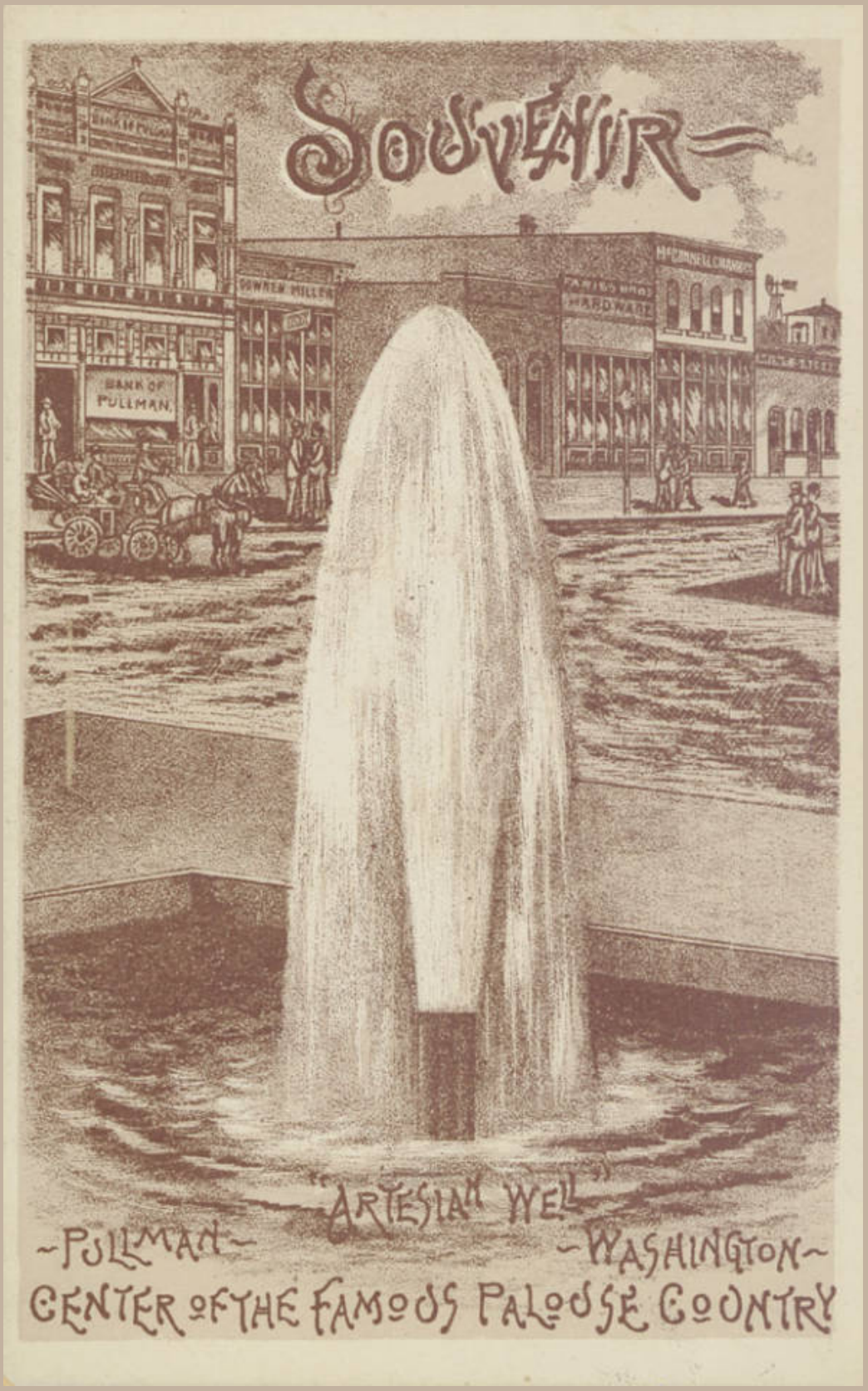
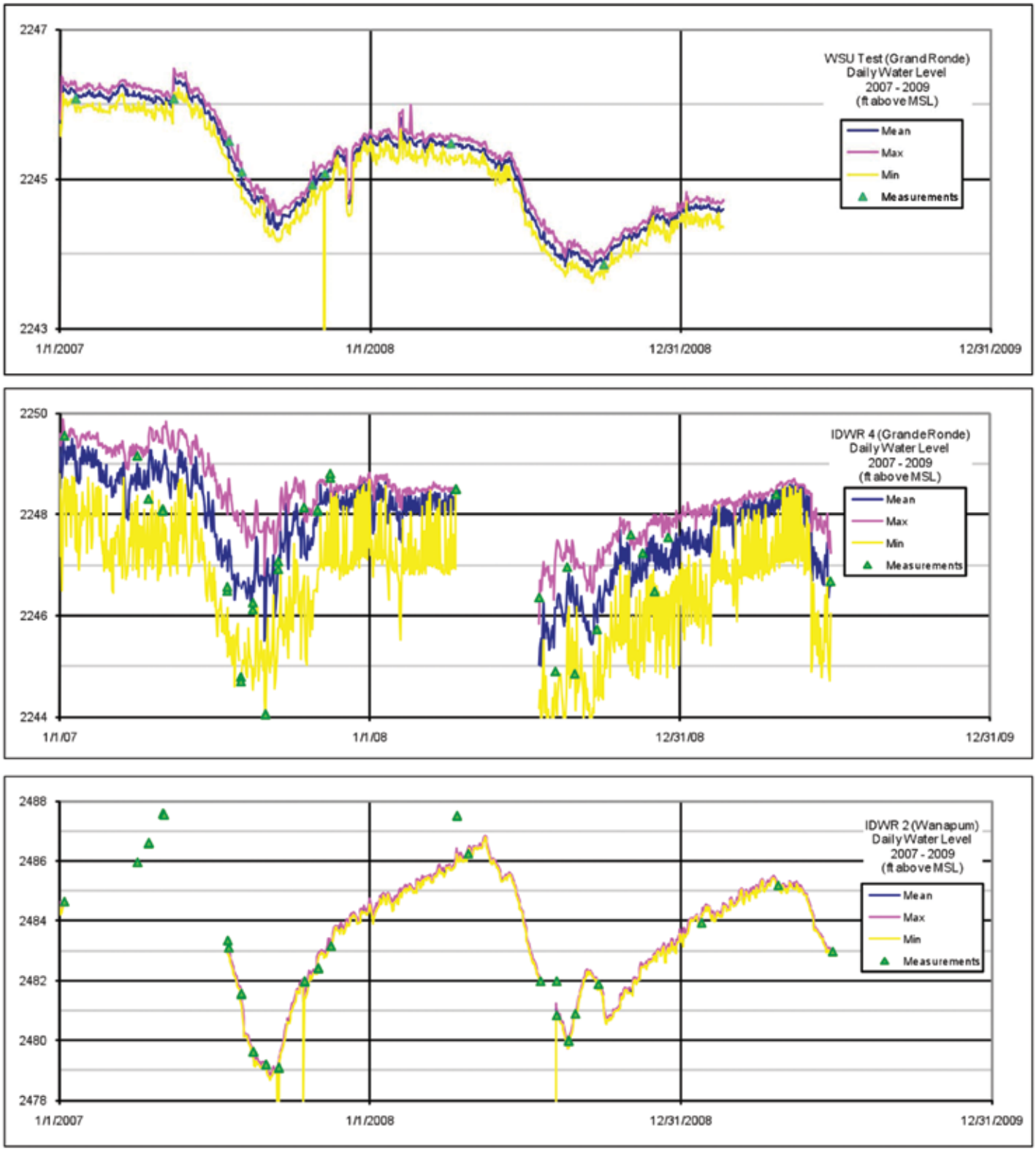
2008
Palouse Ground Water Basin



Water Use Report



Daily hydrographs for 3 PBAC monitoring wells

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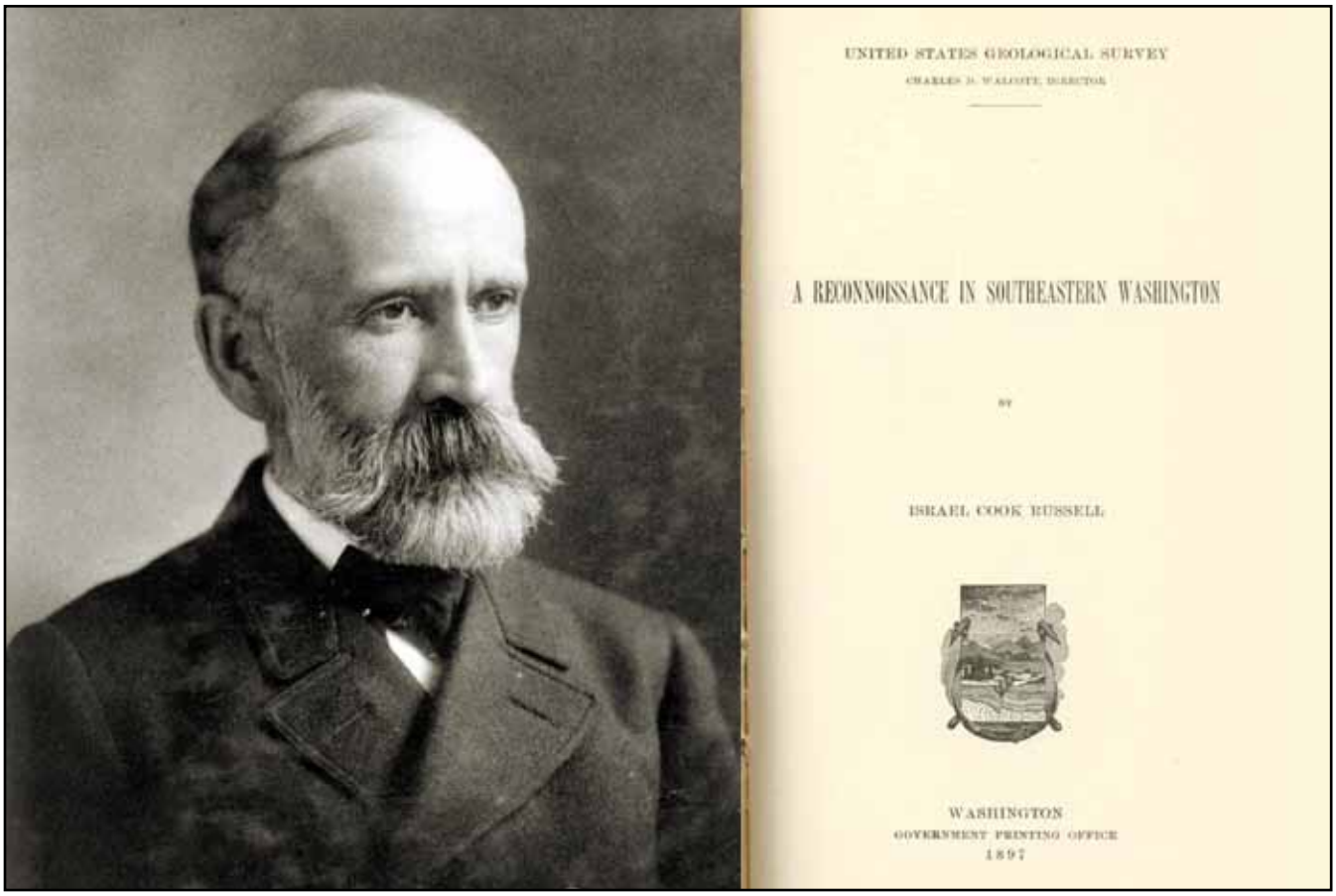
Special thanks to Edwin Garretson and Robert Luedeking of the Whitman County Historical Society (WCHS) for their assistance researching early artesian wells in the Pullman area.

