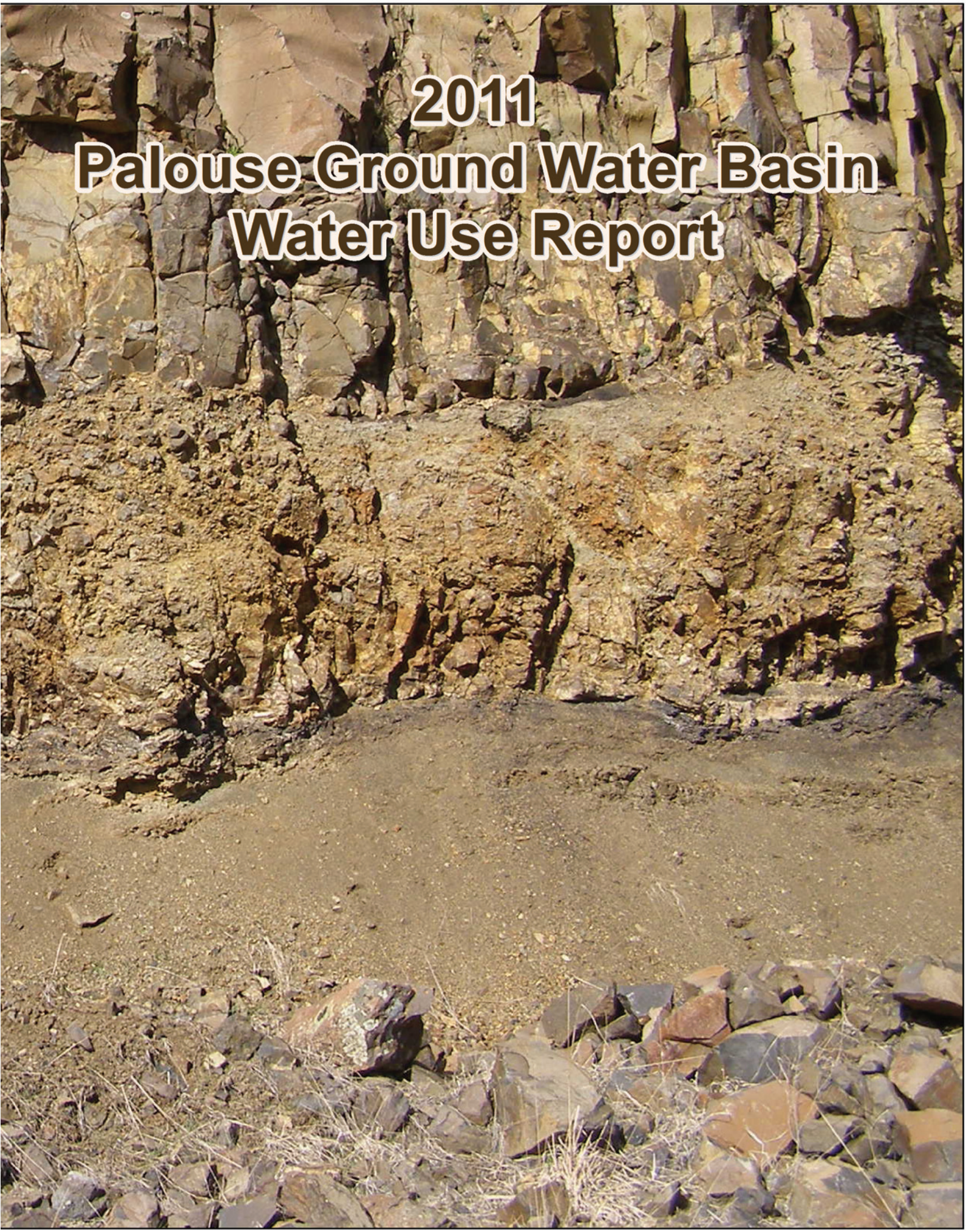
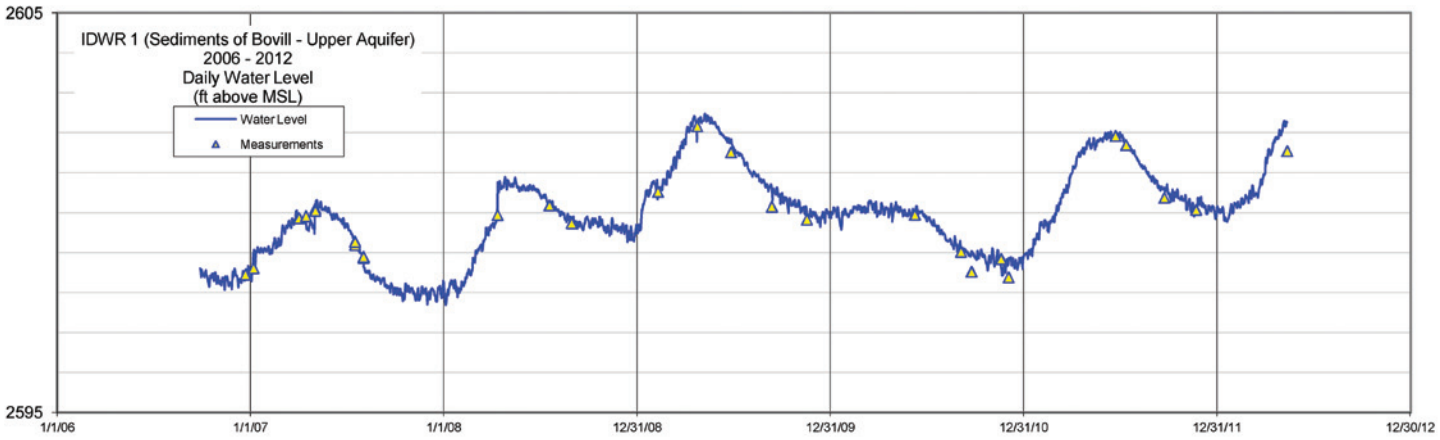
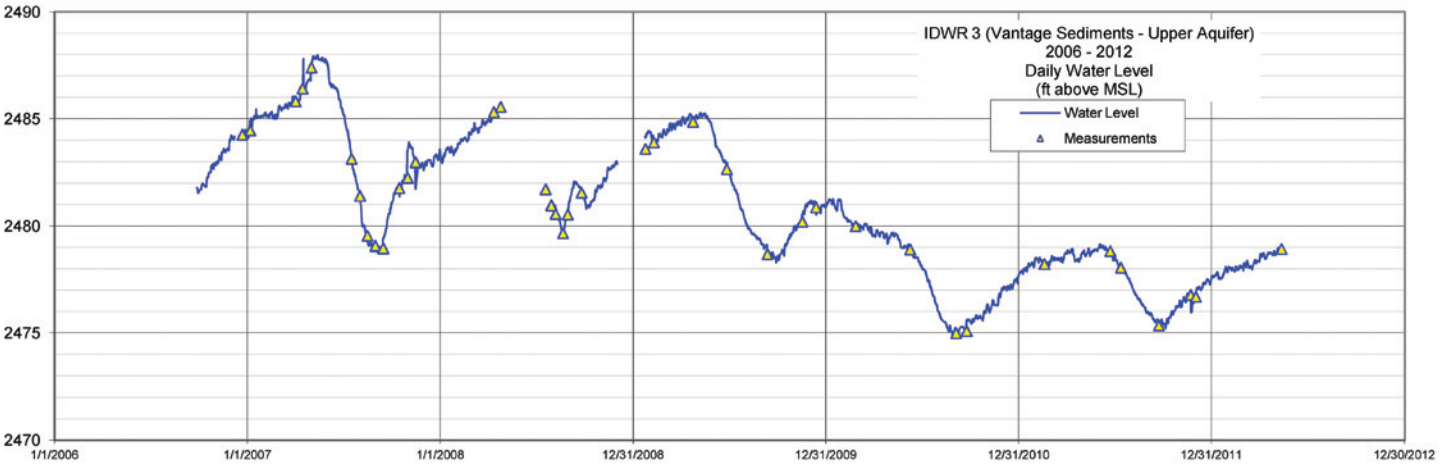
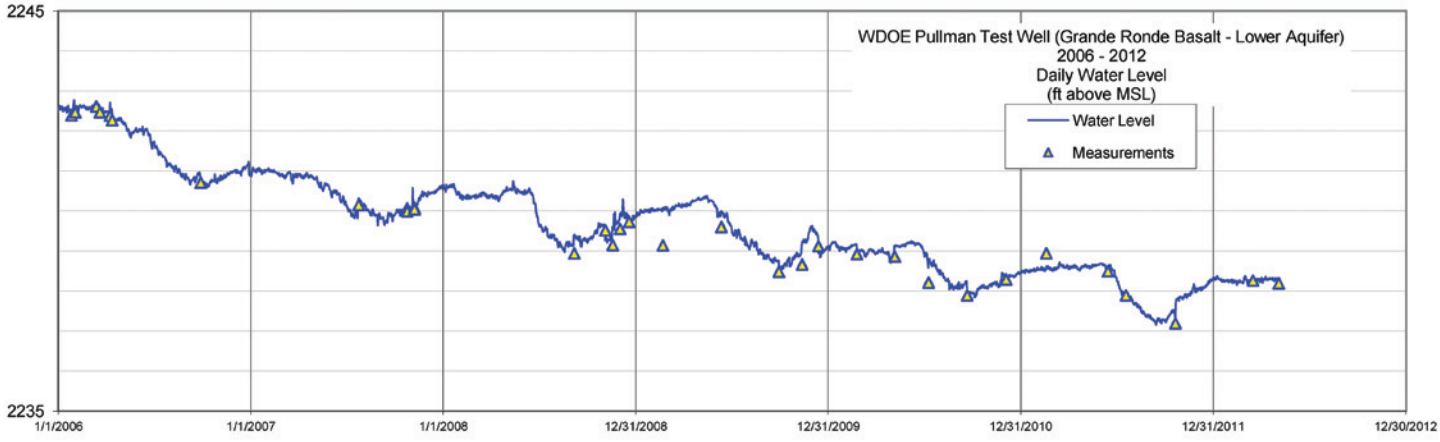


