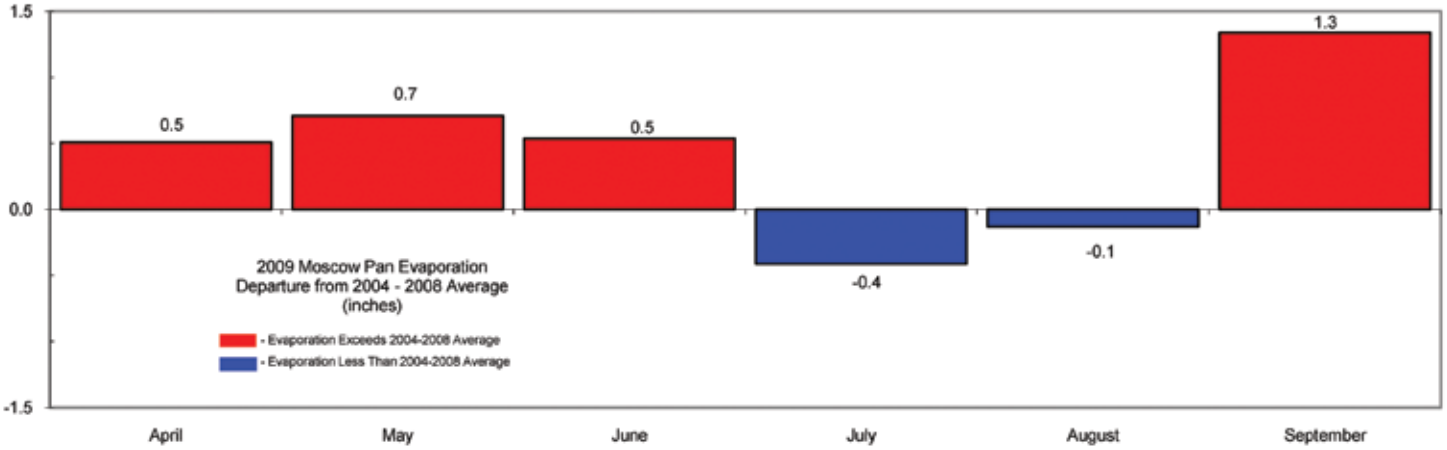


Figure 11: Moscow Pan Evaporation – 2009

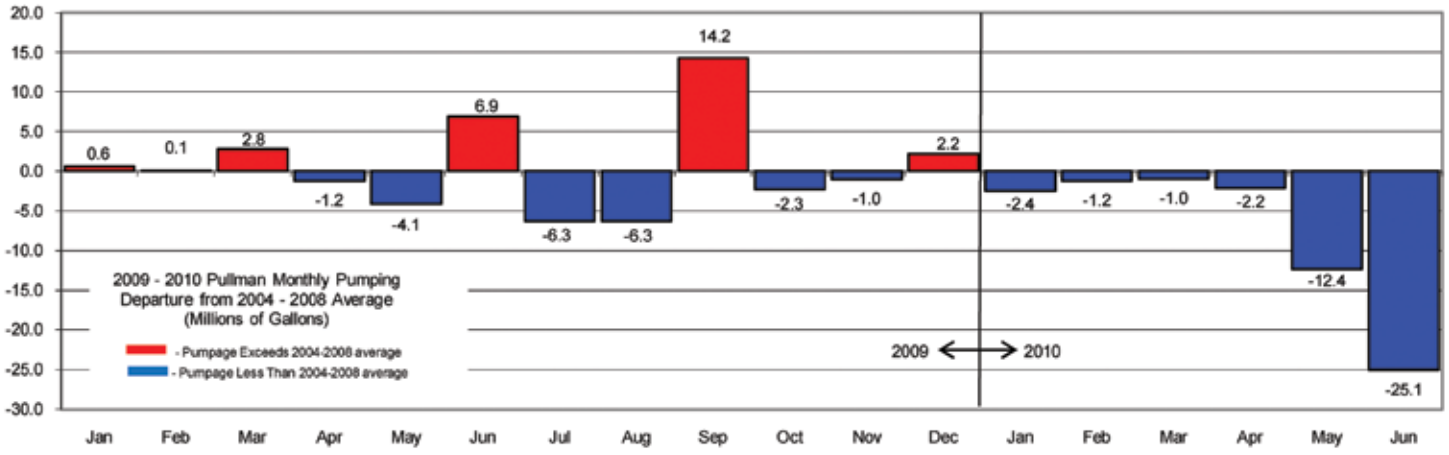


Figure 12: Pullman Monthly Pumping, Departure from 5-year Average, 2009-2010

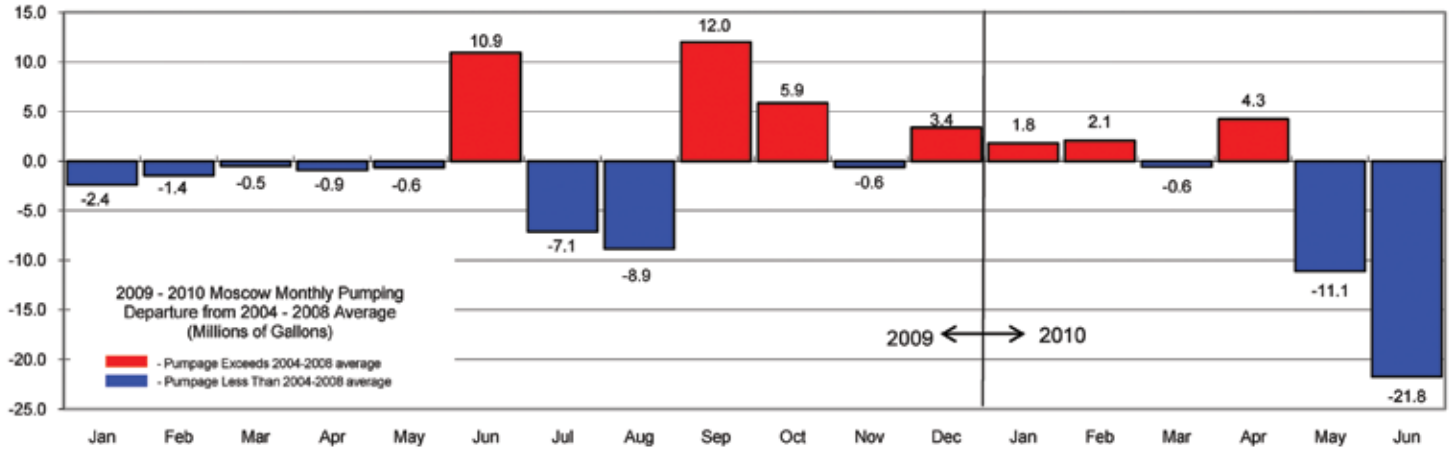


Figure 13: Moscow Monthly Pumping, Departure from 5-year Average, 2009-2010

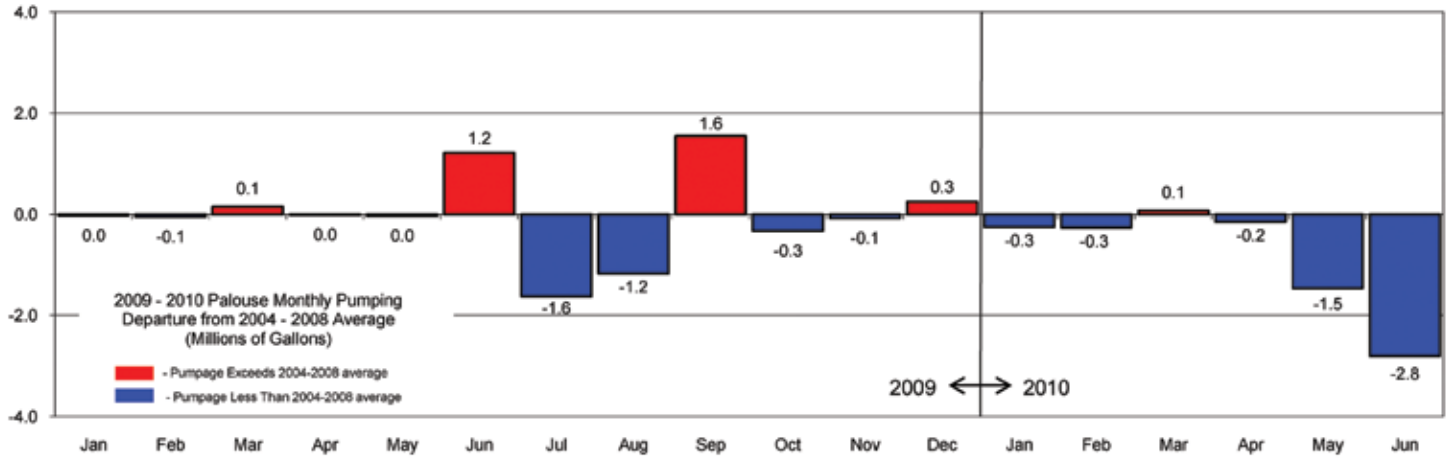


Figure 14: Palouse Monthly Pumping, Departure from 5-year Average, 2009-2010