Front Cover: Souvenir Card, ca 1890 (courtesy Robert King)

Back Cover: Art from Pullman Chamber of Commerce booklet, ca 1910 (courtesy WCHS)



Israel Cook Russell (1852-1906), left (USGS Photographic Library), produced the earliest water report for the area (right, 1897, WSU Digital Collections)

Pullman's Great Artesian Well, ca 1913 (courtesy WCHS)

Executive Summary

Ground water is the drinking water supply for the nearly 58,000 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, 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 2008.

The 2008 total combined ground water pumpage by the primary pumping entities within the Basin was 2.63 billion gallons (Figure 1). In aggregate (Pullman, Moscow, WSU, UI, Colfax, Palouse), pumping for 2008 was approximately 5% less than in 2007 and 15% less than in 1992, the first year the Ground Water Management Plan took effect.

Water level data from deep production wells for 2008 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 be of use in the future.

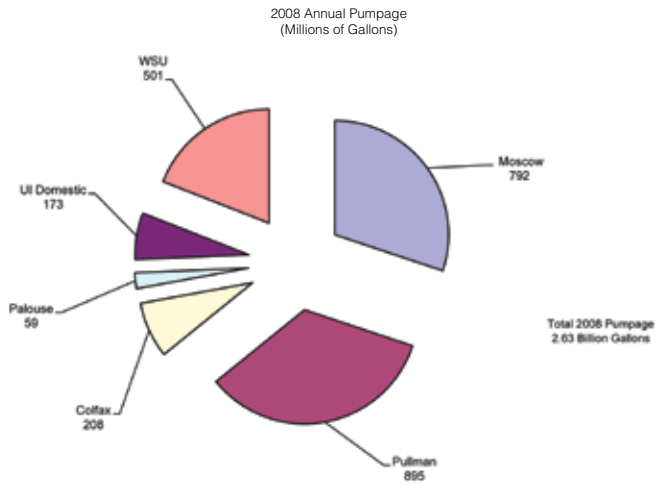


Figure 1: 2008 Ground Water Pumpage

Pullman's Great Artesian Well (courtesy WCHS)

In 2008, PBAC sponsored several research projects. Activities included continuation of shallow and deep aquifer monitoring and testing projects and a study of a standby well at the University of Idaho.

The foundation of the 1992 Ground Water Management Plan consists of a set of goals. As of 2008, 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 level information for the period from 1992 through 2008. In an attempt to provide up to date information where possible, in some instances data are included for portions of 2009. Water use reports for earlier years can be viewed at the PBAC web site *(www.uidaho.edu/PBAC)*.

Pullman's Great Artesian Well (courtesy WCHS)

Introduction

The Palouse Basin Aquifer Committee

Ground water is pumped in the Basin by four major water suppliers (Pullman, Moscow, 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. A recommendation made at a meeting of the Regents of the University of Idaho led to the 1967 formation of a committee, known then as the Pullman Moscow Water Resources 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. The current makeup of PBAC and CAG is detailed at the end of this report.

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 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 a 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 and northeastern Oregon during eruptions that occurred between 17 and 6 million years ago.

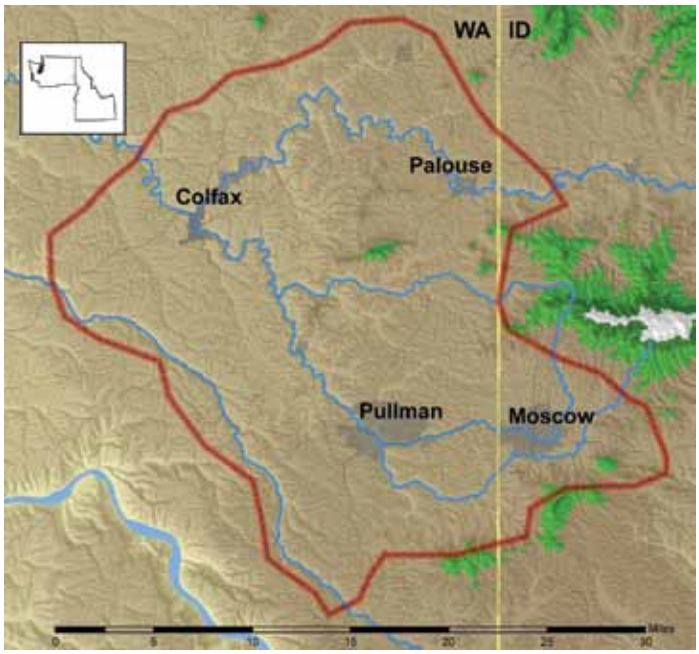


Figure 2: Working Boundary for the Palouse Ground Water Basin

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.

Pullman City Well (in foreground), ca 1891 (courtesy WCHS)

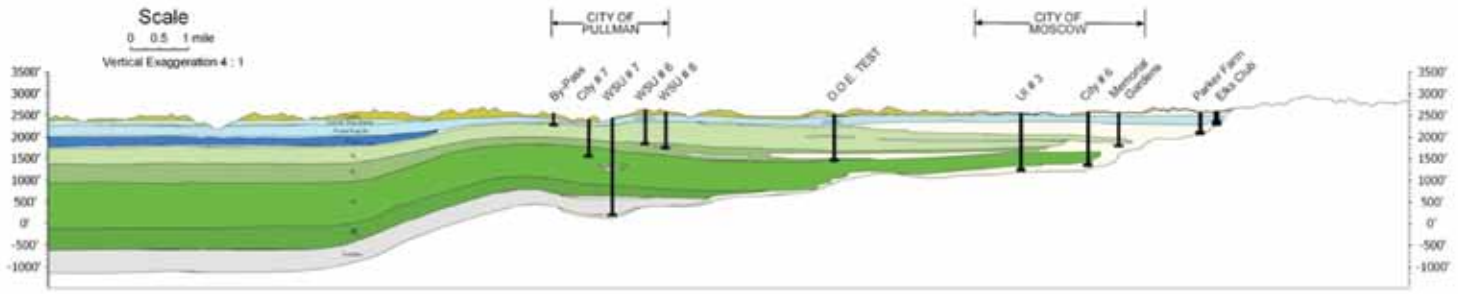


Figure 3: E-W Schematic Cross Section (Bush, Garwood)

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 2008 nearly 20% 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 1 and 2 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.