2011
Palouse Ground Water Basin
Water Use Report







Water level hydrographs for 3 Palouse Basin monitoring wells

Cover and interior photos courtesy Jim Osiensky

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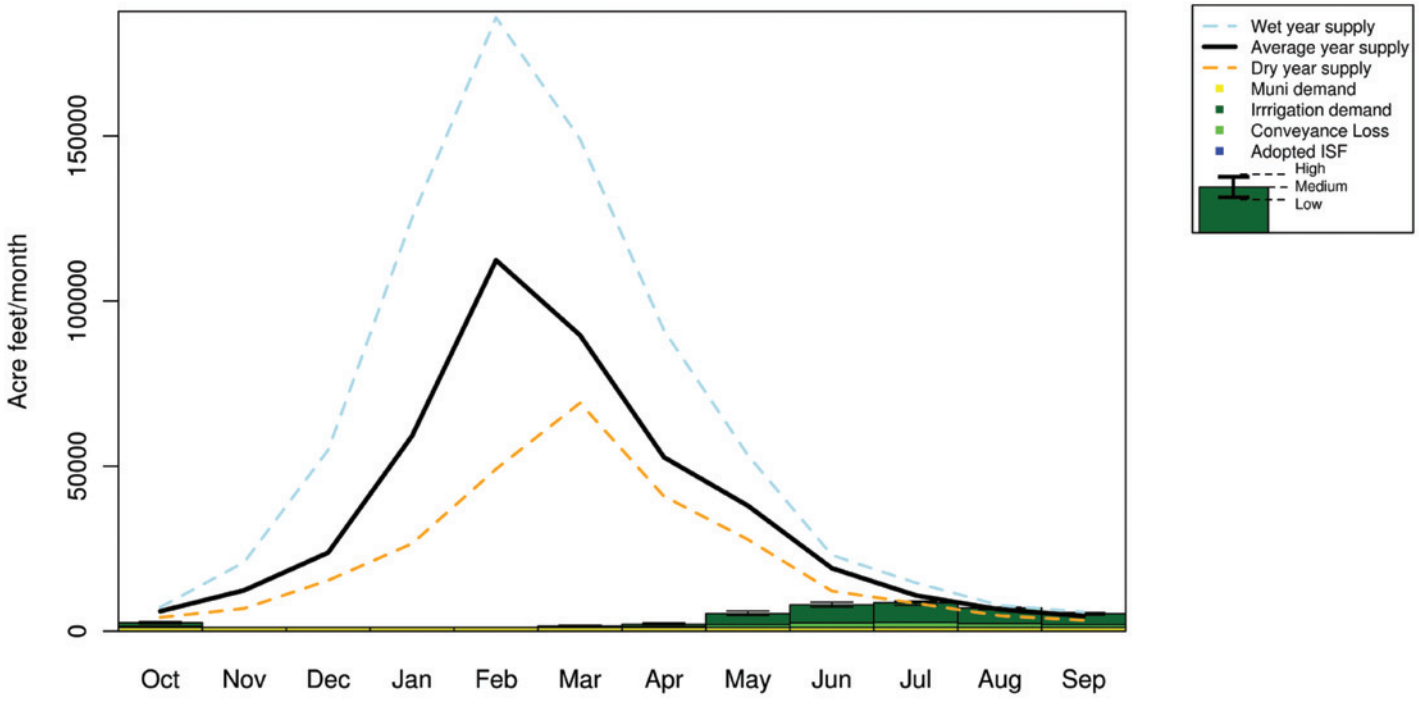

WRIA 34 – Palouse - Comparison of surface water supply, surface water irrigation demands, and municipal demand for 2030, using the baseline economic scenario, and the middle value of the range of climate change scenarios considered. Wet (80th percentile), average, and dry (20th percentile) flow conditions are shown for supply. The 80th, 50th, and 20th percentile conditions are also shown for irrigation demand using error bars. Demands and supplies are defined as above. Water curtailment is not considered (from Columbia River Basin Long-Term Water Supply and Demand Forecast, Legislative Report, Washington Department of Ecology, Publication 11-12-011).

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 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), 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 2011.

The 2011 total combined ground water pumpage by the primary pumping entities within the Basin was 2.6 billion gallons (Figure 1). In aggregate (Pullman, Moscow, WSU, UI, Colfax, Palouse), pumping for 2011 was approximately 3% more than in 2010 and 16% less than in 1992, the first year the Ground Water Management Plan took effect.

Water level data from deep production wells for 2011 reveals a reasonably consistent decline in static water level of somewhat 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 cover of this report.

In 2011, PBAC participated in several projects. Sponsored research activities included a basinwide lower aquifer 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 2011, PBAC's primary goal is to develop and implement a balanced, basin-wide, water supply and use program by the year 2025.

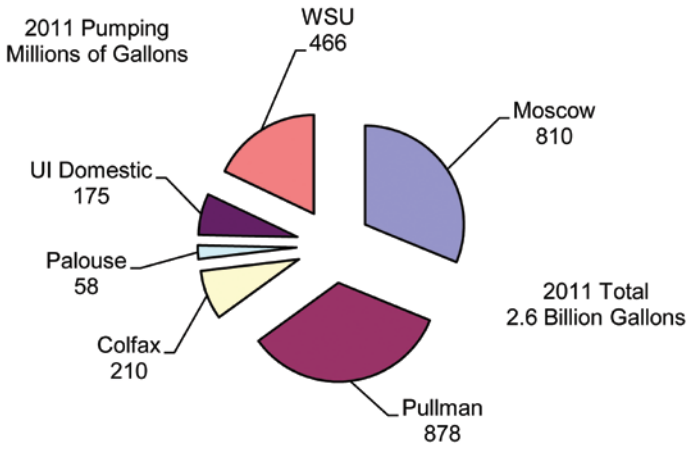

Figure 1: 2011 Ground Water Pumpage

Annual Water Use Report

The report that follows includes water use and water level information for the period from 1992 through 2011. Note that annual pumping data for the City of Colfax are estimates, as pumping amounts for November and December 2011 were not available (values for 2010 were used as proxies). To provide up to date information where available, data are included for portions of 2012. 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 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 systems, 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. 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 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). 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. 2011 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, enacted a Ground Water Management Plan (GWMP) for the Basin. The Plan is authorized by an Intergovernmental Agreement between the (then 6 - 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.

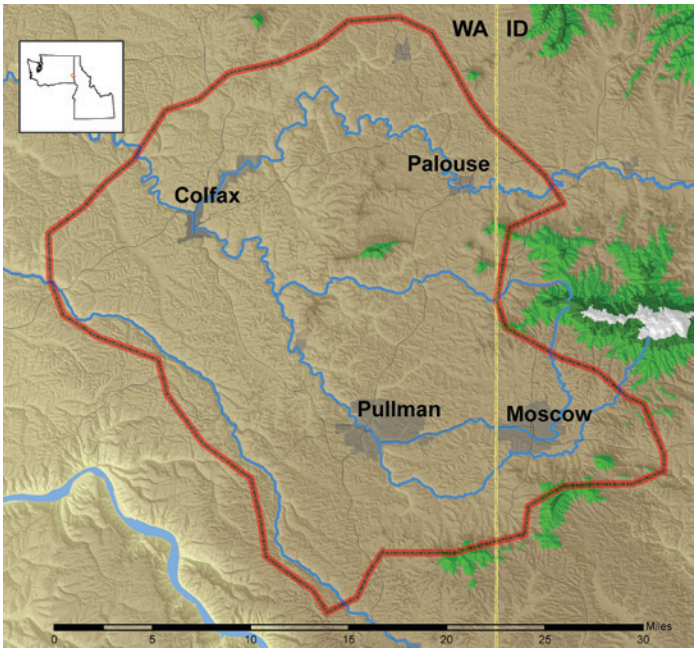

Figure 2: Working Boundary for the Palouse Ground Water Basin

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.

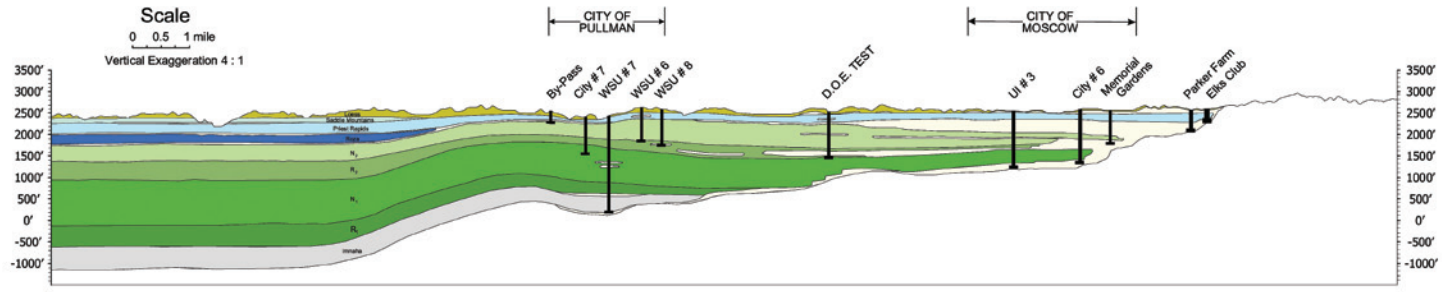

Figure 3: E-W Schematic Cross Section (Bush, Garwood, 2005)

