2010 Palouse Ground Water Basin Water Use Report







Water level hydrographs for 3 Palouse Basin monitoring wells

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Plot of relative water levels for selected Palouse Basin wells. Vertical axis is for scale only and does not indicate relative elevation. Individual hydrographs have been offset vertically in order to compare magnitudes of water level change. Elapsed time refers to the number of days past 11/24/2009 (Moran, 2011)

EXECUTIVE SUMMARY

Ground water is the drinking water supply for the nearly 64,000 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 2010.

The 2010 total combined ground water pumpage by the primary pumping entities within the Basin was 2.52 billion gallons (Figure 1). In aggregate (Pullman, Moscow, WSU, UI, Colfax, Palouse), pumping for 2010 was approximately 6% less than in 2009 and over 18% less than in 1992, the first year the Ground Water Management Plan took effect.

Water level data from deep production wells for 2010 reveals 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. Hydrograph records for wells in both the shallow and deep aquifers are illustrated on the inside front cover of this report.

In 2010, 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 2010, PBAC's primary goal is to develop and implement a balanced, basin-wide, water supply and use program by the year 2020.



Figure 1: 2010 Ground Water Pumpage

Annual Water Use Report

The report that follows includes water use and water level information for the period from 1992 through 2010. To provide up to date information where possible, in some instances data are included for portions of 2011. Water use reports for earlier years can be viewed at the PBAC web site (*http://www.uidaho.edu/PBAC*).



January

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 aguifer 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. 2010 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



Figure 2: Working Boundary for the Palouse Ground Water Basin

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



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



Figure 4: Static Water Level, WSU Test Well (Grande Ronde), 1935-2011



Figure 5: Static Water Level, Moscow Well #2 (Wanapum), 1938-2011

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 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 2010 nearly 30% 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.

GROUND WATER PUMPAGE AND WATER LEVELS

The total combined ground water pumpage by the four cities and two universities for the year 2010 was 2.52 billion gallons (7,725 acre-feet). In aggregate, this was 6% less than was pumped in 2009 (2.68 billion gallons), and 18.5% less than was pumped in 1992 (3.09 billion gallons), the first year the Ground Water Management Plan took effect.

In 2010, Pullman and Moscow each pumped approximately 1/3 of the total, followed by WSU at 18%. Colfax and UI pumped 8% and 7%, respectively, and Palouse pumping accounted for 2% of the combined pumping total (Figure 6). By entity, comparisons to 2009 pumping are shown in Figure 7.

Moscow pumped nearly 30% (237 million gallons) of its water from the Wanapum aquifer system in 2010; the other pumping entities all pump solely from the Grande Ronde. Of the combined entity pumping total, in 2010 the Moscow Wanapum contribution amounted to approximately 9.4%.



Figure 6: Ground Water Pumpage – Percentage of Total – 2010



Figure 7: 2010 Pumping – Change from 2009



Palouse Falls

Pumping increases significantly in the summer months, primarily due to increased irrigation demand. For 2010, 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 24% for Moscow to 38% for Colfax (Figure 8). (Note: The UI nonbaseline use is presented both with and without inclusion of the 62 million gallons of reclaimed water utilized in 2010)

Non-baseline usage varies with the weather conditions experienced during the year. In aggregate, the 2010 irrigation season was cooler and wetter than the five year trailing average, as shown in Figures 9-11. These conditions undoubtedly contributed to the reduction in total combined pumping detailed above. Charts of 2010 and first half 2011 monthly pumping compared to the 2005-2009 averages are shown in Figures 12-16. Figures 27-32 illustrate monthly pumping for the period between 2006 and mid 2011.



Figure 8: Non-Baseline Water Use - 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 Colfax and Palouse as they were not original signatories to the Ground Water Management Plan, and are not subject to the pumping targets.