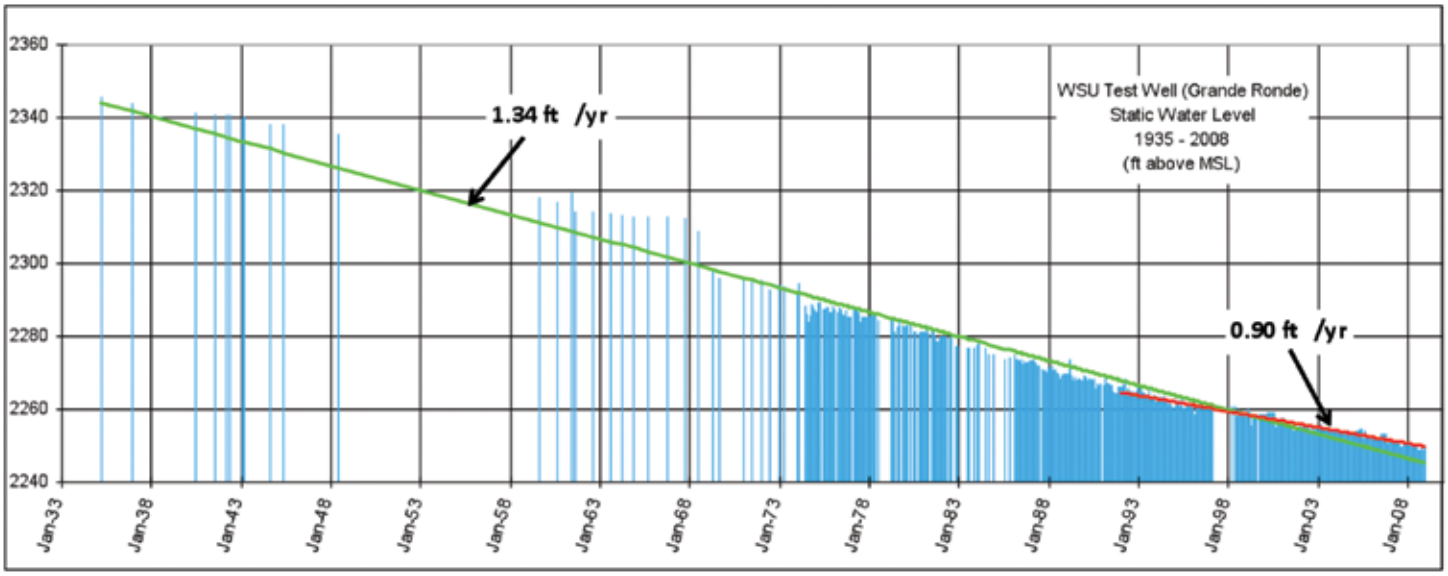


Figure 4: Static Water Level, WSU Test Well (Grande Ronde), 1935-2008

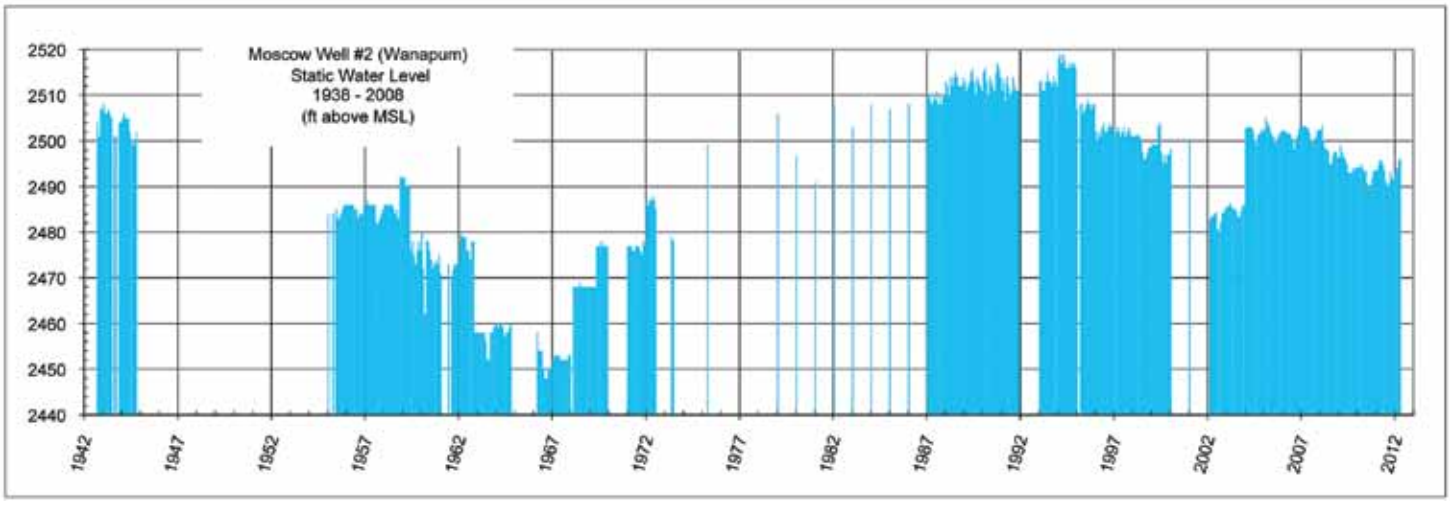


Figure 5: Static Water Level, Moscow Well #2 (Wanapum), 1938 – 2008

Ground Water Pumpage and Water Levels

The total combined ground water pumpage by the four cities and two universities for the year 2008 was 2.63 billion gallons (8065 acre-feet). In aggregate, this was approximately 5.2% less than was pumped in 2007 (2.77 billion gallons), and 14.9% less than was pumped in 1992 (3.09 billion gallons), the first year the Ground Water Management Plan took effect.

In 2008, Pullman and Moscow each pumped approximately 1/3 of the total (34% and 30%) followed by WSU at 19%. Colfax and UI pumped 8% and 7%, respectively, and Palouse pumping accounted for just over 2% of the combined pumping total (Figure 6). By entity, comparisons to 2007 pumping are shown in Figure 7.

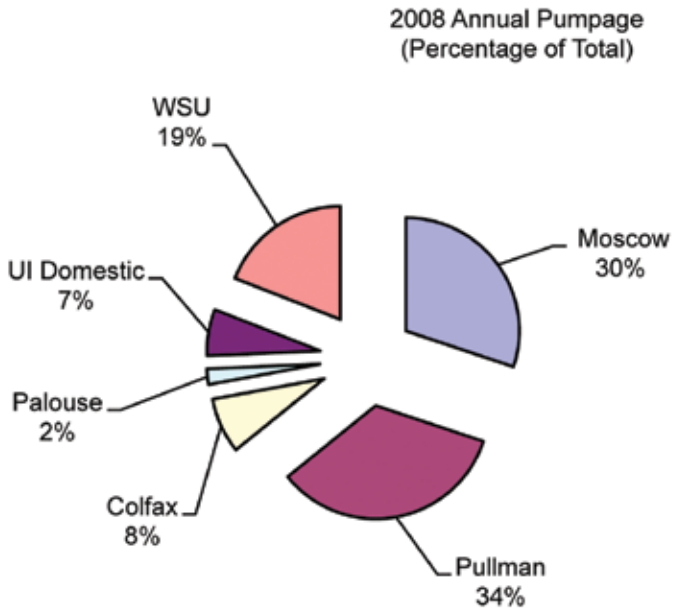


Figure 6: Ground Water Pumpage – Percentage of Total – 2008

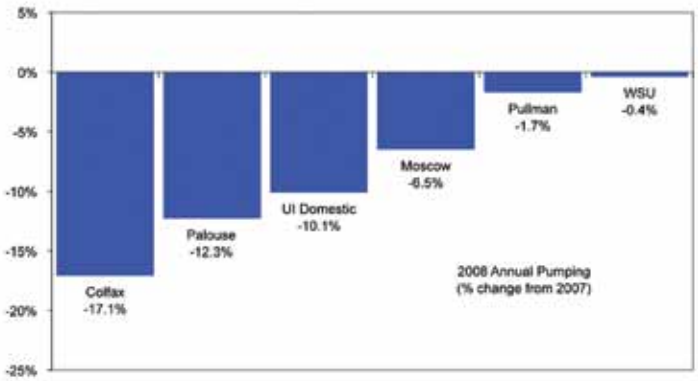


Figure 7: 2008 Pumping – Change from 2007

Moscow pumped nearly 20% (154 million gallons) of its water from the Wanapum aquifer system in 2008; the other pumping entities all pump solely from the Grande Ronde. Of the combined pumping total, in 2008 the Moscow Wanapum contribution amounted to approximately 6%.

Pumping increases significantly in the summer months, primarily due to increased irrigation demand. For 2008, 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 four largest pumping entities ranges from 24.1% for UI to 38.2% for WSU (Figure 8). (Note: The UI non-baseline use is presented both with and without inclusion of the 80 million gallons of reclaimed water utilized in 2008)

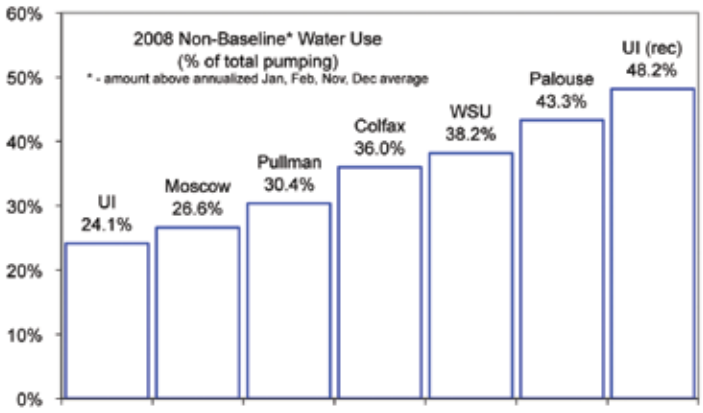


Figure 8: Non-Baseline Water Use – 2008

Non-baseline usage varies with the weather conditions experienced during the year. In aggregate, the 2008 irrigation season was cooler and drier than the five year trailing average, as shown in Figures 9-11. Charts of 2008 and first half 2009 monthly pumping compared to the 2003-2007 averages are shown in Figures 12-16. Figures 27-33 illustrate monthly pumping for the period between 2004 and mid 2009.

Pullman City Well, ca 1891 (courtesy WCHS)