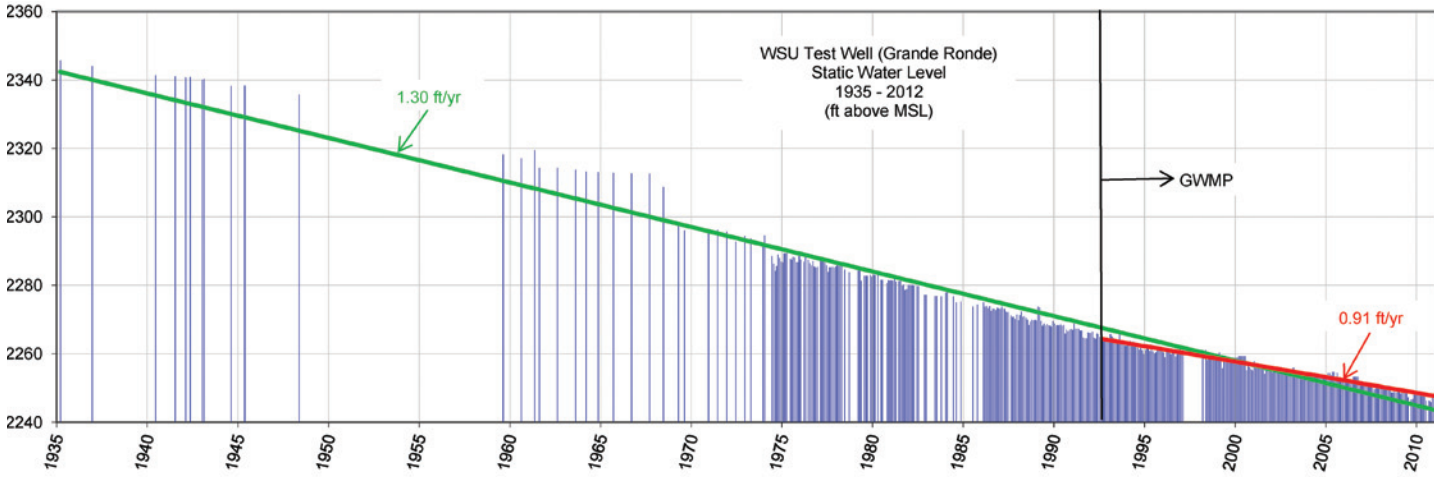

Figure 4: Static Water Level, WSU Test Well (Lower Aquifer), 1935 - 2012

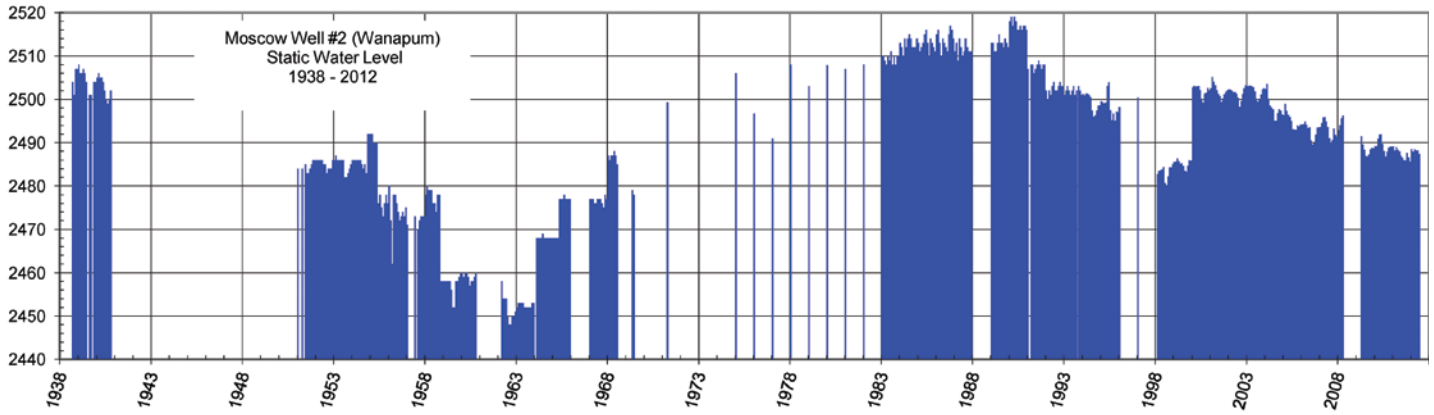

Figure 5: Static Water Level, Moscow Well #2 (Upper Aquifer), 1938 - 2012

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 and many of the rural residents obtain their drinking water from the Grande Ronde. In Moscow, in 2011 over 32% of the 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 0.9 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 the Wanapum and little recharge to the Grande Ronde.

Ground Water Pumpage and Water Levels

The total combined ground water pumpage by the four cities and two universities for the year 2011 was 2.6 billion gallons (7,976 acre-feet). In aggregate, this was 3.1% more than was pumped in 2010 (2.52 billion gallons), and 15.9% less than was pumped in 1992 (3.09 billion gallons), the first year the Ground Water Management Plan took effect.

In 2011, Pullman and Moscow each pumped approximately 1/3 of the total (34% and 31% respectively), followed by WSU at 18%. Colfax and UI pumped 8% and 7%, respectively, and Palouse pumping accounted for 2% of the combined total (Figure 6). By entity, comparisons to 2010 pumping are shown in Figure 7.

Moscow pumped 32.2% (261 million gallons) of its water from the upper Wanapum aquifer system in 2011; the other pumping entities all pump solely from the lower Grande Ronde. As a percentage of the combined pumping total, the 2011 Moscow Wanapum contribution amounted to 10%.

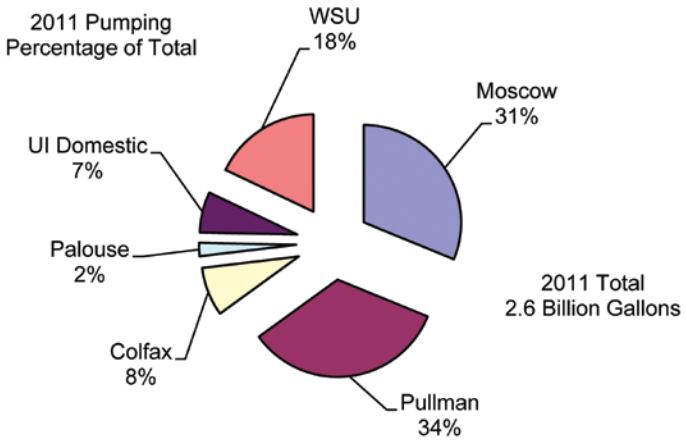

Figure 6: Ground Water Pumpage – Percentage of Total – 2011

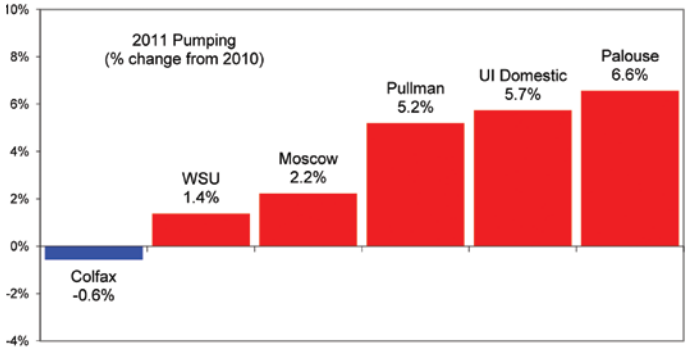

Figure 7: 2011 Pumping – Change from 2010

Pumping increases significantly in the summer months, primarily due to increased irrigation demand. For 2011, 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 ranged from 22.4% for UI to 34.8% for Colfax (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 2011)

Non-baseline usage varies with the weather conditions experienced during the year. In 2011, the early portion of the irrigation season was cooler and the late portion warmer and drier than the five year trailing average, as detailed in Figures 9-11. The late summer conditions likely contributed to the increase in total combined pumping detailed above. Charts of 2011 and first half 2012 monthly pumping compared to the 2006-2010 averages are shown in Figures 12-17. Figures 28-33 illustrate monthly pumping for the period between 2007 and mid 2012.

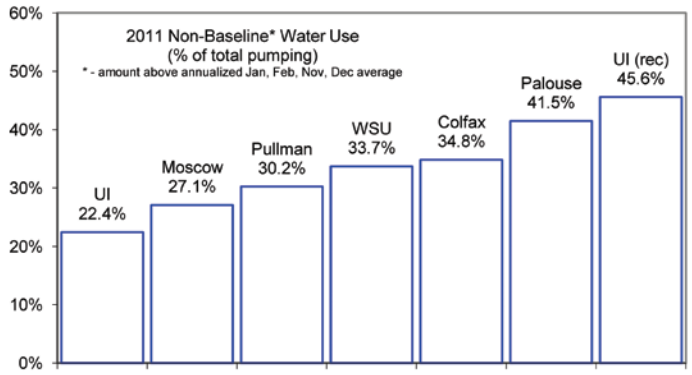

Figure 8: Non-Baseline Water Use – 2011

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 18 and 19. The 1% and 125% targets for individual GWMP pumping entities are illustrated in Figures 20-23 and Figures 24-27. 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.

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 reveals that the maximum water level in the DOE Pullman Test (lower aquifer) monitoring well in 2011 appears to have declined by approximately one half foot from the 2010 maximum. In the upper aquifer, the static level in the IDWR 3 monitoring well exhibits more interannual variation with a nearly 2 foot decline in maximum water level between 2010 and 2011. In the IDWR 1 monitoring well, which is completed above the Wanapum basalt in the Sediments of Bovill, water levels exhibit a marked difference during spring 2011 as compared to 2010. This behavior likely reflects the much wetter weather experienced during the first four months of 2011.