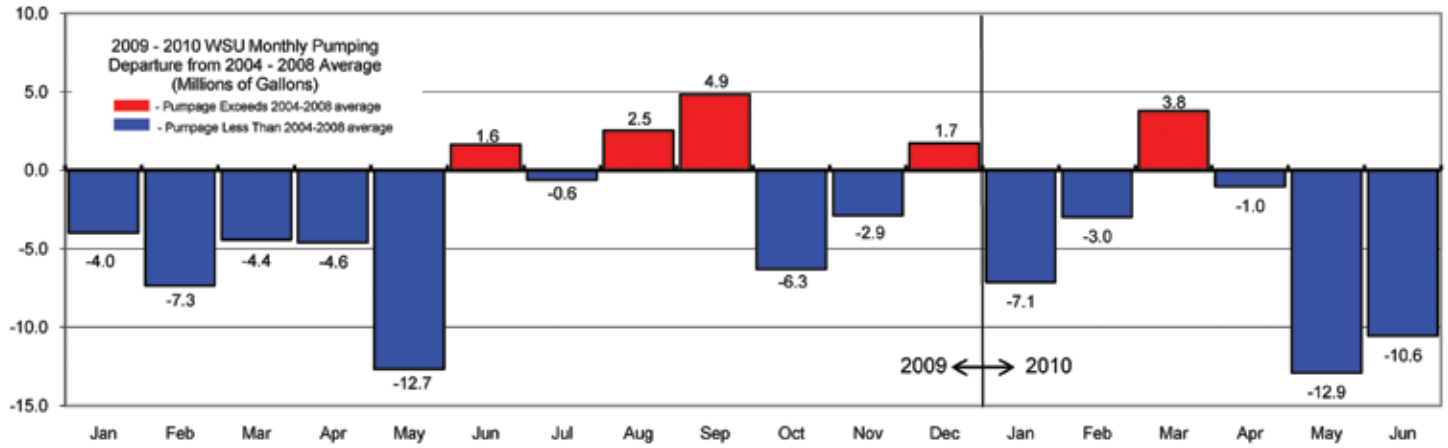


Figure 15: WSU Monthly Pumping, Departure from 5-year Average, 2009-2010

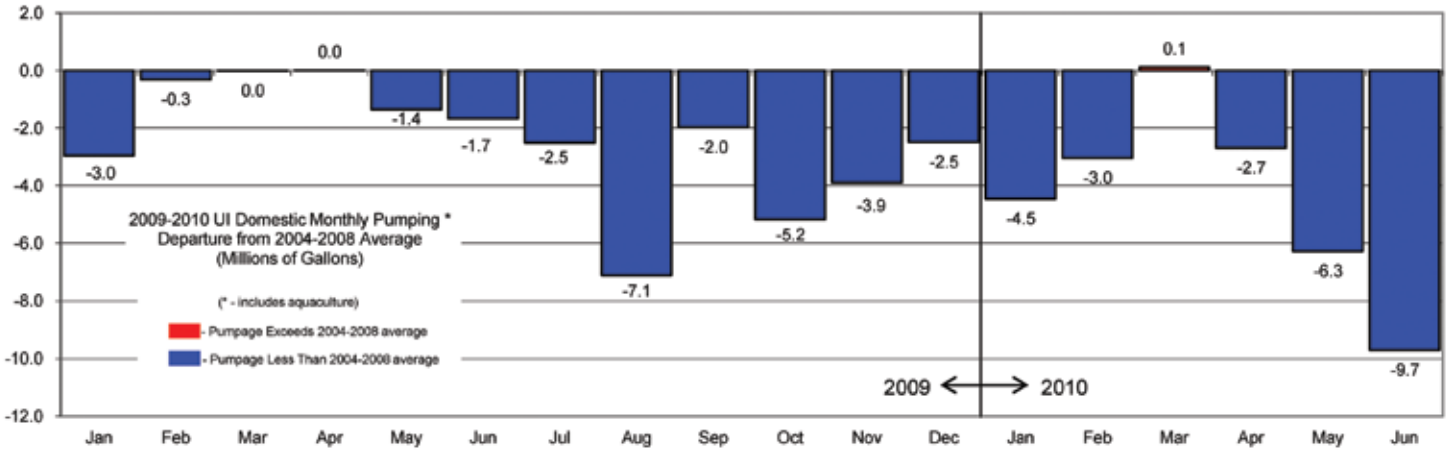
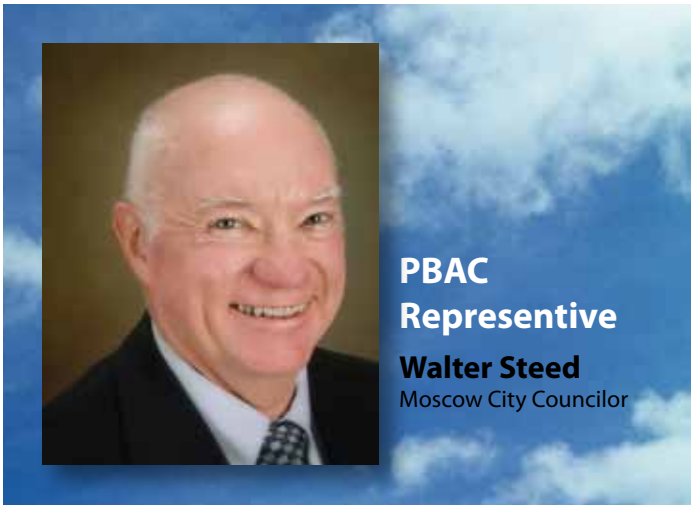


Figure 16: UI Monthly Pumping, Departure from 5-year Average, 2009-2010

Colfax and Palouse as they were not original signatories to the Ground Water Management Plan, and are not subject to the pumping targets.

In general, water level trends for 2009 resemble those from the recent past. 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 hydrographs will reveal that the Palouse 1 and DOE Test monitoring wells appear to have declined by somewhat less than a foot during 2009. In the Wanapum aquifer, the static level in the IDWR2 monitoring well exhibits more seasonal variation, and also appears to have experienced a decline during 2009.