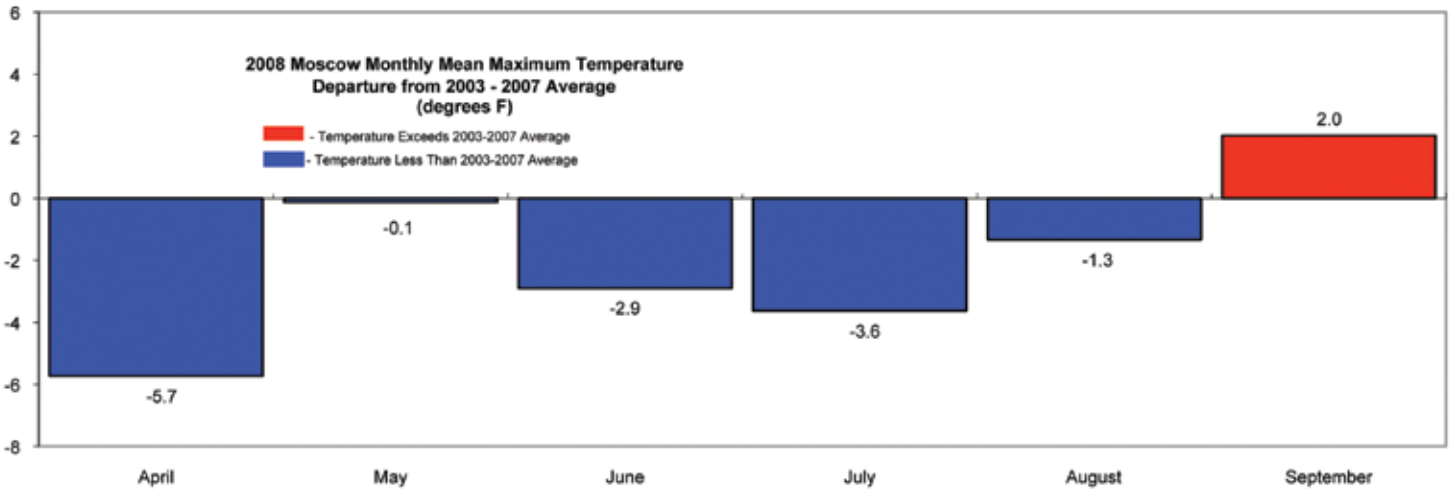


Figure 9: Moscow Mean Maximum Temperature – 2008

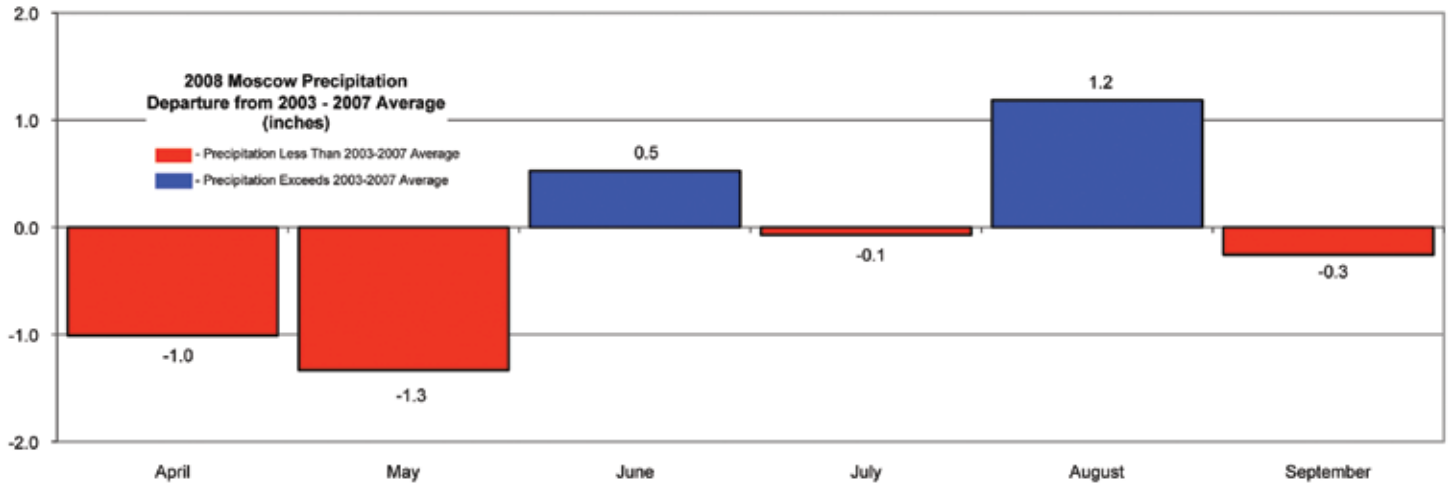


Figure 10: Moscow Precipitation – 2008

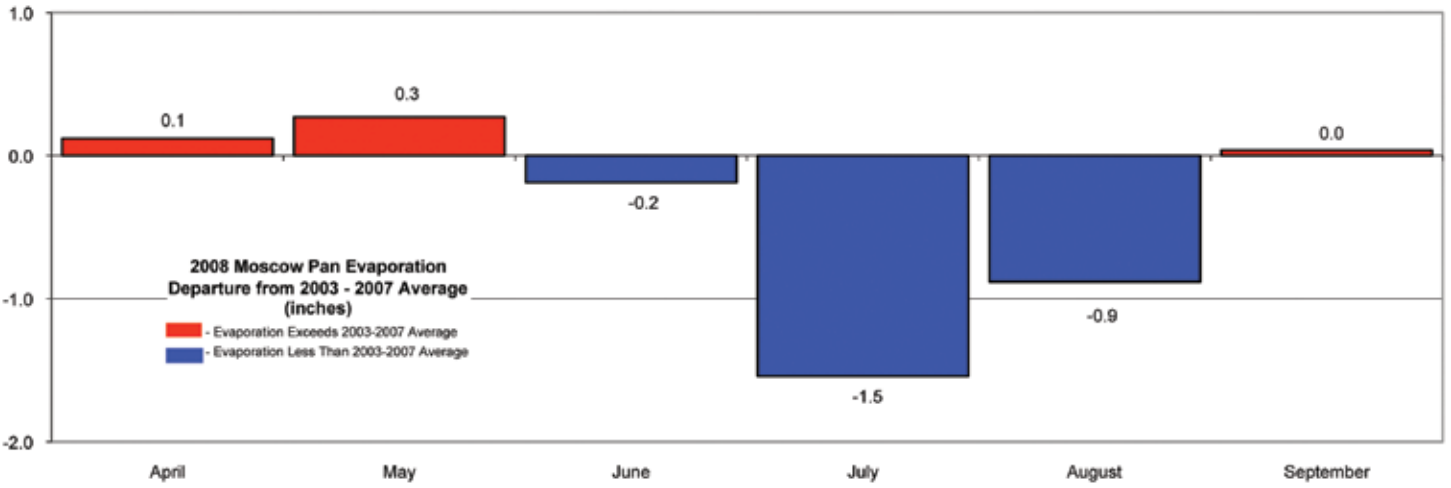


Figure 11: Moscow Pan Evaporation – 2008

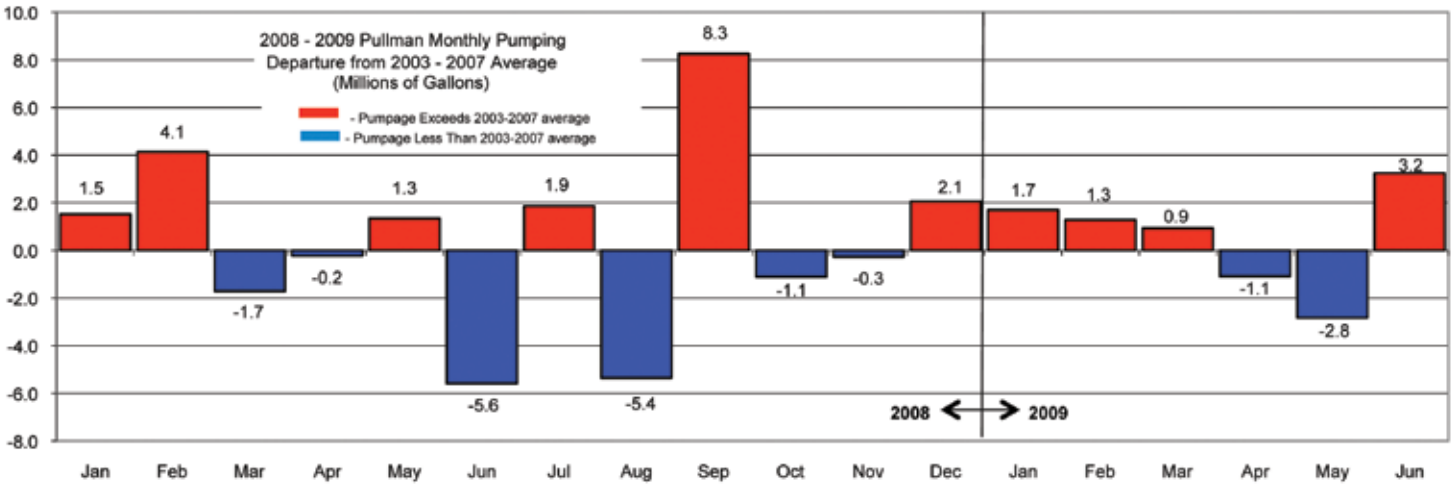


Figure 12: Pullman Monthly Pumping, Departure from 5-year Average, 2008-2009

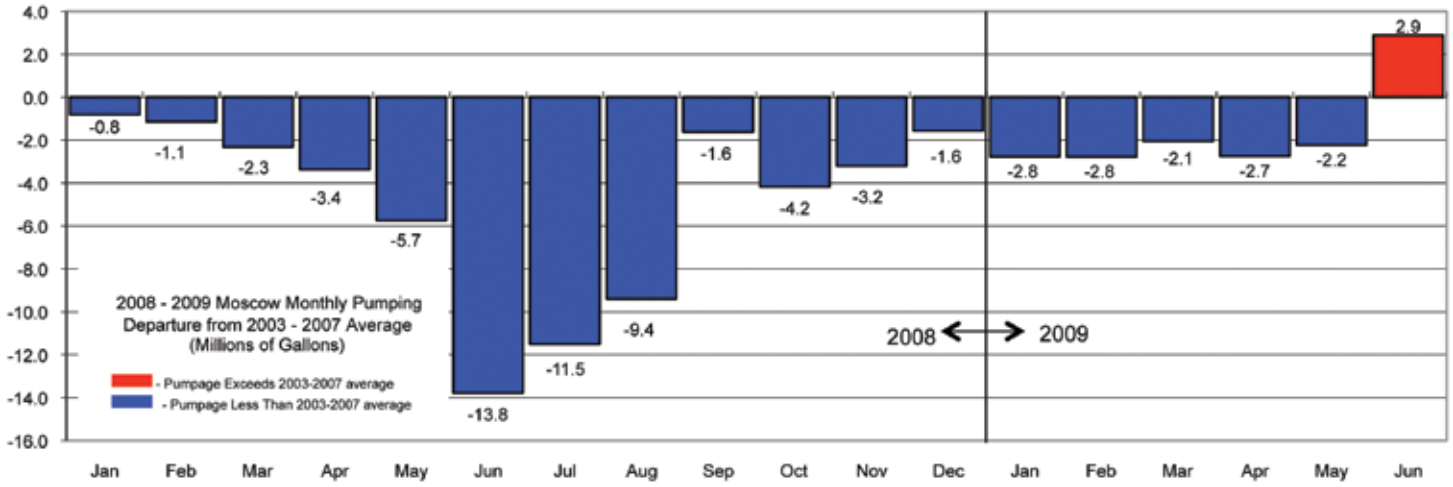


Figure 13: Moscow Monthly Pumping, Departure from 5-year Average, 2008-2009

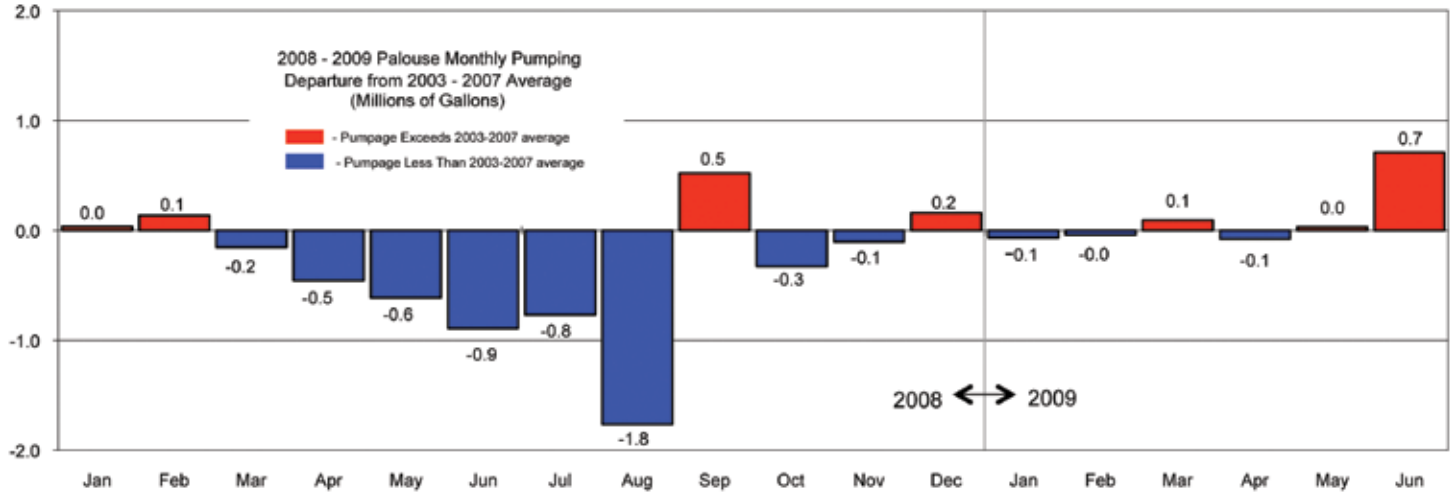


Figure 14: Palouse Monthly Pumping, Departure from 5-year Average, 2008-2009

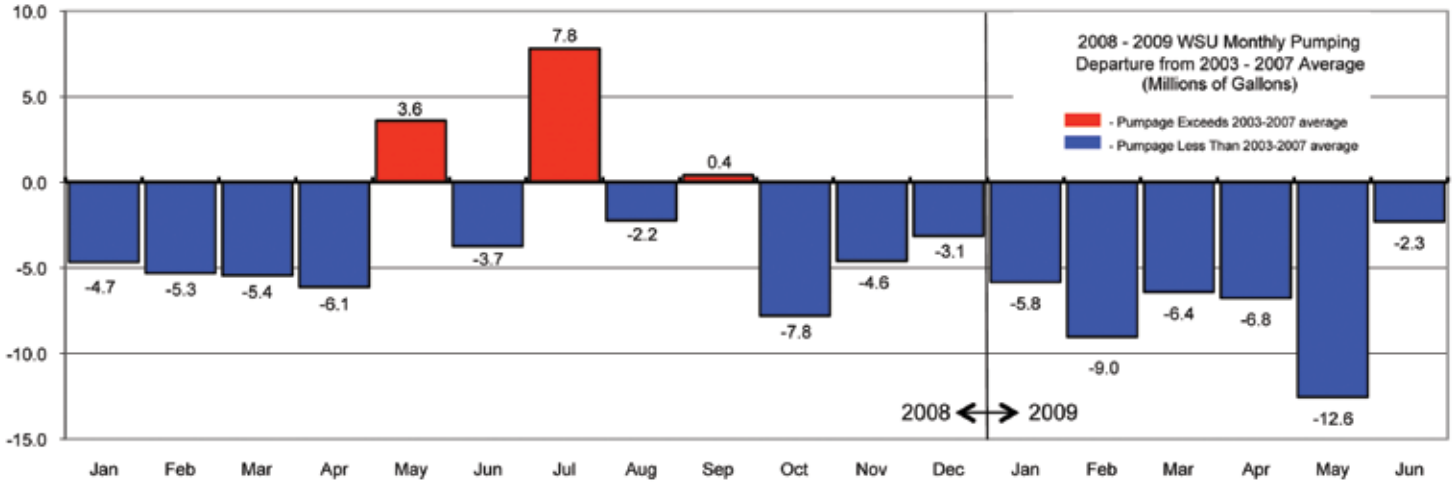


Figure 15: WSU Monthly Pumping, Departure from 5-year Average, 2008-2009

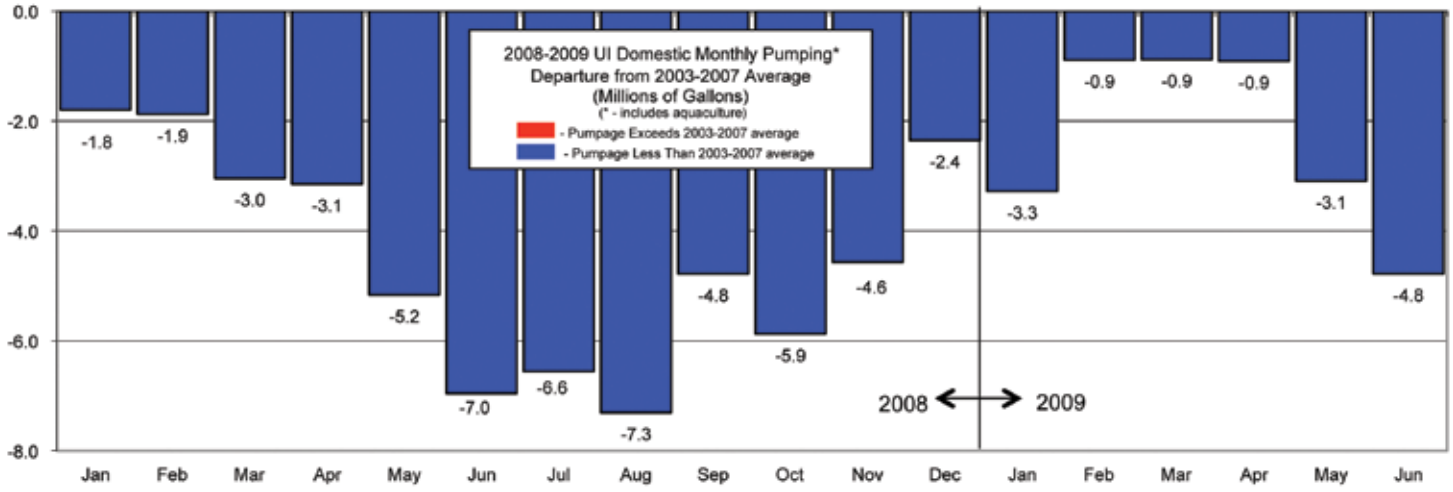


Figure 16: UI Monthly Pumping, Departure from 5-year Average, 2008-2009

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, the cities and universities agreed to keep total pumping below 125% of the 1981-1985 average pumping level. An aggregation of the pumping targets for the four major entities is shown in Figures 17 and 18. The 1% and 125% targets for the major entities are illustrated in Figures 19-22 and Figures 23-26. Note that no charts are shown for 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 2008 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 WSU Test and IDWR4 monitoring wells appear to have declined by somewhat less than a foot during 2008. 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 2008.

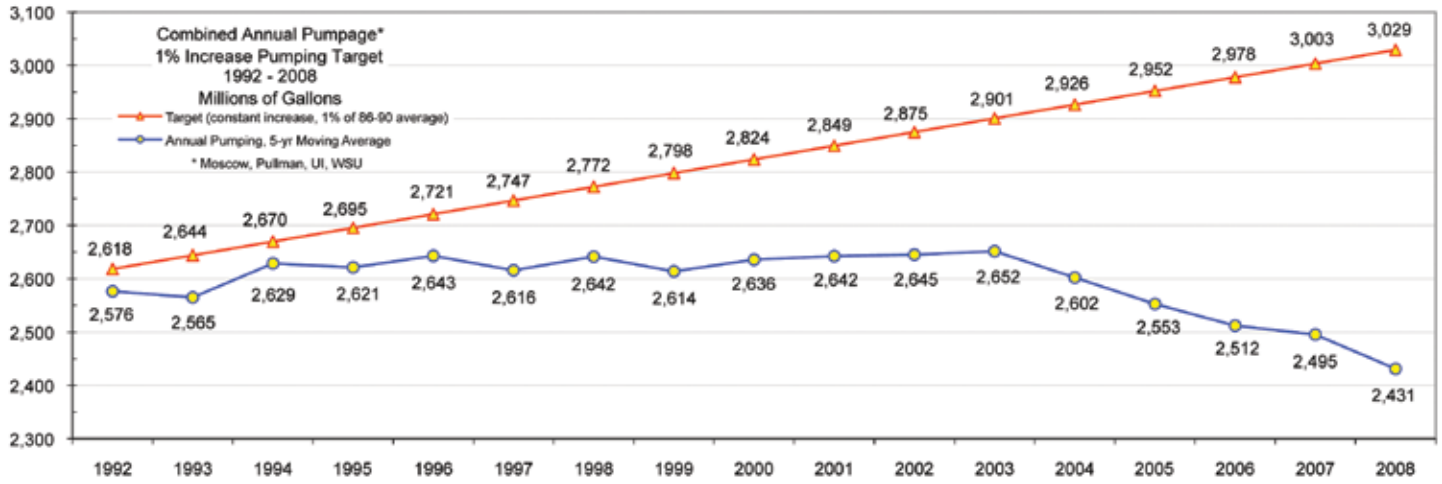


Figure 17: Voluntary 1% Annual Increase Target, 4 Major Entities Combined, 2008

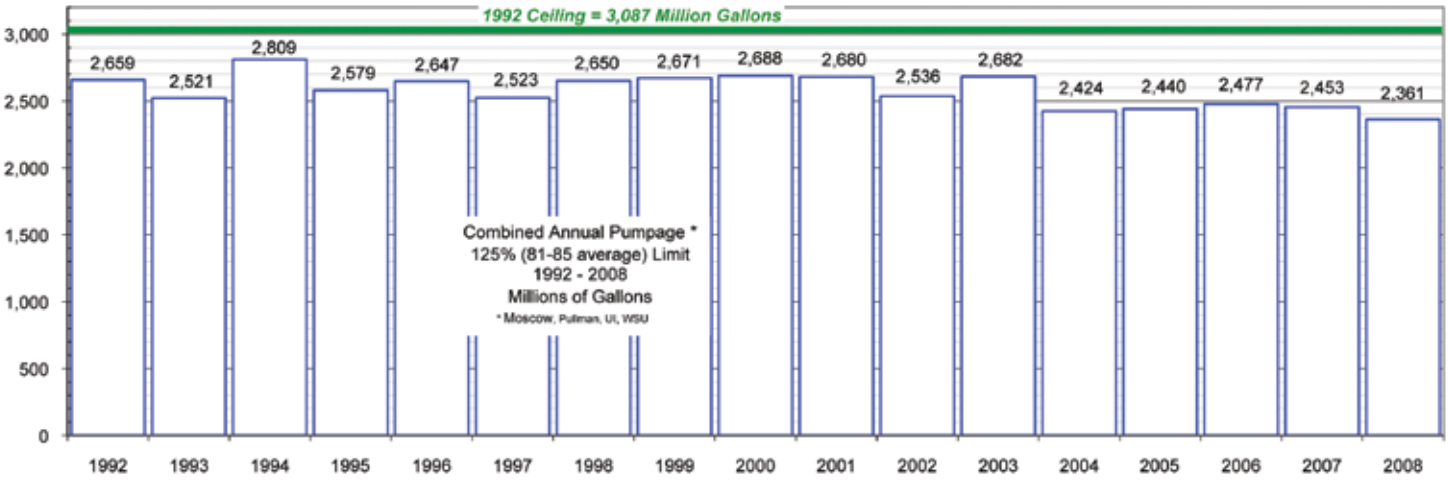


Figure 18: Voluntary 125% (of 1981-85 average) Pumping Ceiling, 4 Major Entities Combined

Research Accomplishments 2008

Two PBAC research projects were active during 2008 and early 2009.