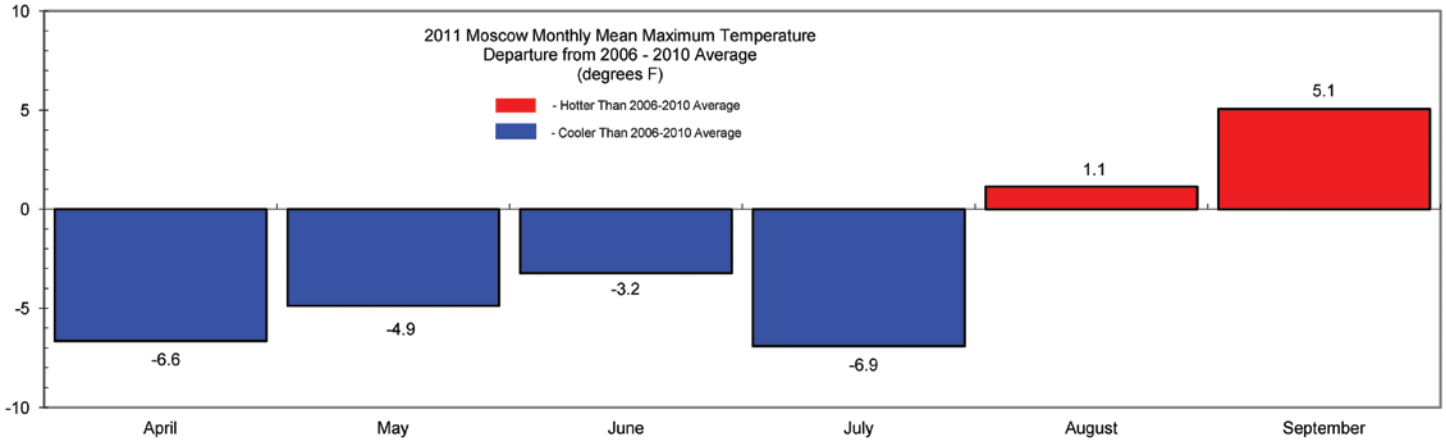

Figure 9: Moscow Mean Maximum Temperature – 2011

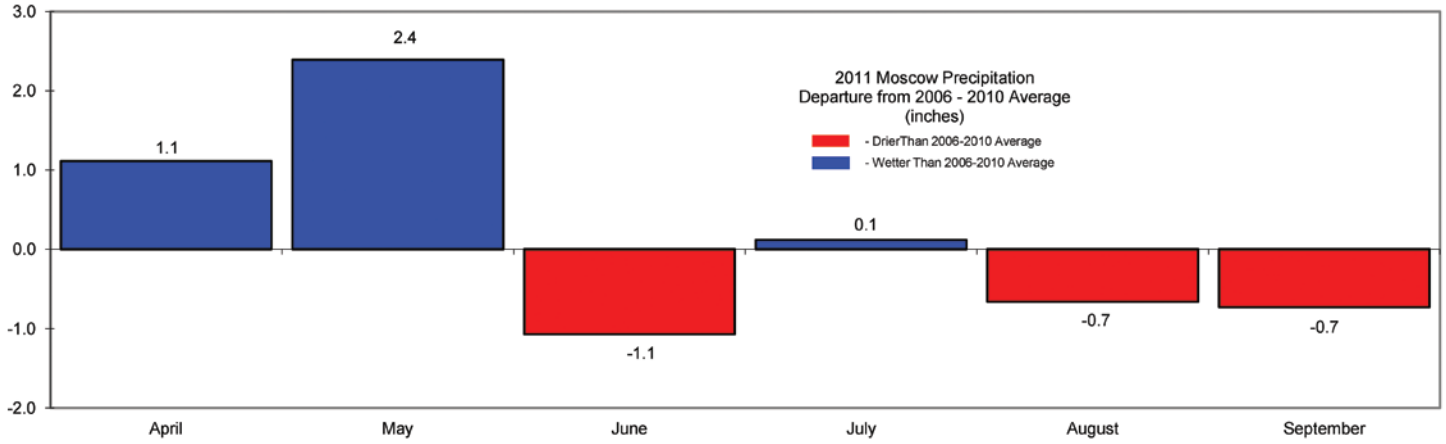

Figure 10: Moscow Precipitation – 2011

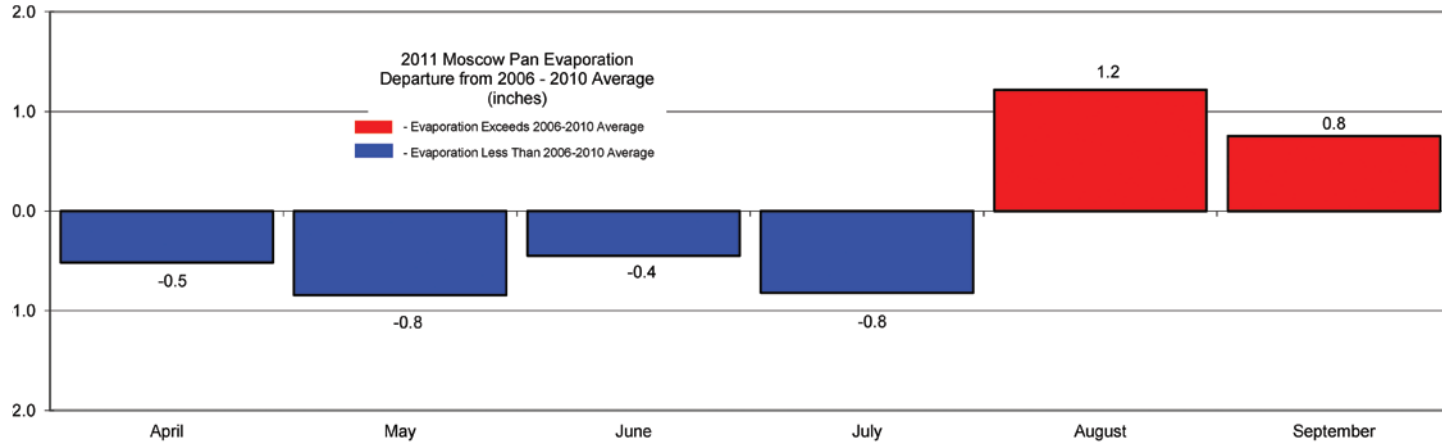

Figure 11: Moscow Pan Evaporation - 2011

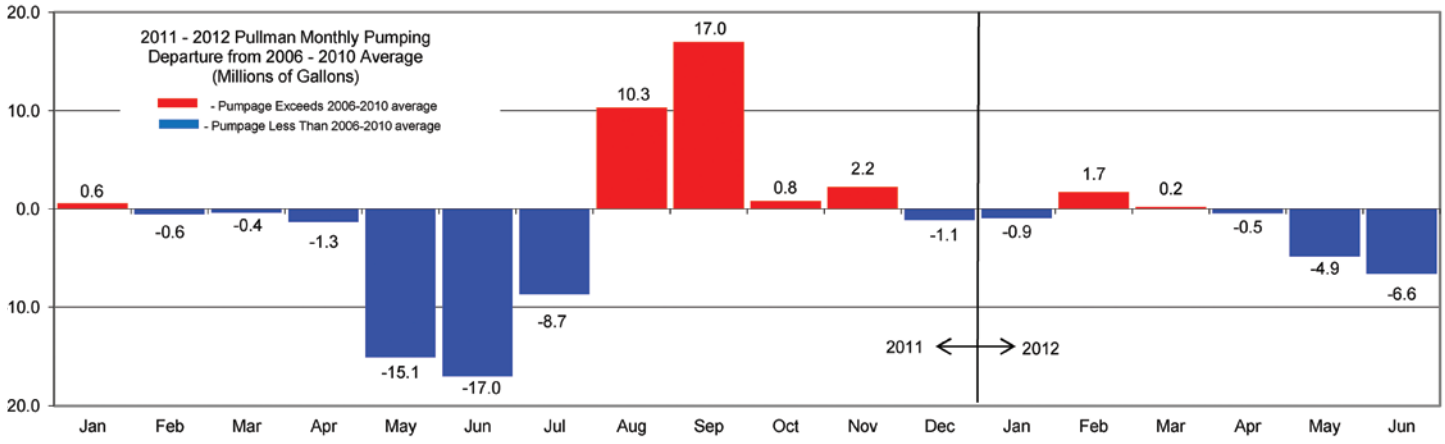

Figure 12: Pullman Monthly Pumping, Departure from 5-year Average, 2011-2012

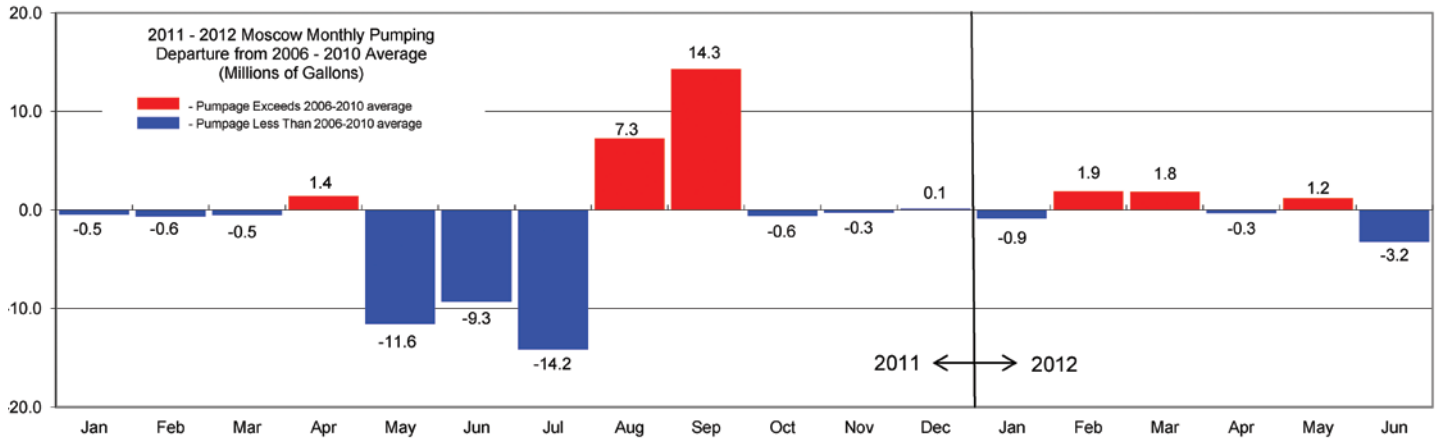

Figure 13: Moscow Monthly Pumping, Departure from 5-year Average, 2011-2012

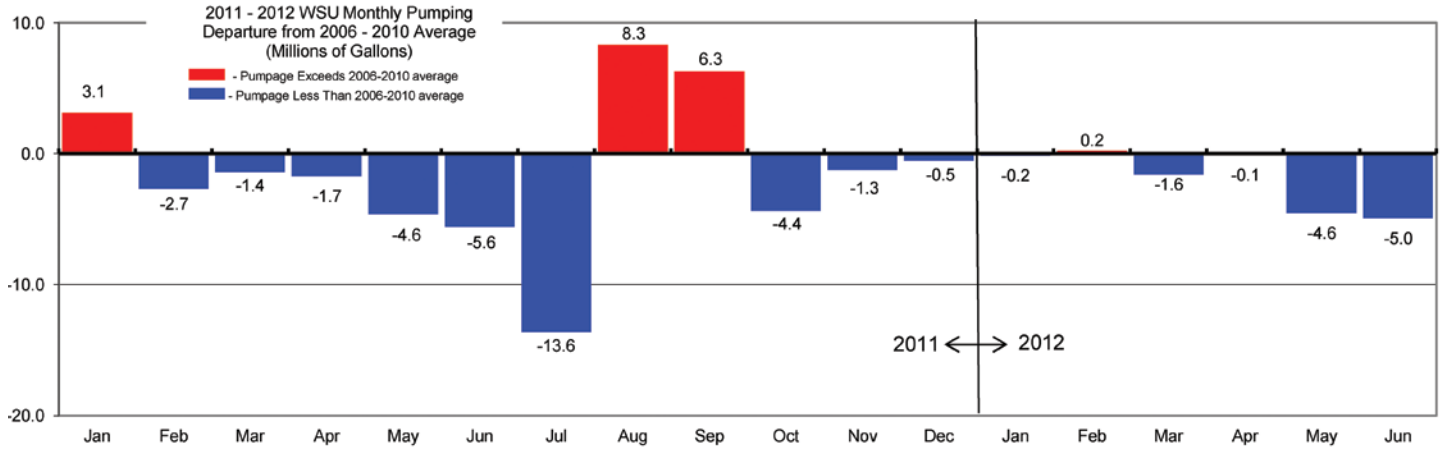

Figure 14: WSU Monthly Pumping, Departure from 5-year Average, 2011-2012

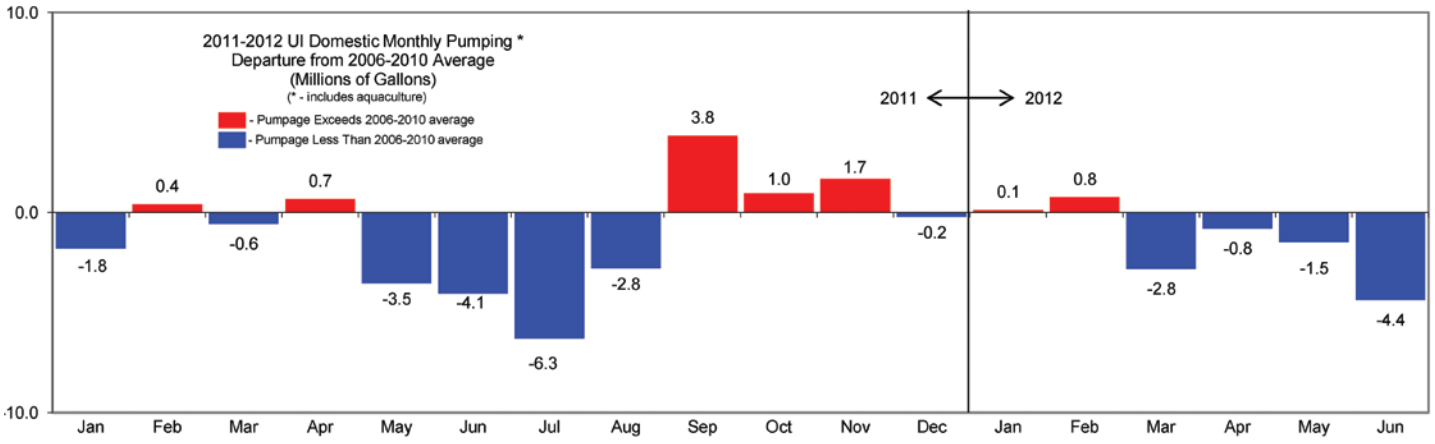

Figure 15: UI Monthly Pumping, Departure from 5-year Average, 2011-2012