Snow angel



Snow trees

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 monitoring well in 2010 appears to have declined by approximately one foot from the 2009 maximum. In the Wanapum aguifer, the static level in the IDWR 3 monitoring well exhibits a more seasonal variation as well as a pronounced nearly 4 foot decline in maximum water level between 2009 and 2010. The IDWR 1 monitoring well, which is completed above the Wanapum basalt in the Sediments of Bovill, exhibits a "flat" period that appears to suggest that the relatively large decline in upper aguifer water levels in 2010 may be at least partially tied to relatively low amounts of precipitation (and upper aguifer recharge) during the 2009-2010 fall/winter/spring.



Figure 9: Moscow Mean Maximum Temperature – 2010



Figure 10: Moscow Precipitation – 2010



Figure 11: Moscow Pan Evaporation – 2010



Figure 12: Pullman Monthly Pumping, Departure from 5-year Average, 2010-2011



Figure 13: Moscow Monthly Pumping, Departure from 5-year Average, 2010-2011



Figure 14: WSU Monthly Pumping, Departure from 5-year Average, 2010-2011



Figure 15: UI Monthly Pumping, Departure from 5-year Average, 2010-2011



Figure 16: Palouse Monthly Pumping, Departure from 5-year Average, 2010-2011



Storm clearing



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



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

RESEARCH ACCOMPLISHMENTS **2010**

Two PBAC funded research projects were active during 2010 and early 2011. Both projects are being conducted by graduate students at the University of Idaho under the guidance of Professor James Osiensky.

Katie Moran initiated (and Attila Folnagy is continuing) 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 and Folnagy's work is aimed toward better quantifying aquifer system properties and delineating aquifer compartmentalization in the lower Grande Ronde aquifer. Lauren Carey conducted a study to identify areas within the basin where recharge may be occurring. Carey collected ground water samples at multiple locations that were analyzed for tritium, oxygen and carbon isotopes to determine to what extent "young" water is present in the deep and shallow aquifers.

In 2010 the committee also continued its participation in a project funded through a watershed planning grant from the Washington Department of Ecology. The Framework project compiled and reviewed past studies in the basin, identified gap areas where knowledge of the ground water resource is incomplete, and outlined follow-on studies that could be conducted to fill the gaps.

GOALS, PLANS AND ONGOING EFFORTS OF THE COMMITTEE



August

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 the fall of 2011, PBAC plans to review 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.

In order to meet the goals, research will likely be required to better characterize those components of the Basin water balance that currently lack high levels of certainty. As a first step in that effort, PBAC is continuing funding of the basinwide aquifer testing project and taking preliminary steps in defining and conducting projects recommended by the Framework project. 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 2010 the CAG continued its work in the areas of conservation and public outreach. In 2011, the CAG plans to continue its work with a focus upon areas identified in the PBAC goal review as those requiring the CAG's expertise.

In 2010, PBAC participated in the sixth (modern) Palouse Water Summit. The 2010 Summit continued to provide information and avenues for dialogue through 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 2011.



March



Figure 19: 1% Annual Target, Pullman, 1992 – 2010



Figure 20: 1% Annual Target, Moscow, 1992 – 2010















Figure 24: 125% (of 1981-85 Average) Ceiling Annual Target, Moscow, 1992 – 2010



Figure 25: 125% (of 1981-85 Average) Ceiling Annual Target, WSU, 1992 – 2010

Figure 26: 125% (of 1981-85 Average) Ceiling Annual Target, UI, 1992 – 2010

MONTHLY PUMPING TOTALS 2006-2011



Figure 27: Monthly Pumping, Pullman, 2006 – 2011



Figure 28: Monthly Pumping, Moscow, 2006 – 2011



Figure 29: Monthly Pumping, Palouse, 2006 – 2011

MONTHLY PUMPING TOTALS 2006-2011



Figure 30: Monthly Pumping, Colfax, 2006 - 2011



Figure 31: Monthly Pumping, WSU, 2006 – 2011



Figure 32: Monthly Pumping, UI, 2006 – 2011

2010 PBAC Representatives

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April



Preliminary geologic map of the Moscow subbasin showing additional mapped Sediments of Bovill, and recently identified springs (Brooks et al., 2010; Brooks and Grader, 2011; Grader 2011, in review.)

Palouse Basin Aquifer Committee September 2011