Aaren Fiedler conducted several large scale aquifer tests utilizing pumping information from major production wells and observation data from the deepest of the 4 new monitoring wells (IDWR4 – 750 feet deep). Brad Bennett conducted aquifer stress tests of the Wanapum aquifer to evaluate whether strategic pumping during high flow periods can induce additional recharge into the aquifer system. Copies of the resulting Masters theses can be obtained from the PBAC web site (*www.uidaho.edu/pbac)*.

In early 2007, a new interdisciplinary water resources graduate program was formed at the University of Idaho. During 2008, PBAC members partnered with program researchers in a project involving the participatory development of a system dynamics-based water balance model of the Basin. PBAC also agreed to share funding for the second phase of the project, which began in the spring of 2009.

Goals, Plans and Ongoing Efforts of the Committee

Pullman City Well, ca 1890 (courtesy WCHS)

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.

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 2009 plans to continue funding a deep aquifer monitoring and testing project as well as a project to conduct tritium testing at selected sites within the Basin. In addition, PBAC will partner with the Washington Department of Ecology on a project that will compile and evaluate the data and studies that have been conducted in the area over the years.

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 2008 the CAG continued its work in the areas of conservation and public outreach.

PBAC members continued to collaborate with the WRIA 34 (Palouse) Watershed Planning Unit. The Palouse Watershed Plan was adopted by the counties in the fall of 2007, and in 2008 the group developed a detailed implementation plan to guide future activities.

In 2008, PBAC participated in the fourth (modern) Palouse Water Summit. The Summit continued its focus on local water resource 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 fifth Summit, scheduled for October 2009.