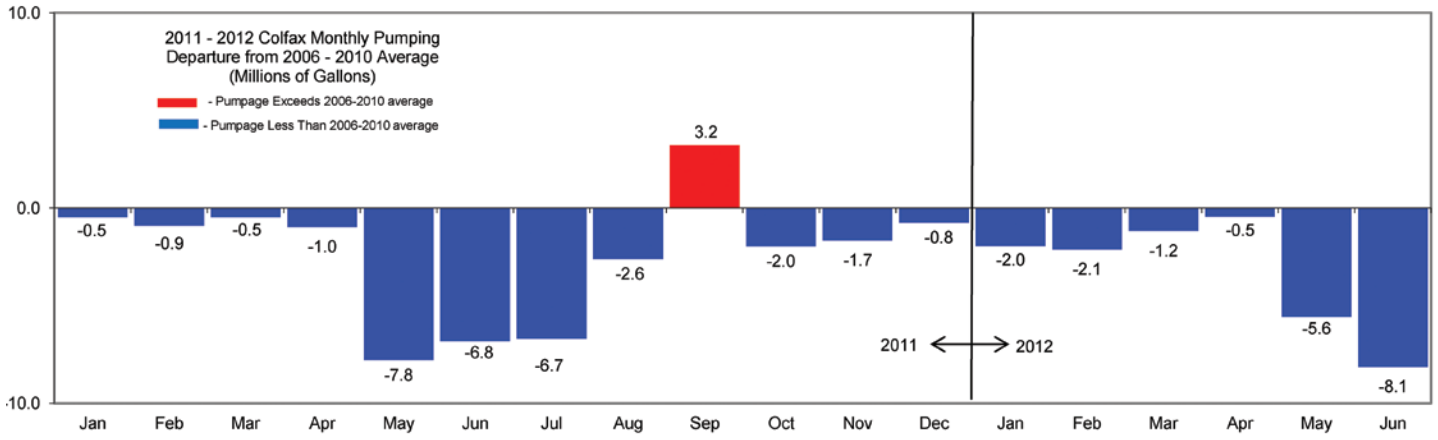

Figure 16: Colfax Monthly Pumping, Departure from 5-year Average, 2011-2012

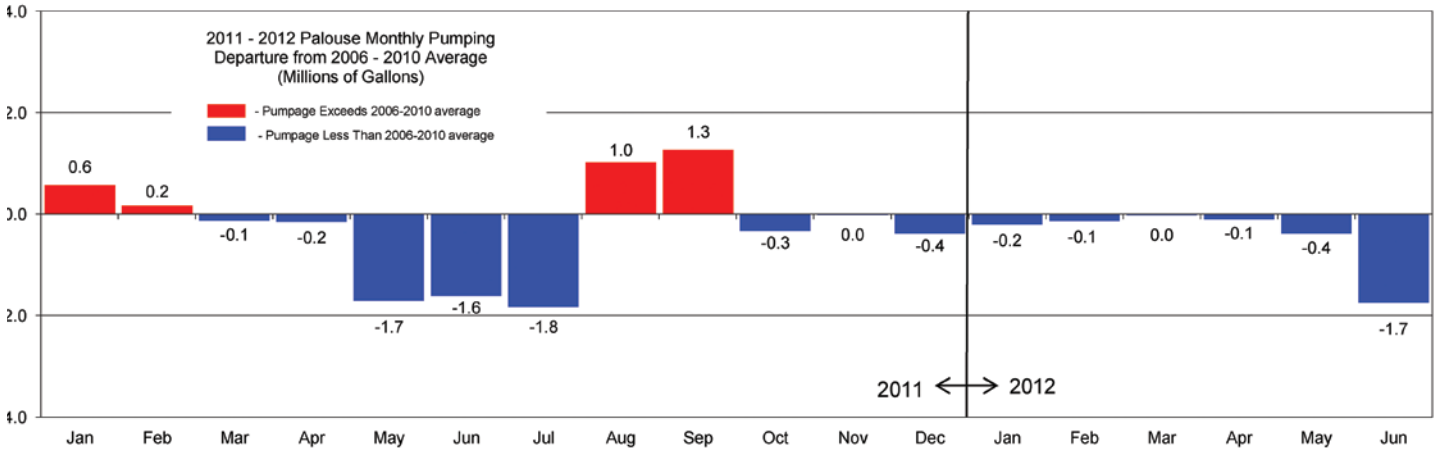

Figure 17: Palouse Monthly Pumping, Departure from 5-year Average, 2011-2012

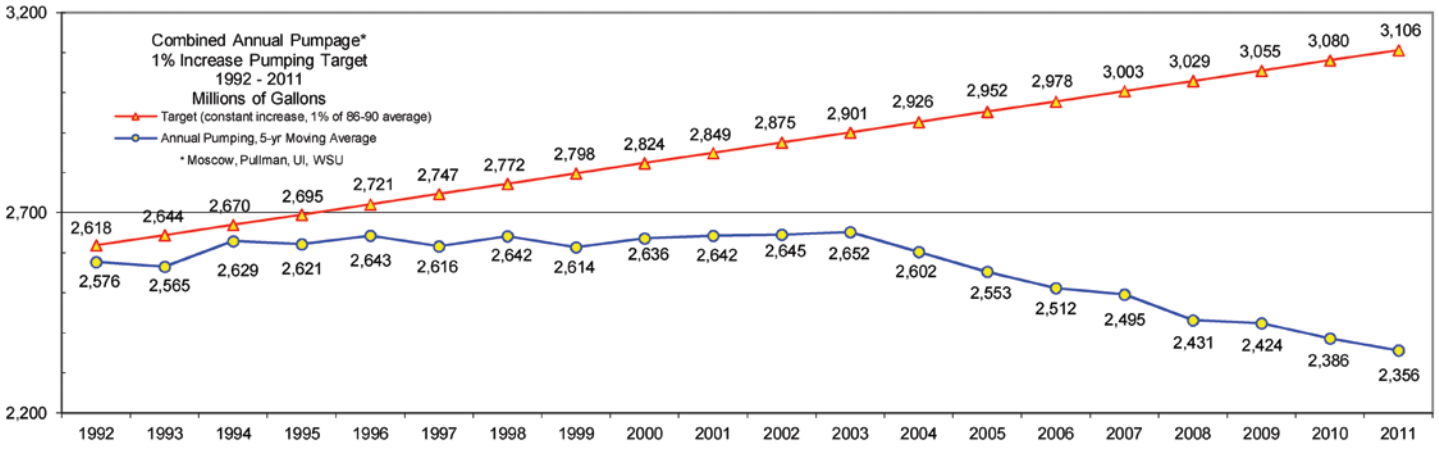

Figure 18: Voluntary 1% Annual Increase Target, 4 Major Entities Combined

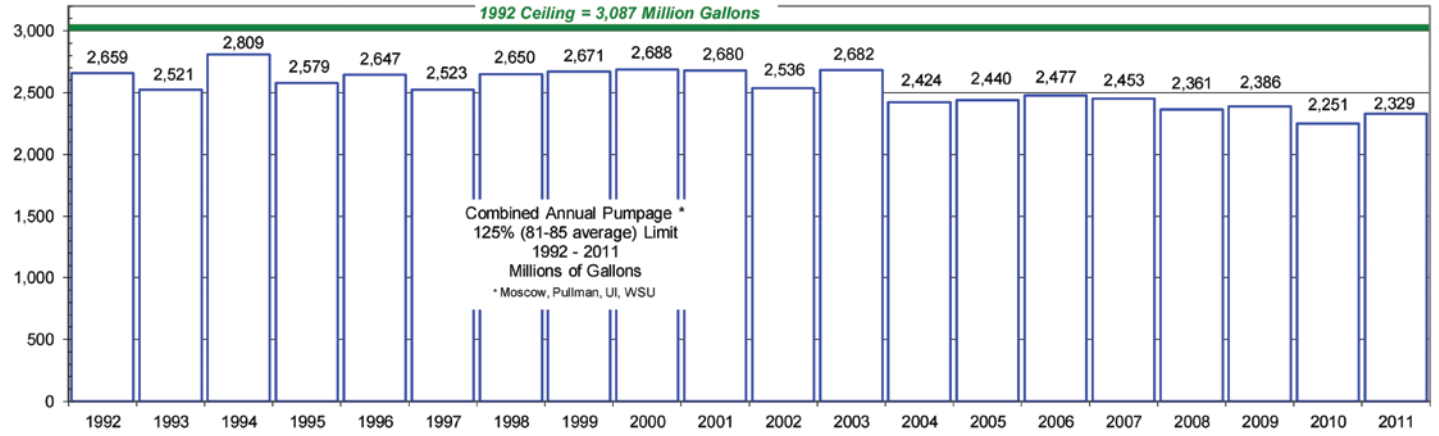

Figure 19: Voluntary 125% (of 1981 – 85 average) Pumping Ceiling, 4 Major Entities Combined

Research Accomplishments 2011

Two PBAC funded research projects were active during 2011. Both projects were conducted by graduate students at the University of Idaho under the guidance of Professor James Osiensky.