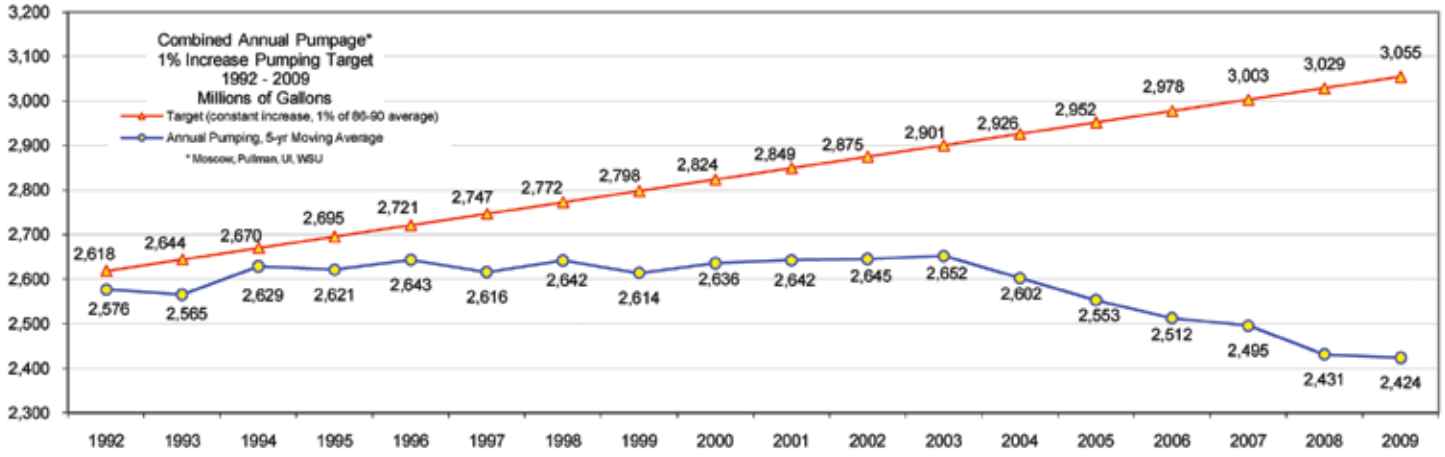


Figure 17: Voluntary 1% Annual Increase Target, 4 Major Entities Combined, 2009

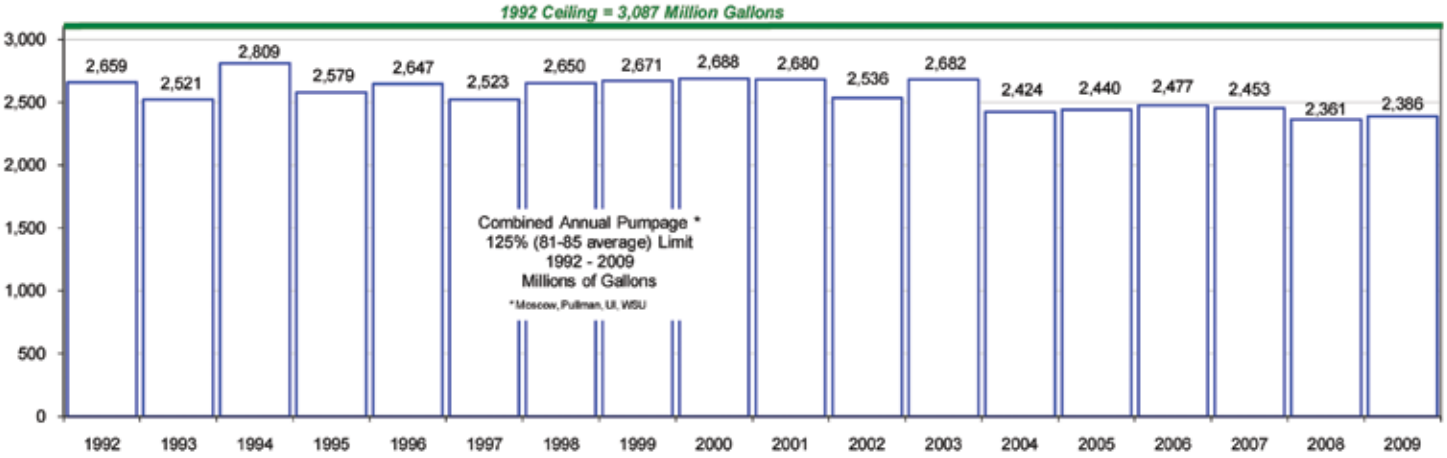


Figure 18: Voluntary 125% (of 1981-85 average) Pumping Ceiling, 4 Major Entities Combined

Research Accomplishments 2009

Two PBAC funded research projects were active during 2009 and early 2010. Both projects are being conducted by graduate students at the University of Idaho under the guidance of Professor James Osiensky.

Katie Moran is conducting a basinwide aquifer testing project that involves the instrumentation and monitoring of pumping quantities for the large municipal providers within the basin. In conjunction with data from water level transducers located in monitoring wells throughout the area, Moran will attempt to better quantify aquifer system properties.

Lauren Carey began a project that will attempt to identify areas within the basin where recharge may be occurring. Carey is collecting ground water Tritium samples at multiple locations to determine whether "young" (post 1950) water is present in the deep and shallow aquifers.

Goals, Plans and Ongoing Efforts of the Committee

The foundation of the Ground Water Management Plan consists of a set of goals. Each member entity crafts its water resource management plan(s) to support the goals. The goals are periodically reviewed and updated by PBAC.

The goals were revised in 2006, and the current primary goal of PBAC is to develop and implement a balanced Basin-wide water supply and use program by the year 2020. An interim goal requires that an action plan for the program be developed by 2010.

An effective action plan will need to consider the time horizon under which a supply and use program will be implemented. Towards that end, PBAC members, in partnership with Allyson Beall and the University of Idaho Waters of the West (WoW) program, have worked to develop a systems dynamics water balance model for the basin known as the Palouse Basin Water Resource Visioning Tool (*http://forio.com/simulation/ns/allysonbeall/palouse_basin_model/*). The model enables users to explore a variety of long term water supply and demand scenarios, learn about the science of aquifer systems, and interactively evaluate personal water use.

In order to meet the current goals, research will be required to better characterize those components of the Basin water balance that currently lack high levels of certainty. As part of the characterization effort, PBAC in 2010 plans to continue funding the basinwide aquifer testing and tritium sampling projects. In late 2009 PBAC partnered with the Washington Department of Ecology on a project that is working to compile and evaluate the data and studies that have been conducted in the area over the years. A portion of the project involves the identification of areas where there are gaps in the existing data. Projects that could potentially fill those gaps will be identified, prioritized and evaluated for PBAC funding.

The Citizens Advisory Group (CAG), aimed at ensuring dialogue among a broad range of interested parties, has continued its work on recommendations for consideration by PBAC involving management, research, conservation and public participation. In 2009 the CAG continued its work in the areas of conservation and public outreach.

In 2009, PBAC participated in the fifth (modern) Palouse Water Summit. The 2009 Summit expanded its focus to include water quality issues, and featured a variety of presentations and panel discussions related to the Basin's common ground water resource. PBAC will support and participate in the sixth Summit, scheduled for October 2010.