Pullman's Great Artesian Well (courtesy WCHS)

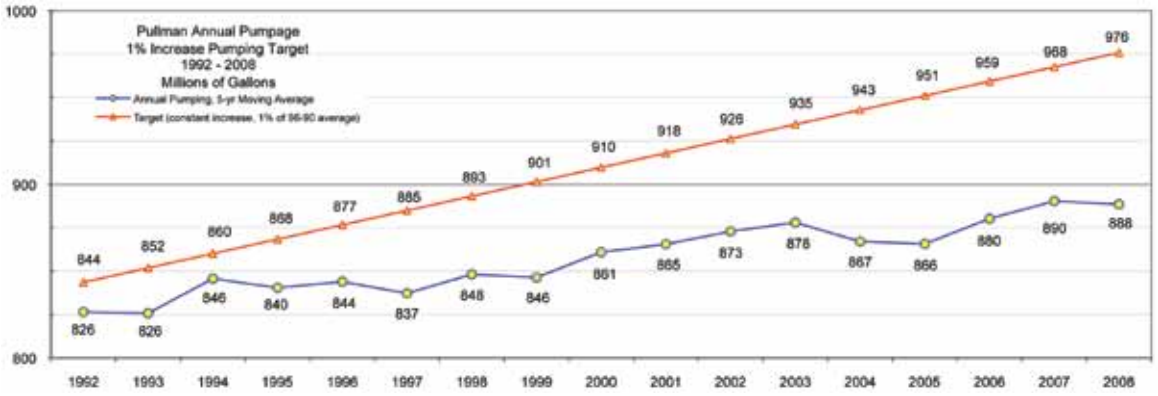


Figure 19: 1% Annual Target, Pullman, 1992 – 2008

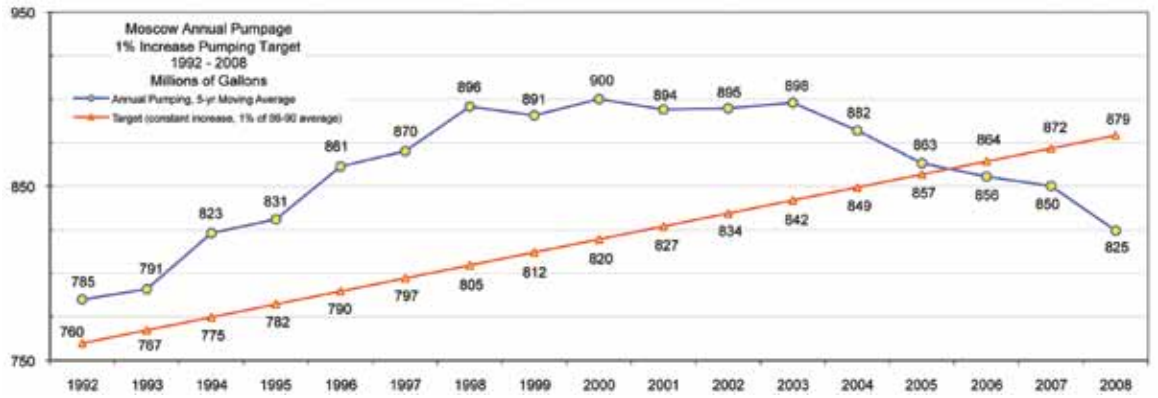


Figure 20: 1% Annual Target, Moscow, 1992 – 2008

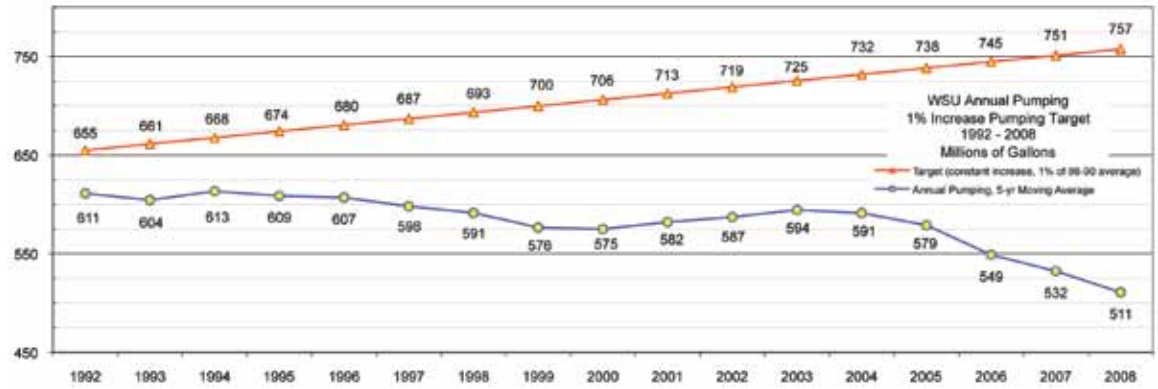


Figure 21: 1% Annual Target, WSU, 1992 – 2008

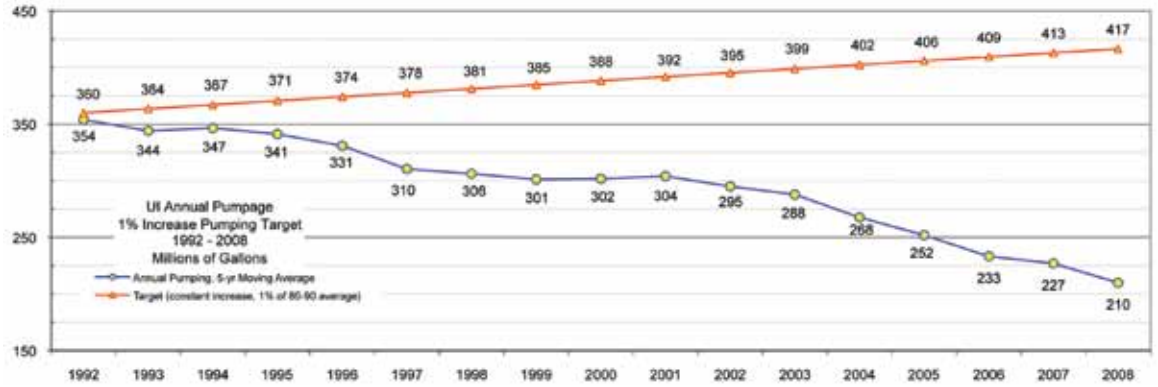


Figure 22: 1% Annual Target, UI, 1992 – 2008

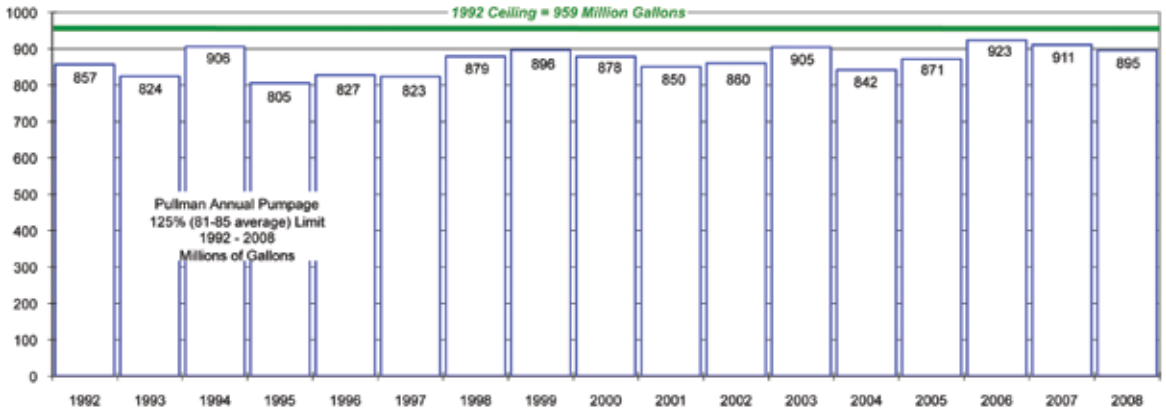


Figure 23: 125% (of 1981-85 Average) Ceiling Annual Target, Pullman, 1992 – 2008

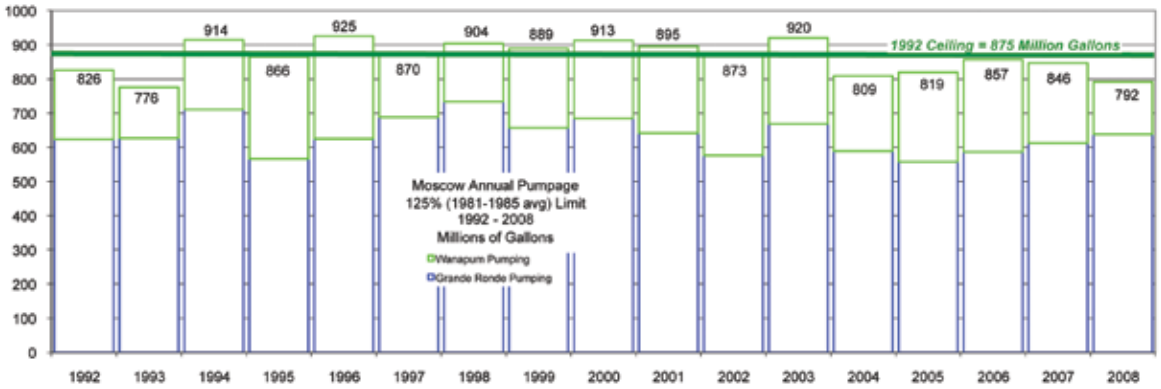


Figure 24: 125% (of 1981-85 Average) Ceiling Annual Target, Moscow, 1992 – 2008

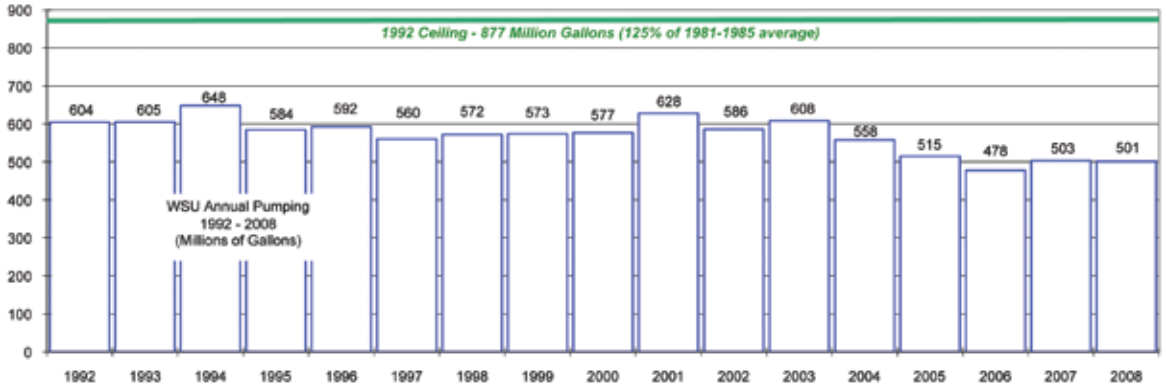


Figure 25: 125% (of 1981-85 Average) Ceiling Annual Target, WSU, 1992 – 2008

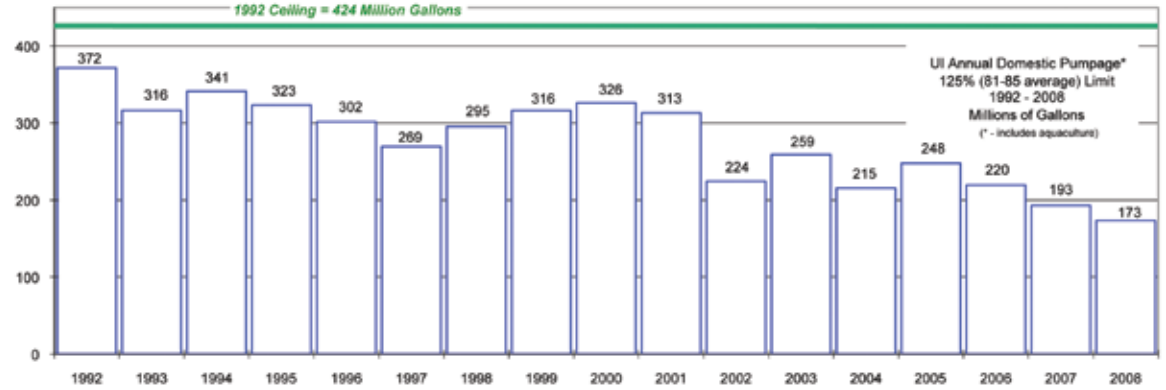


Figure 26: 125% (of 1981-85 Average) Ceiling Annual Target, UI, 1992 – 2008

Monthly Pumping Totals 2004-2009

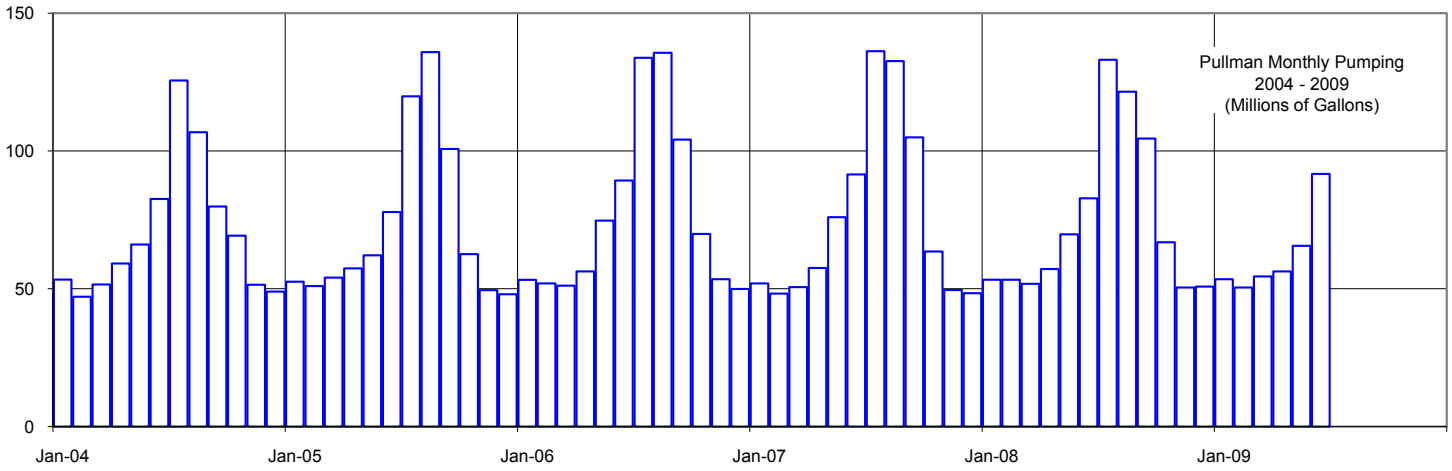


Figure 27: Monthly Pumping, Pullman, 2004 – 2009

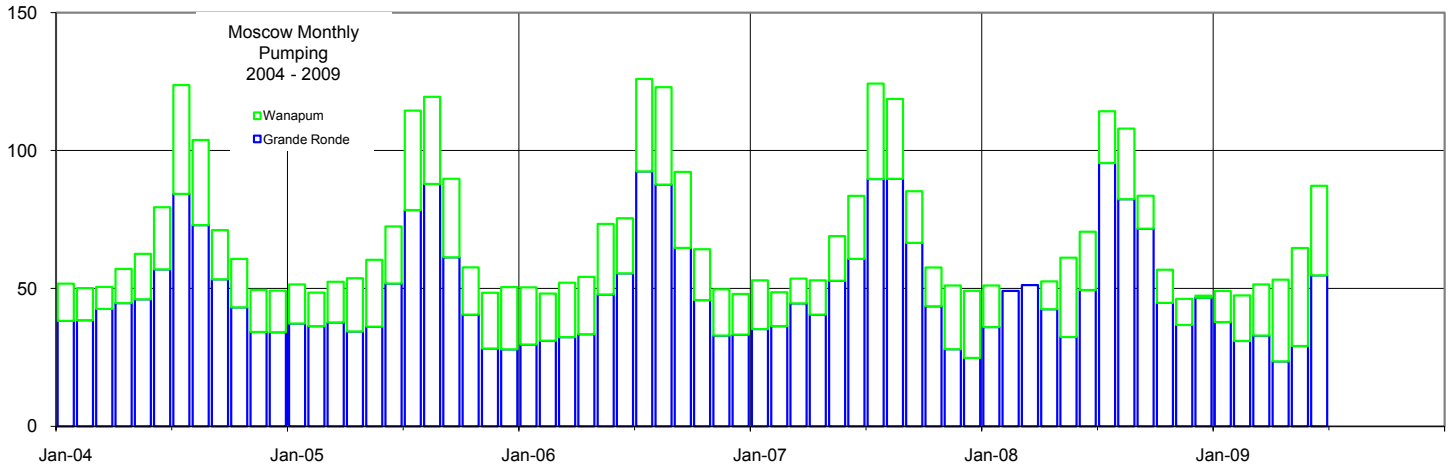


Figure 28: Monthly Pumping, Moscow, 2004 – 2009

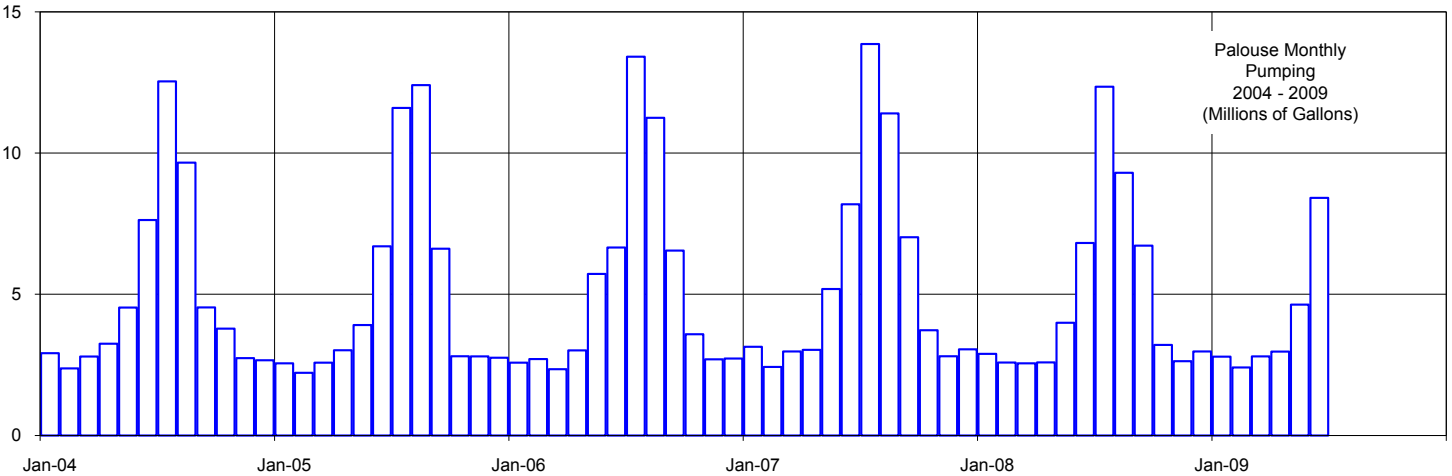


Figure 29: Monthly Pumping, Palouse, 2004 – 2009

Monthly Pumping Totals 2004-2009