Attila Folnagy completed the second year of an ongoing basinwide aquifer testing project that involved the installation of instrumentation and monitoring of pumping quantities for the large municipal providers within the basin. By combining pumping information with data from water level transducers located in monitoring wells throughout the area, Folnagy's analyses were able to better quantify aquifer system properties and delineate aquifer compartmentalization in the lower aquifer.

Lauren Carey conducted a study to identify areas within the basin where recharge may be occurring. Carey collected ground water samples that were analyzed for tritium, oxygen and carbon isotopes to help determine to what extent "young" water is present in the deep and shallow aquifers.

In 2011 the committee also partnered in a project funded primarily by a grant from the Washington Department of Ecology. The Palouse Monitoring Wells project is drilling a number of lower aquifer monitoring wells in locations removed from the major pumping centers that will provide long-term water level data and help researchers understand aquifer behavior over a wider geographic extent.

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.

In October 2011, PBAC reviewed the 2006 goals with the intent of incorporating information gathered in the past 5 years and aligning the focus toward next steps required to help bring about the mission of providing a long-term, quality water supply for the Palouse Basin region.

The Citizens Advisory Group (CAG), aimed at ensuring dialogue among a broad range of interested parties, completed its work on recommendations for consideration by PBAC involving management, research, conservation and public participation. In 2012, PBAC is working to develop a new public engagement and communication outreach process

In 2011, PBAC participated in the sixth (modern) Palouse Water Summit. The 2011 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 seventh Summit, scheduled for September 2012.

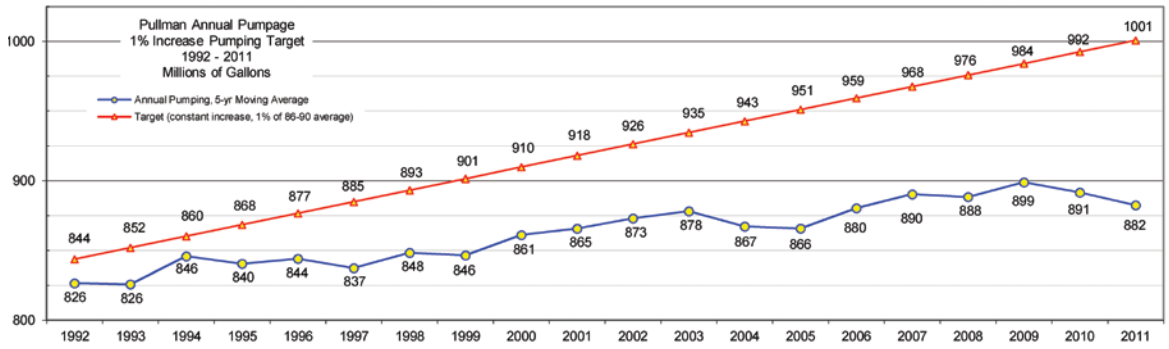

Figure 20: 1% Annual Increase Target, Pullman, 1992 - 2011

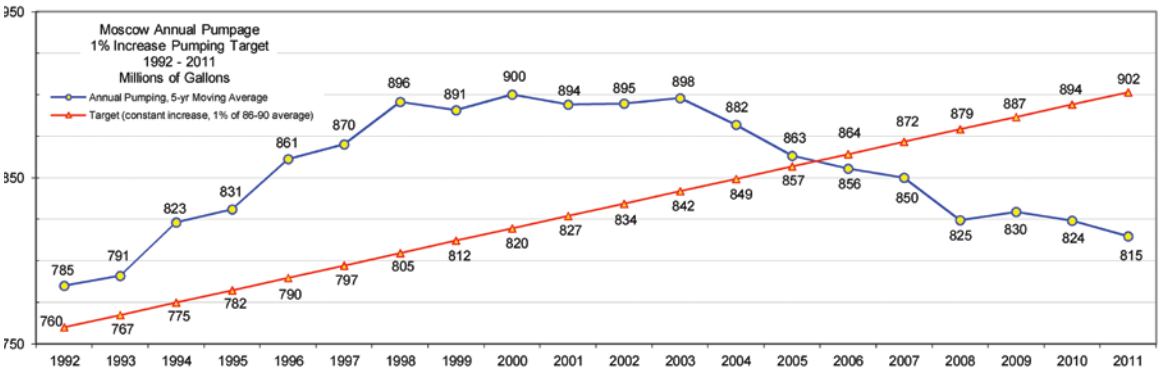

Figure 21: 1% Annual Increase Target, Moscow, 1992 - 2011

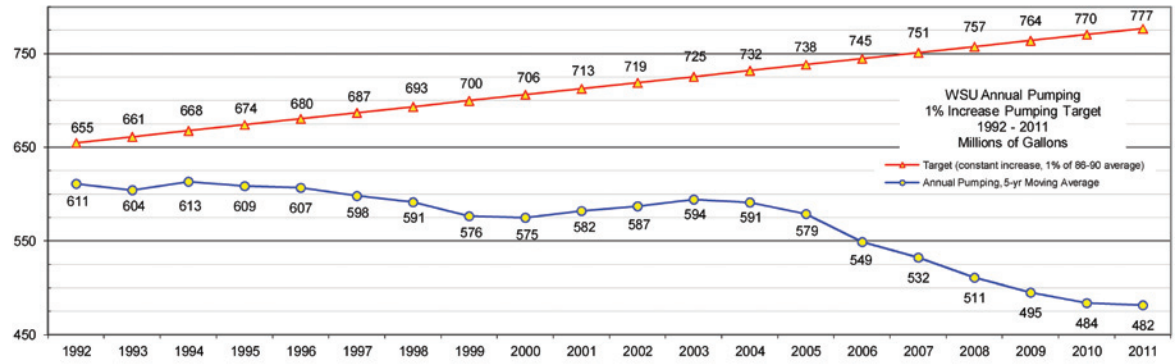

Figure 22: 1% Annual Increase Target, WSU, 1992 - 2011

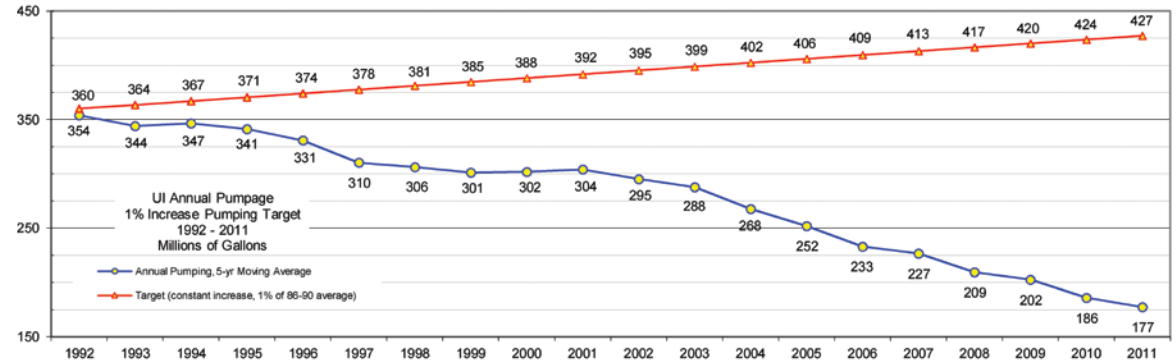

Figure 23: 1% Annual Increase Target, UI, 1992 - 2011

Voluntary 125% (of 1981-85 Average) Annual Pumping Ceiling 1992-2011

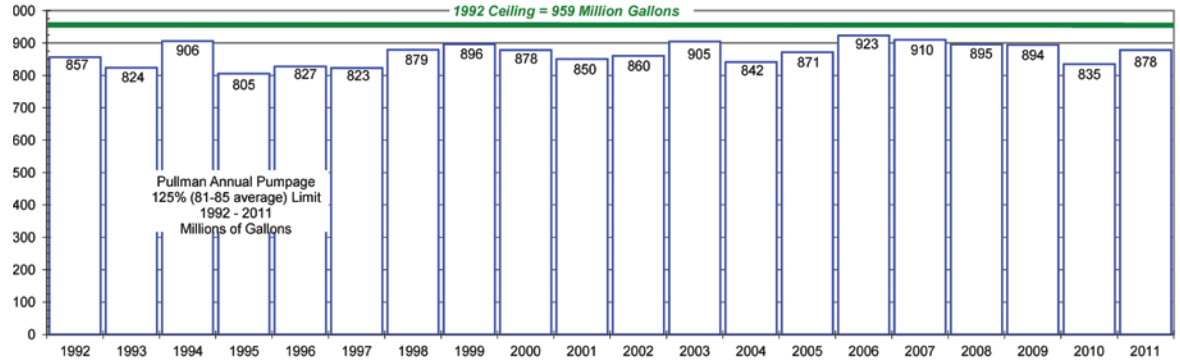

Figure 24: 125% (of 1981 – 85 average) Annual Ceiling Target, Pullman, 1992 - 2011

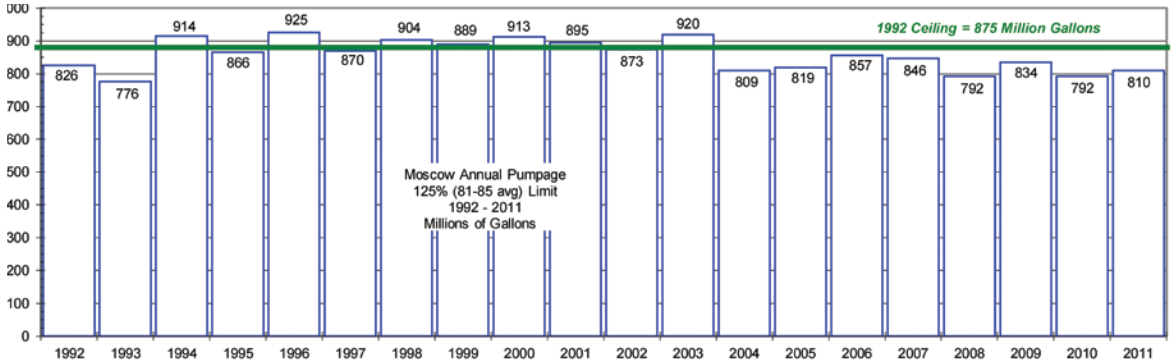

Figure 25: 125% (of 1981 – 85 average) Annual Ceiling Target, Moscow, 1992 - 2011