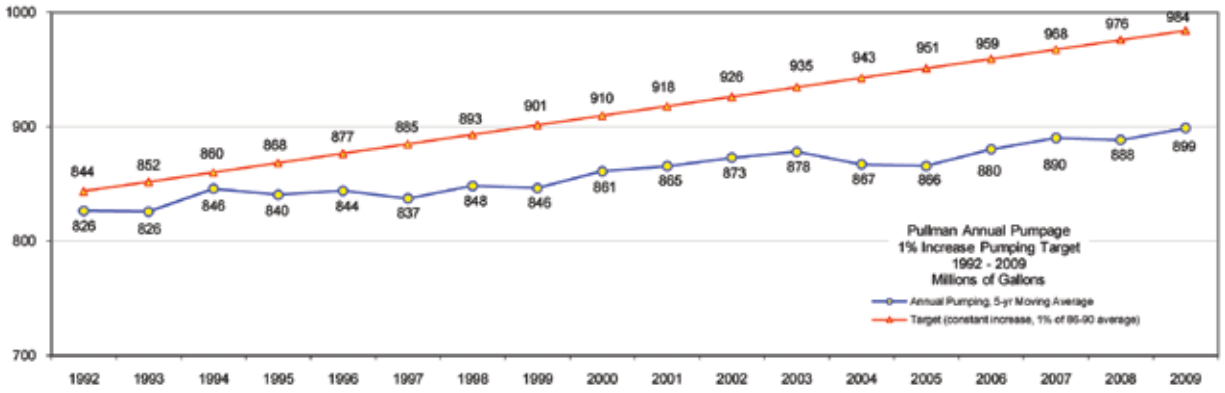


Figure 19: 1% Annual Target, Pullman, 1992 – 2009

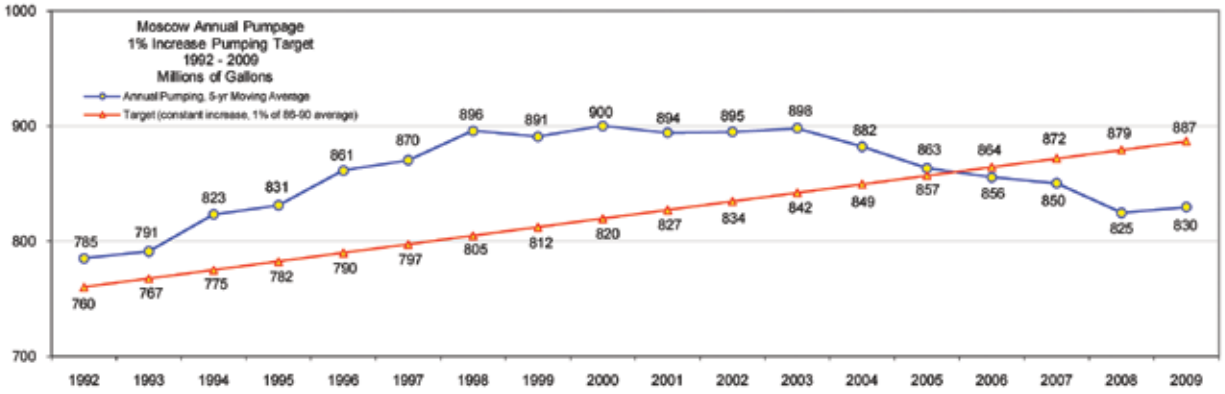


Figure 20: 1% Annual Target, Moscow, 1992 – 2009

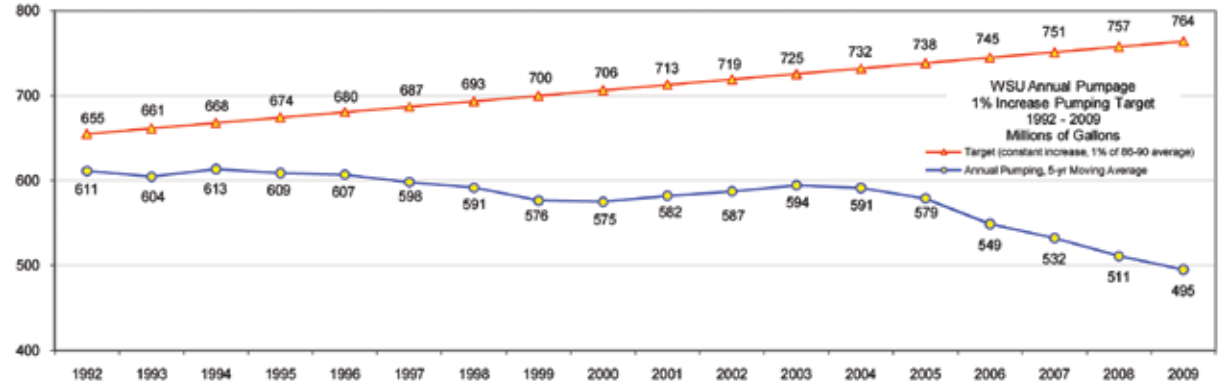


Figure 21: 1% Annual Target, WSU, 1992 – 2009

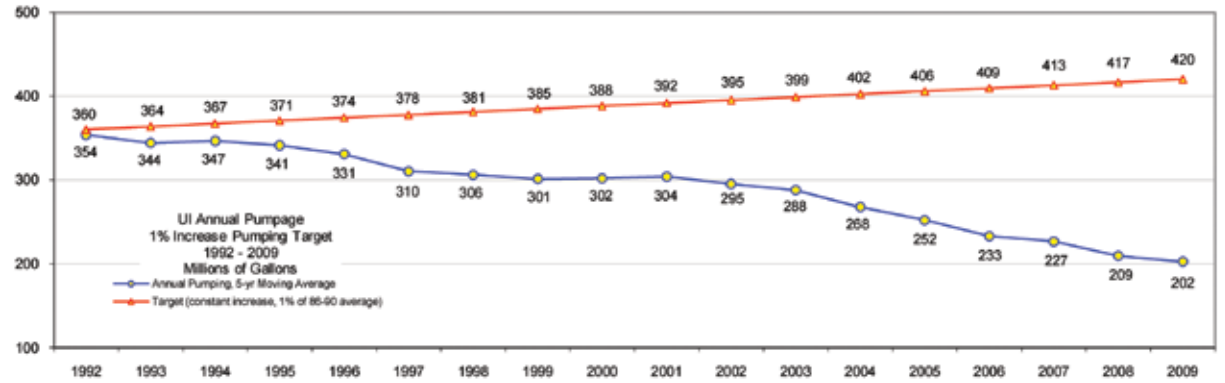


Figure 22: 1% Annual Target, UI, 1992 – 2009

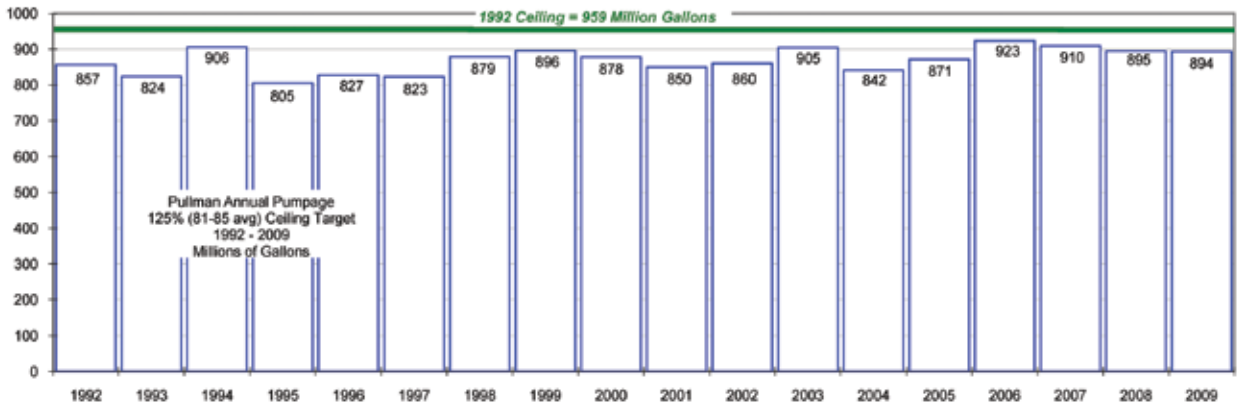