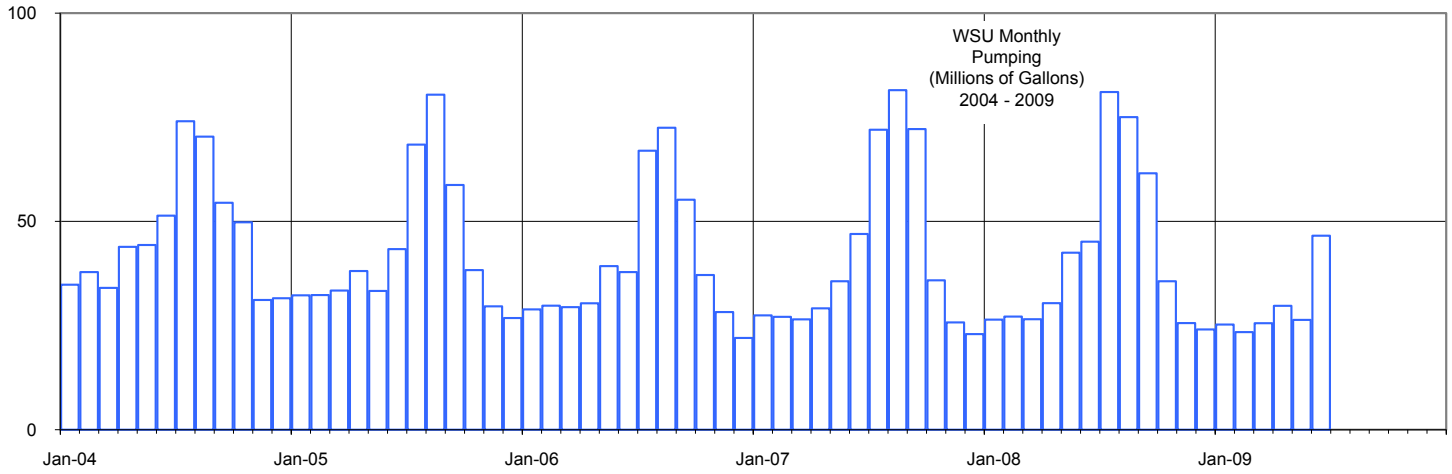


Figure 30: Monthly Pumping, WSU, 2006 – 2009

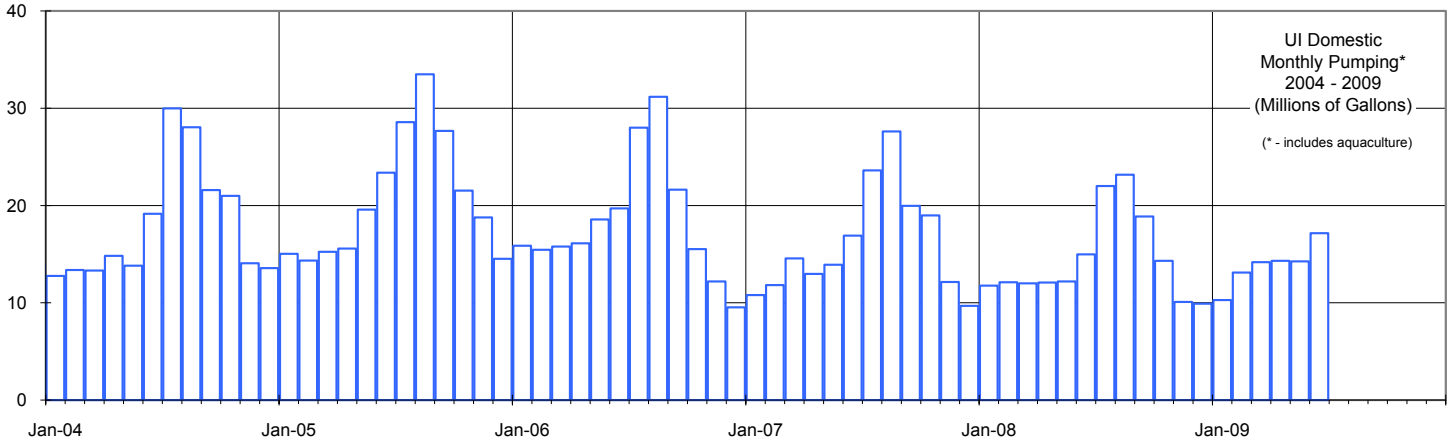


Figure 31: Monthly Pumping, UI, 2004 – 2009

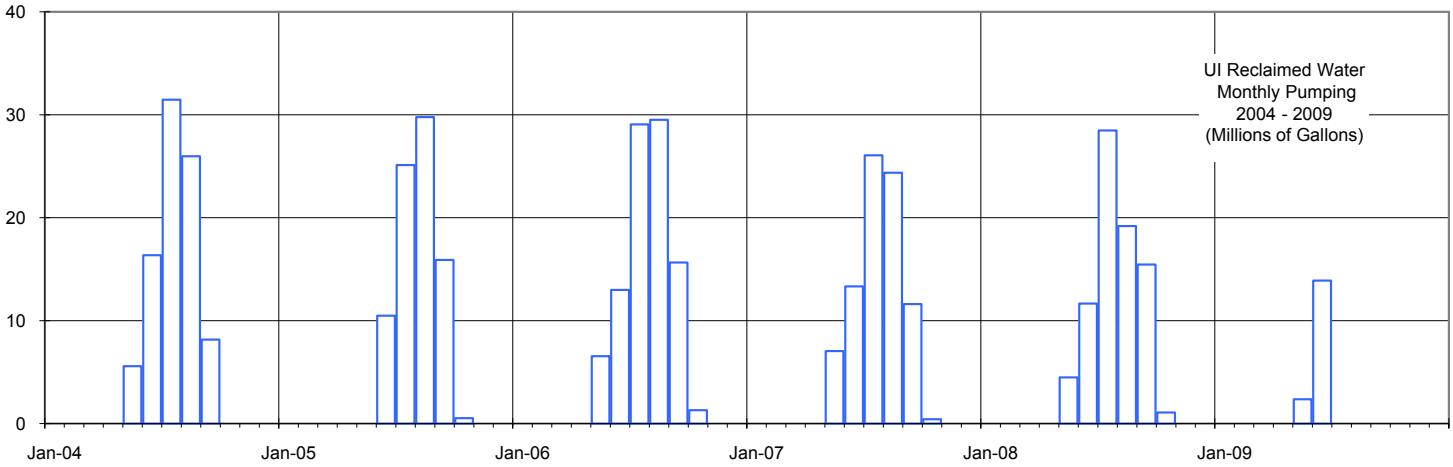


Figure 32: Monthly Pumping, UI Reclaimed, 2004 – 2009

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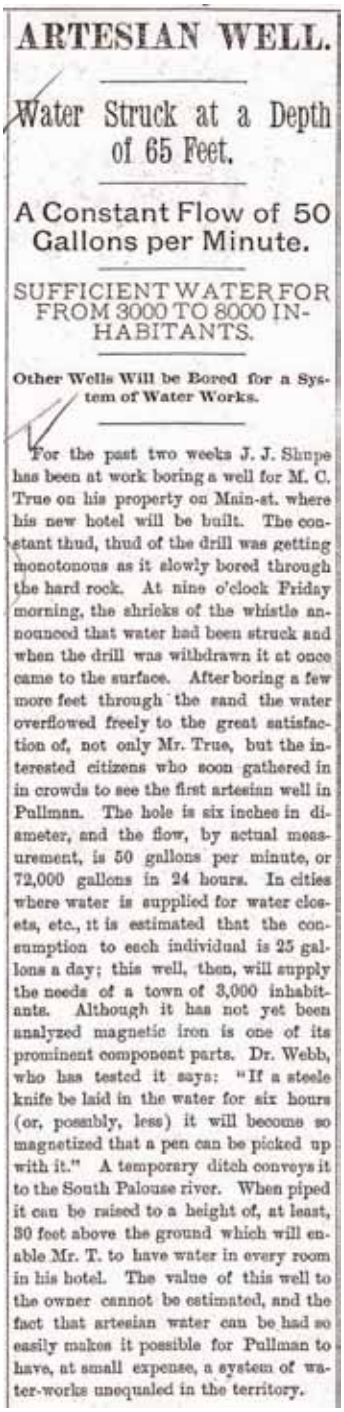

ARTESIAN WELL.

Water Struck at a Depth of 65 Feet.

A Constant Flow of 50 Gallons per Minute.

SUFFICIENT WATER FOR FROM 3000 TO 8000 INHABITANTS.

Other Wells Will be Bored for a System of Water Works.

For the past two weeks J. J. Shupe has been at work boring a well for M. C. True on his property on Main-st. where his new hotel will be built. The constant thud, thud of the drill was getting monotonous as it slowly bored through the hard rock. At nine o'clock Friday morning, the shrieks of the whistle announced that water had been struck and when the drill was withdrawn it at once came to the surface. After boring a few more feet through the sand the water overflowed freely to the great satisfaction of, not only Mr. True, but the interested citizens who soon gathered in in crowds to see the first artesian well in Pullman. The hole is six inches