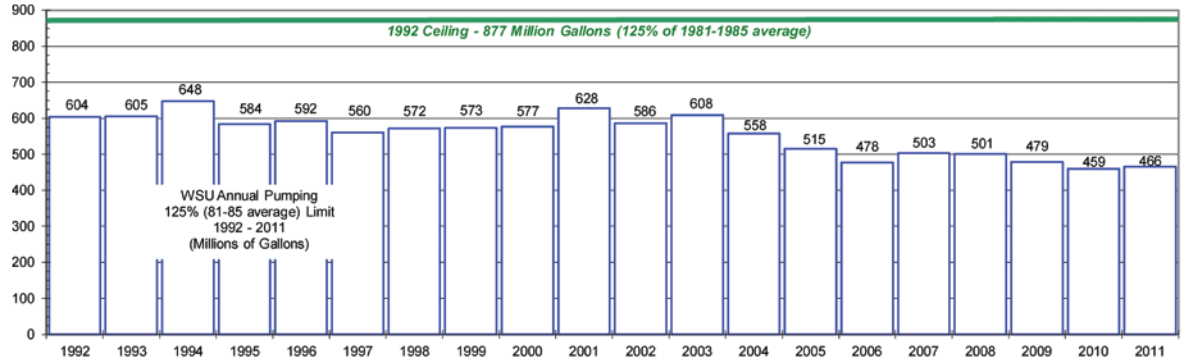

Figure 26: 125% (of 1981 – 85 average) Annual Ceiling Target, WSU, 1992 - 2011

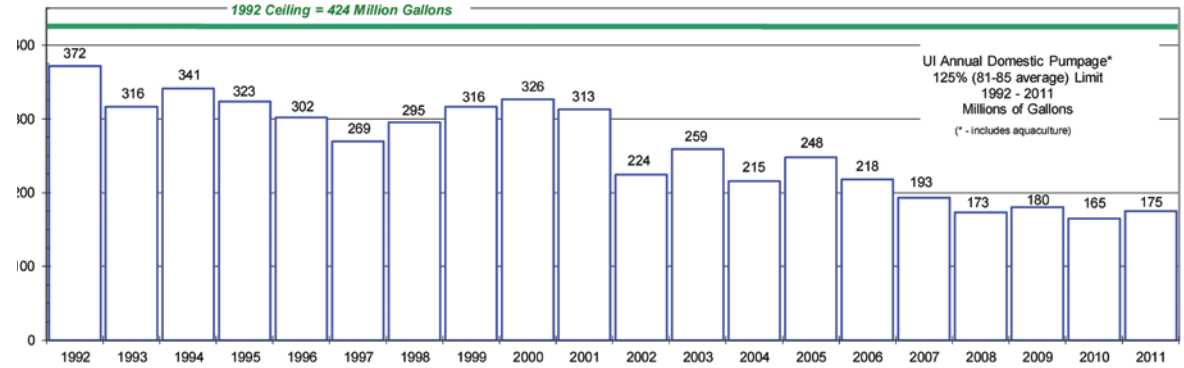

Figure 27: 125% (of 1981 – 85 average) Annual Ceiling Target, UI, 1992 - 2011

Monthly Pumping Totals 2007-2012

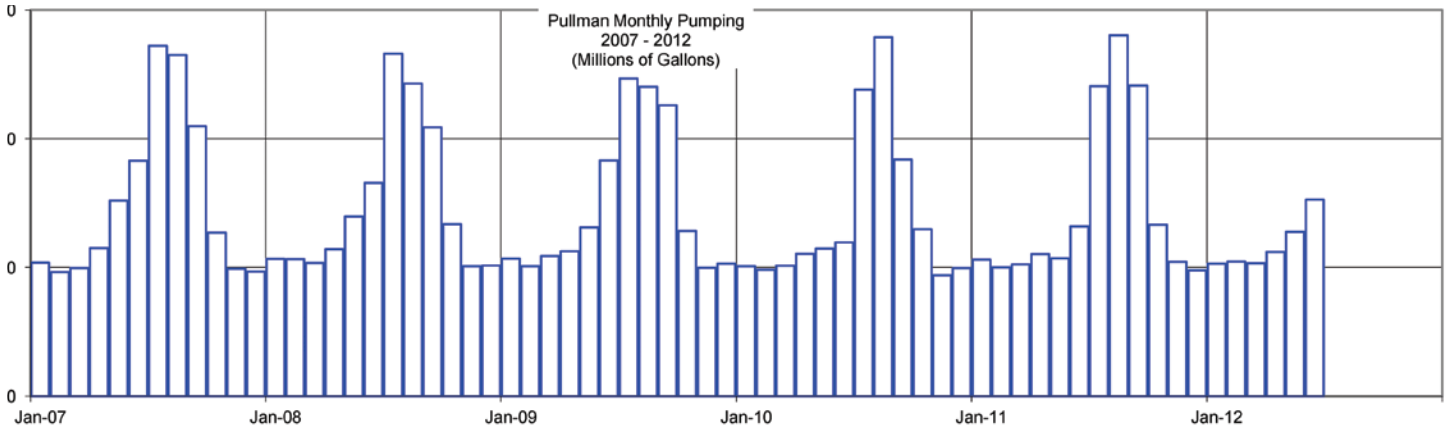

Figure 28: Monthly Pumping, Pullman, 2007 - 2012

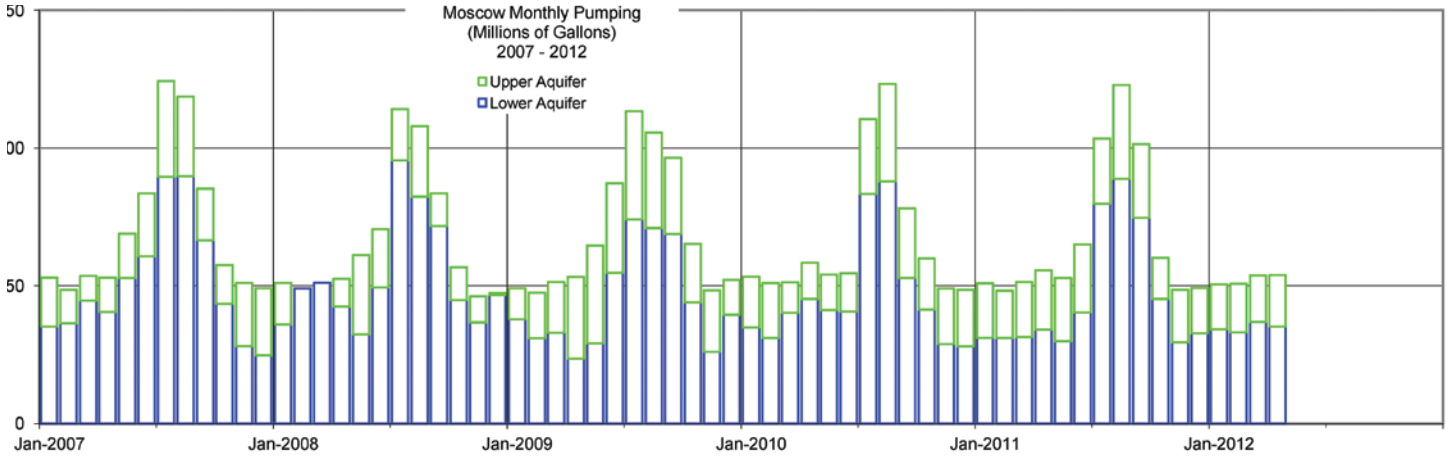

Figure 29: Monthly Pumping, Moscow, 2007 - 2012

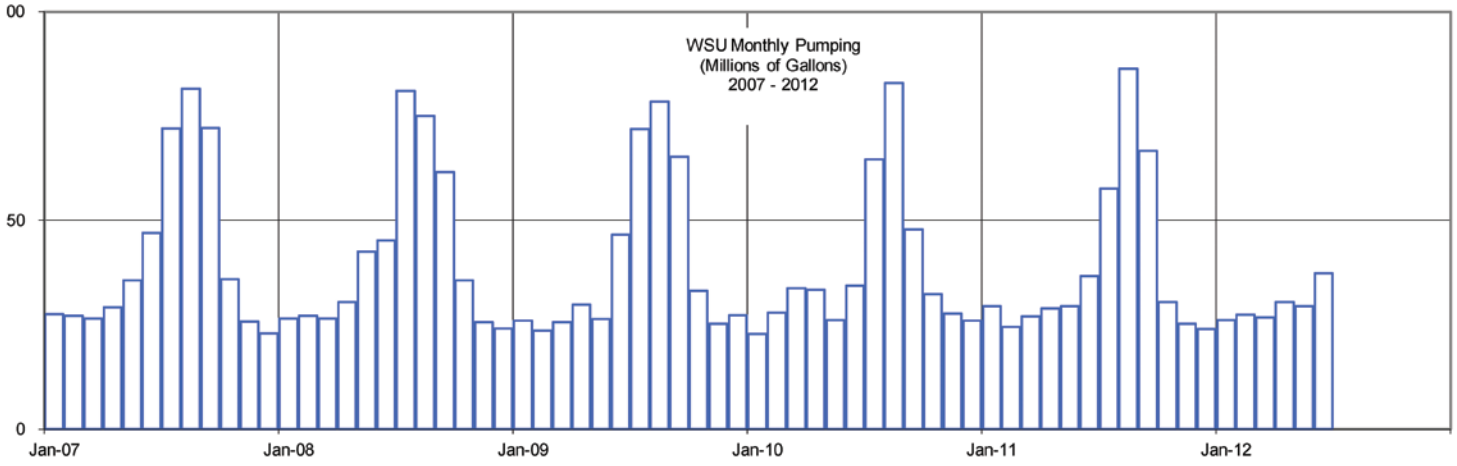

Figure 30: Monthly Pumping, WSU, 2007 - 2012

Monthly Pumping Totals 2007-2012

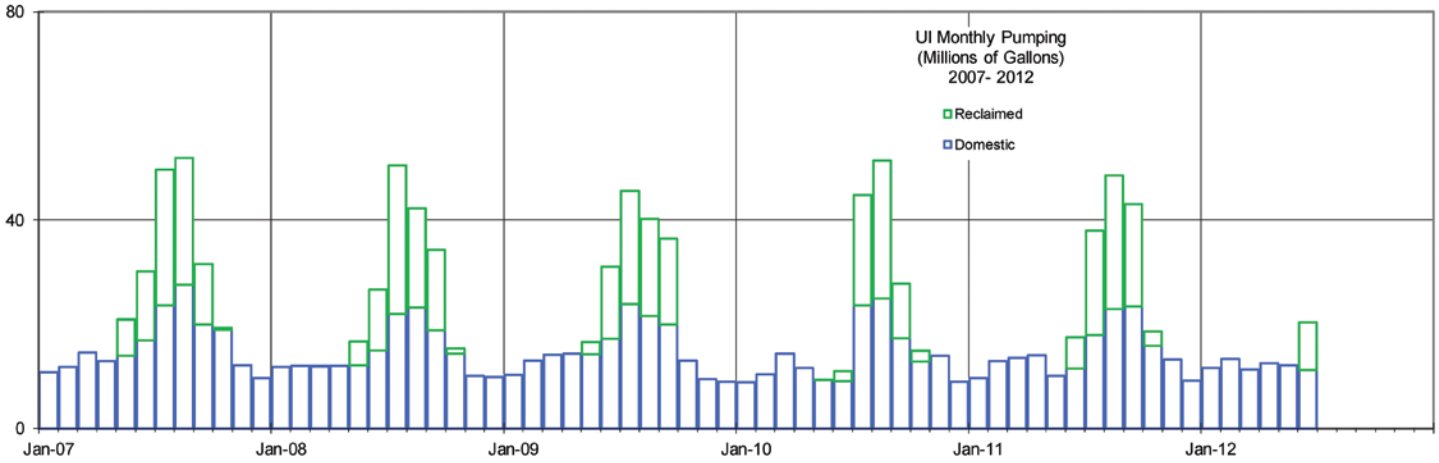

Figure 31: Monthly Pumping, UI, 2007 - 2012

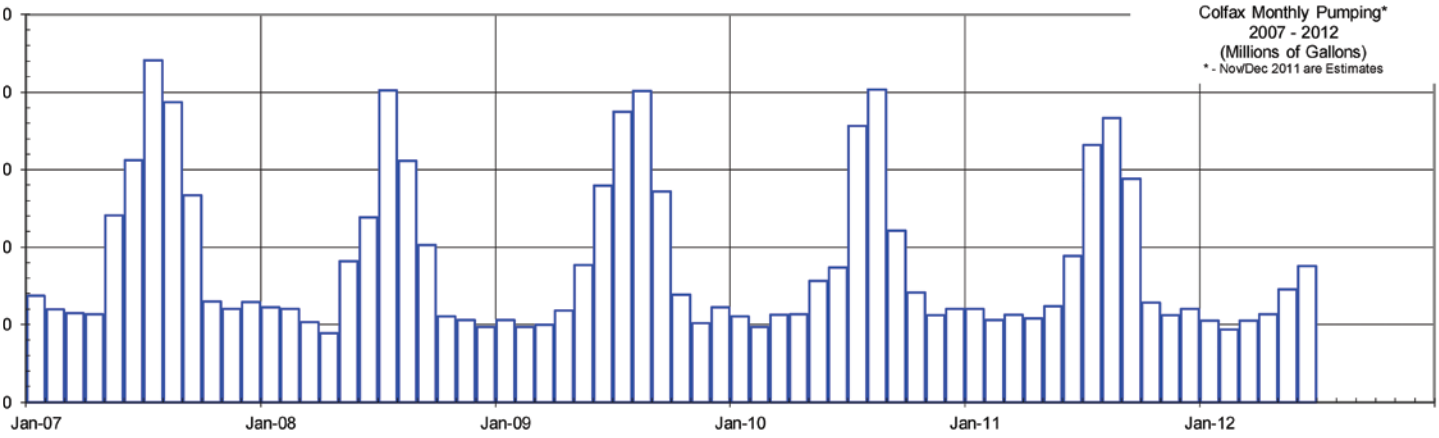

Figure 32: Monthly Pumping, Colfax, 2007 - 2012

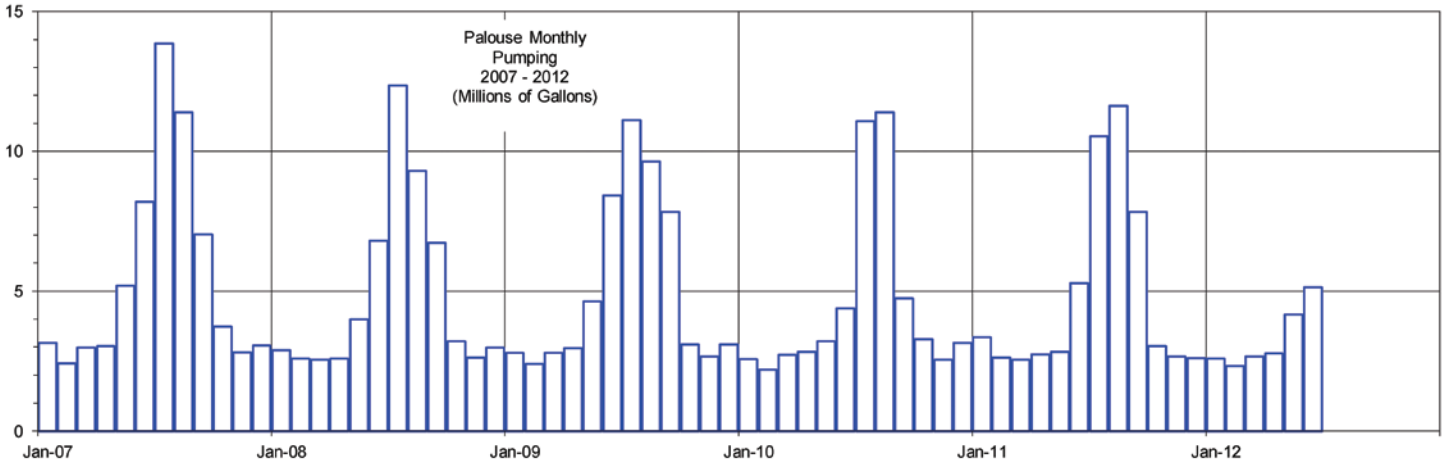

Figure 33: Monthly Pumping, Palouse, 2007 – 2012