Figure 23: 125% (of 1981-85 Average) Ceiling Annual Target, Pullman, 1992 – 2009

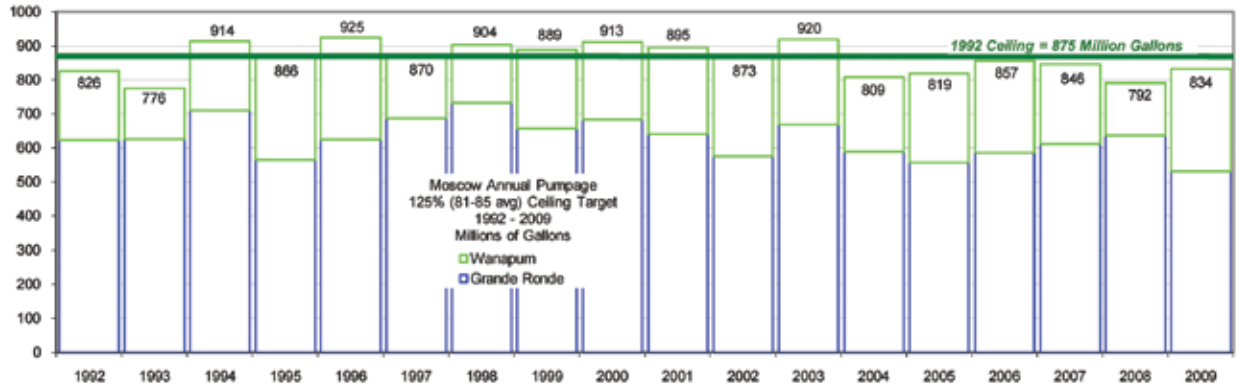


Figure 24: 125% (of 1981-85 Average) Ceiling Annual Target, Moscow, 1992 – 2009

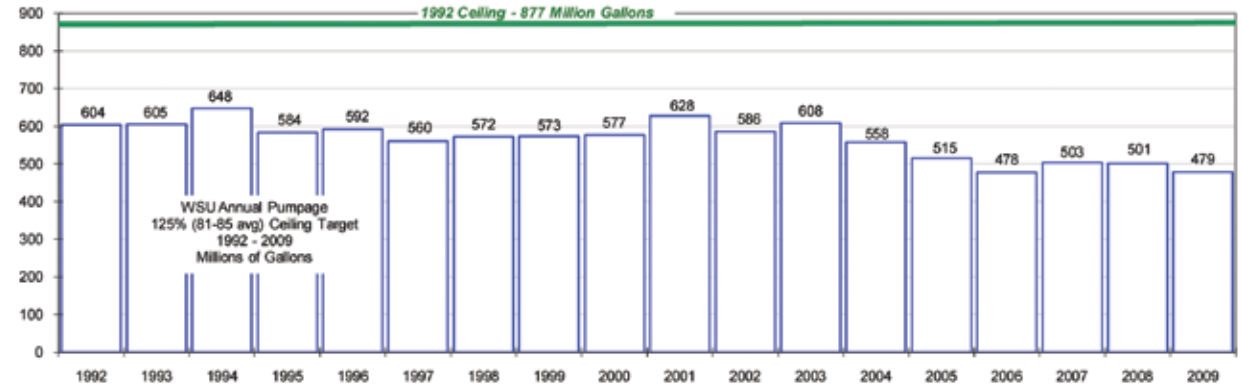


Figure 25: 125% (of 1981-85 Average) Ceiling Annual Target, WSU, 1992 – 2009

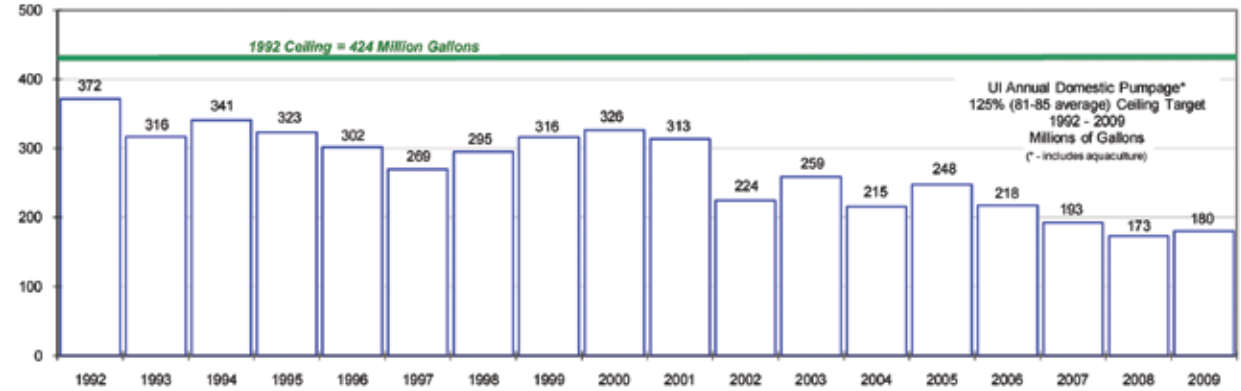