in diameter, and the flow, by actual measurement, is 50 gallons per minute, or 72,000 gallons in 24 hours. In cities where water is supplied for water closets, etc., it is estimated that the consumption to each individual is 25 gallons a day; this well, then, will supply the needs of a town of 3,000 inhabitants. Although it has not yet been analyzed magnetic iron is one of its prominent component parts. Dr. Webb, who has tested it says: "If a steele knife be laid in the water for six hours (or, possibly, less) it will become so magnetized that a pen can be picked up with it." A temporary ditch conveys it to the South Palouse river. When piped it can be raised to a height of, at least, 30 feet above the ground which will enable Mr. T. to have water in every room in his hotel. The value of this well to the owner cannot be estimated, and the fact that artesian water can be had so easily makes it possible for Pullman to have, at small expense, a system of water-works unequaled in the territory.

Pullman Herald, May 25, 1889
(courtesy WCHS)

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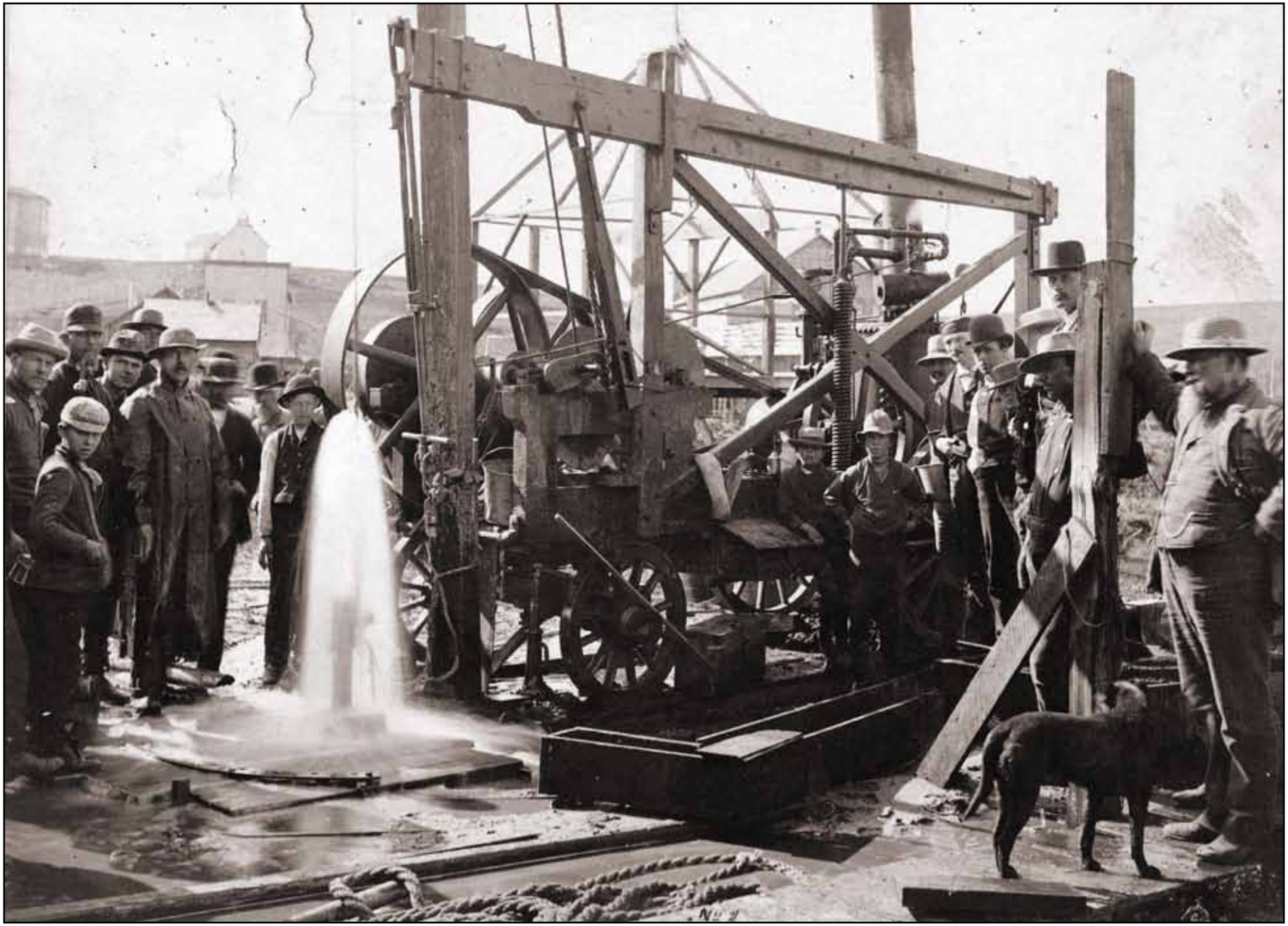

Pullman City Well, ca 1890 (courtesy WCHS)

Palouse Basin Aquifer Committee
September 2009