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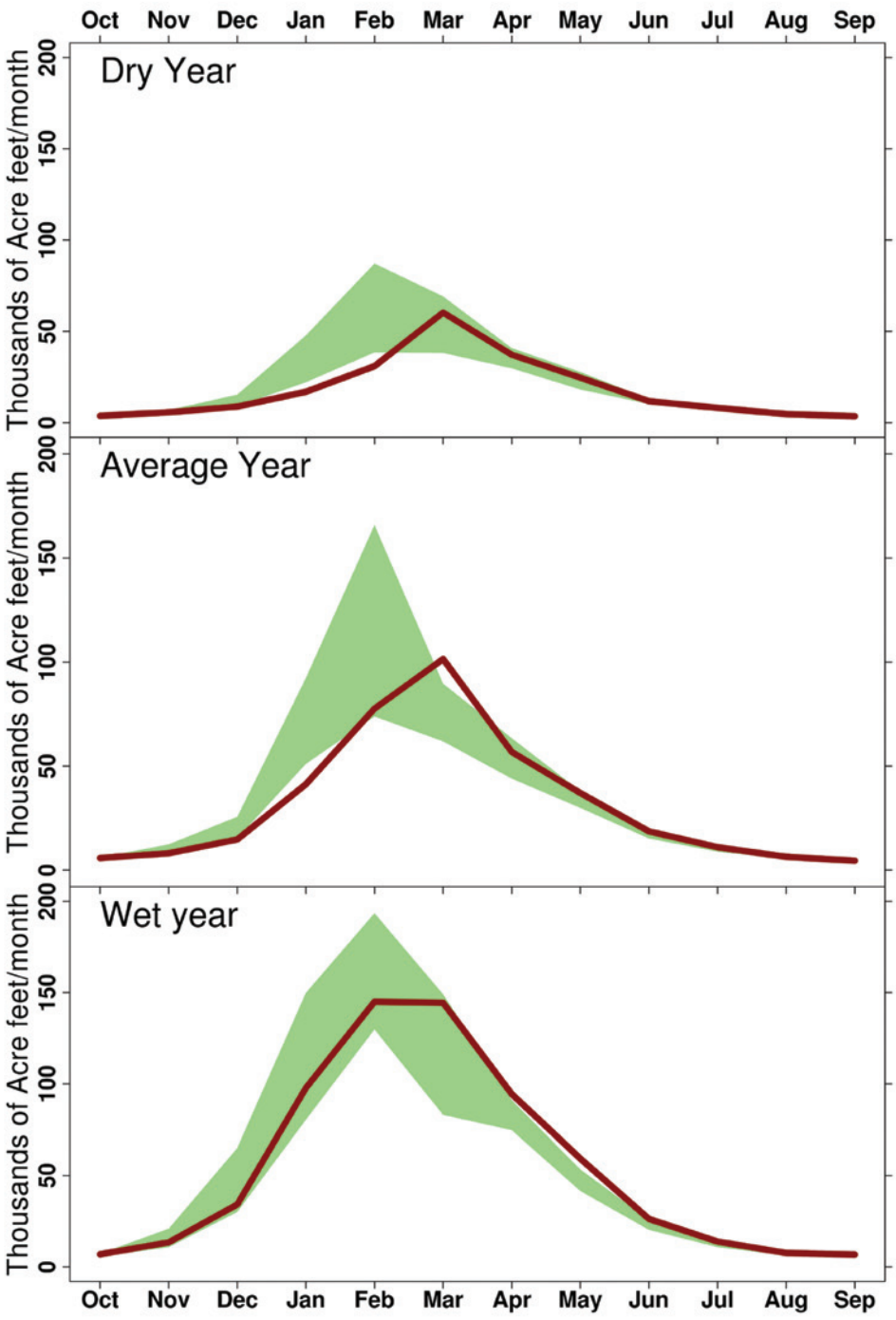

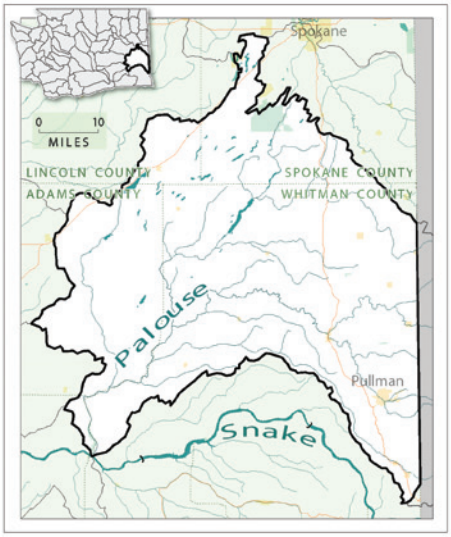

Historical
2030 Range

WRIA 34 – Palouse - Modeled historical (1977-2006) and 2030 surface water supply generated within the WRIA for dry (20th percentile, top), average (middle), and wet (80th percentile, bottom) flow conditions. The spread of 2030 flow conditions is due to the range of climate change scenarios considered. Supplies are reported prior to accounting for demands, and thus should not be compared to observed flows. Surface water supplies include only supplies generated on tributaries within the Washington portion of the watershed (from Columbia River Basin Long-Term Water Supply and Demand Forecast, Legislative Report, Washington Department of Ecology, Publication 11-12-011).

Palouse Basin Aquifer Committee
September 2012