Figure 26: 125% (of 1981-85 Average) Ceiling Annual Target, UI, 1992 – 2009

Monthly Pumping Totals 2005-2010

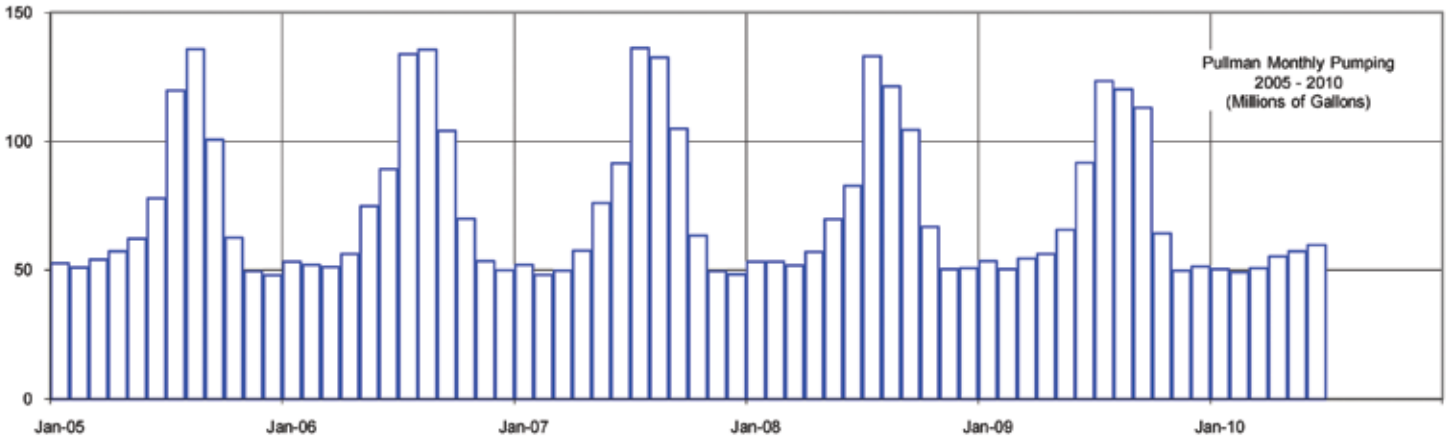


Figure 27: Monthly Pumping, Pullman, 2005 – 2010

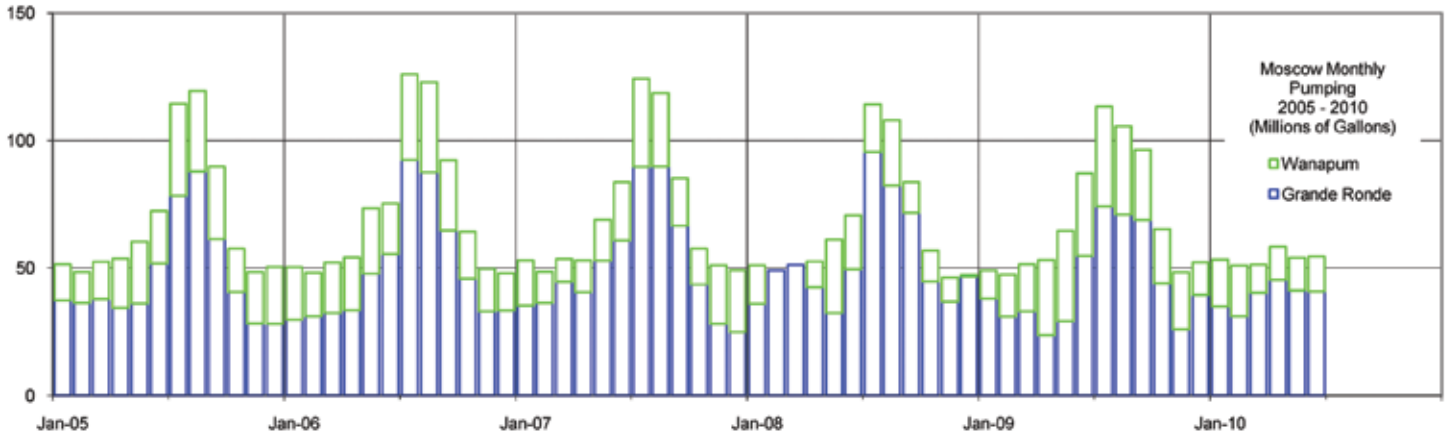


Figure 28: Monthly Pumping, Moscow, 2005 – 2010

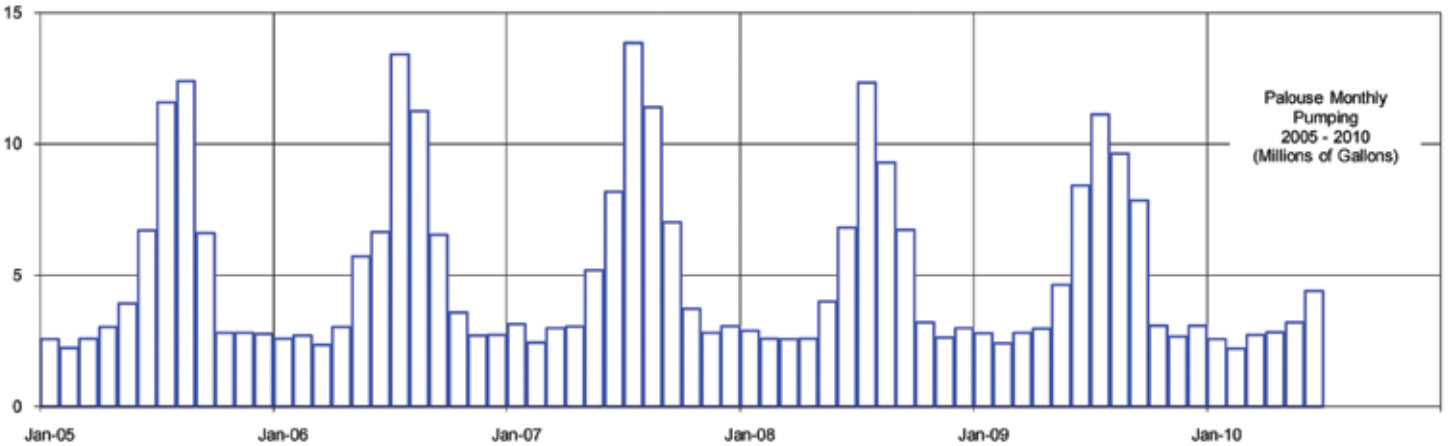


Figure 29: Monthly Pumping, Palouse, 2005 – 2010

Monthly Pumping Totals 2005-2010

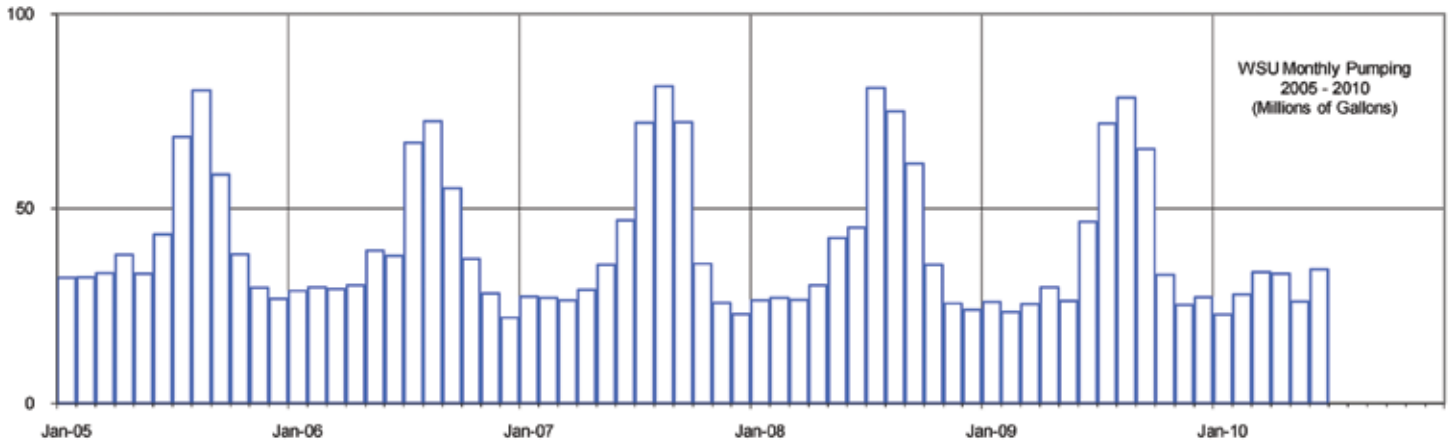


Figure 30: Monthly Pumping, WSU, 2005 – 2010

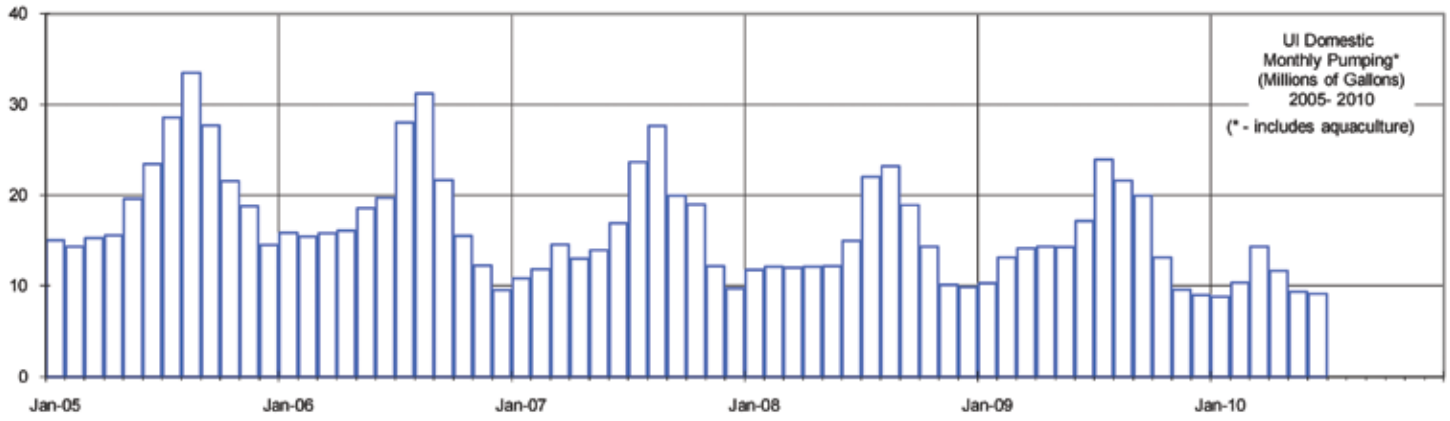


Figure 31: Monthly Pumping, UI, 2005 – 2010

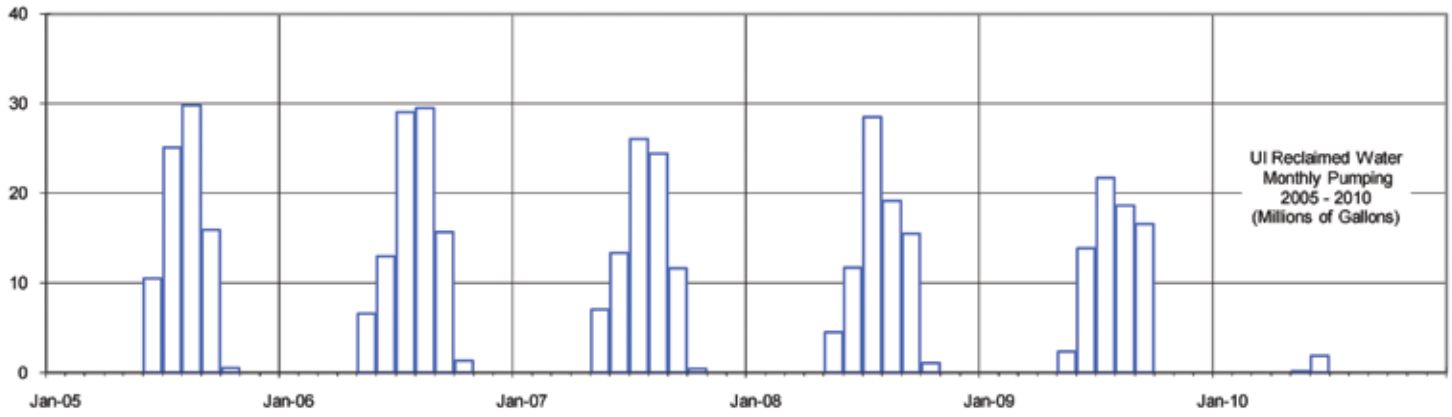


Figure 32: Monthly Pumping, UI Reclaimed, 2005 – 2010

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PBAC Meeting May 2010

Palouse Basin Aquifer Committee
September 2010