

**STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION**

STAFF REPORT FOR REGULAR MEETING OF FEBRUARY 1-2, 2012

Prepared on January 3, 2012

ITEM NUMBER: 19

SUBJECT: Status Report on Efforts to Counter Seawater Intrusion in the Pajaro Valley Groundwater Basin

SUMMARY

Numerous studies conducted over the past 50 years have documented that the Pajaro Valley groundwater basin is in an overdraft condition, which is resulting in continuing seawater intrusion. This staff report provides some background information, a discussion of current actions, and an attached description of activities being taken by the Pajaro Valley Water Management Agency. Information for this staff report came primarily from the Agency's website at <http://www.pvwma.dst.ca.us/>. More information with greater detail is available there.

DISCUSSION

Extent of Seawater Intrusion

The Pajaro Valley encompasses approximately 79,600 acres of irrigated agricultural lands, nonirrigated lands in the hillside areas, the City of Watsonville, and the unincorporated communities of Pajaro, Freedom, Corralitos, and Aromas. The Pajaro Valley is home to over 80,000 residents, all of whom, to a great degree, rely on the existing groundwater supply. Agriculture is the most significant economic industry in the valley. High-value crops include strawberries, bush berries, apples, flowers, lettuce, artichokes, and a variety of other vegetables. In 1984, the Pajaro Valley Water Management Agency (PVWMA) was formed and given the responsibility of managing groundwater resources within the Pajaro Valley. The geographic boundaries of the agency approximately correspond to the topographic and hydrologic boundaries of the valley.

The State Water Resources Control Board Bulletin 5 first documented the need to augment Pajaro Valley water supplies in 1953. A 1964 Reclamation San Felipe Division feasibility study confirmed water supply concerns, primarily overdraft and seawater intrusion problems in the PVWMA service area along Monterey Bay. Overdraft occurs when the amount of groundwater withdrawn from a basin exceeds the amount of fresh water replenishing the basin. When the basin draft, or withdrawal, equals safe yield of the basin, the piezometric surface (the hydrostatic pressure level of the groundwater) slopes downward toward the ocean and a relatively small amount of water is wasted to the ocean in order stabilize the position of the wedge of sea water that intrudes inland under the fresh water (seawater is more dense than fresh water). Consequently, to prevent seawater intrusion, water withdrawals from pumping must be less than the amount of water recharging the basin to account for wastage to the ocean. In the Pajaro Valley Basin, groundwater levels have declined as the groundwater pumping rate

has exceeded the rate of natural replenishment. These overdraft conditions result in increased pumping costs and land subsidence, which in turn can cause building settlement and increased flooding. In the coastal areas and throughout much of the basin, overdraft conditions have caused groundwater levels to drop below sea level, creating a landward pressure gradient that causes seawater to move inland, mixing with fresh groundwater. The density difference between seawater and fresh water causes the fresh water to stratify above the seawater. As seawater encroaches into the fresh groundwater basin, water quality degrades, limiting the usability of groundwater for irrigation and domestic purposes, and the wells have to be abandoned. Seawater intrusion creates a progressive increase in the concentrations of chloride, sodium, magnesium, and other constituents in groundwater. Chloride is used as an indicative constituent for seawater intrusion; increasing chloride concentrations in well water samples are an indication of seawater intrusion. The average concentration of chloride in seawater is 19,000 milligrams per liter (mg/L). Water is likely to result in increasing problems for agricultural irrigation when chloride levels exceed 142 mg/L. The actual process of seawater intrusion is irregular, with seawater moving into different freshwater aquifers at different times. These conditions are not expected to improve without either a decrease of coastal groundwater pumping or development and delivery of additional water supplies.

Overdraft of the groundwater basin and seawater intrusion are problematic at the current level of water demand. Projected increases in urban and agricultural water use will cause further problems if this situation is not rectified. Urban water use has increased by 86% in since 1964, and the current urban water use of 12,200 AFY is projected to increase an additional 32% (3,900 AFY) to approximately 16,100 AFY by the year 2040. If the current trend in cropping patterns continues towards more water-intensive crops such as strawberries and raspberries, agricultural water use could increase from 59,300 AFY to 64,400 AFY by the year 2040. These projections combine for a possible 80,500 AFY in 28 years, vs. a safe yield of 48,000 AFY (it's only 24,000 AFY without the Coastal Distribution System pipeline, which distributes recycled water from the Watsonville Recycled Water Treatment Facility (RWF) able to provide 4,000 AFY at full delivery, blended with surface and groundwater to provide up to 7,000 AFY). The amount of overdraft at that time would be about 32,500 AFY. However, with current ag and urban demands of 71,500 AFY, and with a fully functioning CDS system, the overdraft would be about 23,000 AFY. Irrigation efficiency increases of 25% have been readily achieved in nearby areas. If that efficiency increase is applied to the current 59,300 AFY of ag water use, an additional 15,000 AFY could be "saved," which would eliminate 65% of the overdraft without a large capital intensive public works project.

In the coastal and central portion of the Pajaro Valley, groundwater elevations are regularly below sea level during the summer season, and some wells are chronically below sea level throughout the year. Water-level data collected from Pajaro Valley wells indicate that the direction of groundwater flow is from the ocean to inland areas. The drought conditions from 1987 to 1992 lowered the water table further, thereby resulting in an increased rate and volume of seawater intrusion. The general pattern of water levels across the basin has remained stable over the past few years.

Numerous studies conducted over the past 50 years have documented that the Pajaro Valley groundwater basin is in an overdraft condition; i.e., the amount of water withdrawn exceeds the amount of water replenishing the basin. Today, groundwater pumping provides approximately 69,000 AFY toward the total PVWMA area water demand of 71,500 AFY. Existing well data maintained by the United States Geological Survey (USGS) and the PVWMA indicate that areas of depressed groundwater levels

are expanding in the Pajaro Valley groundwater aquifers and that the groundwater elevations regularly fall below sea level. This trend has caused seawater intrusion in the PVWMA service area because the ocean pushes seawater inland to raise the water table until equilibrium is reached at sea level. Well data collected since 1998 indicate that seawater intrusion (evidenced by chloride levels exceeding 100 mg/L) is more extensive than previously reported, and chloride levels ranging from 200 mg/L to 8,500 mg/L have been observed in a number of deeper wells.

Current PVWMA Activities

Attachment 1 is a document entitled *Pajaro Valley Water Management Agency Overview*, from October 2011. It provides background information about PVWMA and some of its current activities. Notable projects include:

- Watsonville Recycled Water Facility: The RWF will provide 4,000 acre feet per year of recycled wastewater for agricultural use at full delivery.
- Harkins Slough Project: a pump station on Harkins Slough near the coast that diverts winter flows to a 12-acre recharge basin.
- Coastal Distribution System: a pipeline system that delivers supplies from the Harkins Slough Project, Recycled Water Facility, supplemental wells, and City of Watsonville supply.

Ad Hoc Basin Management Plan Committee

The Basin Management Plan documents the PVWMA's plans for projects and programs to decrease groundwater overdraft. PVWMA has convened an Ad Hoc Basin Management Plan Committee consisting of interested stakeholders to research alternatives, obtain engineering analyses, and provide advice to the Board of Directors as to the projects and programs to be considered in an updated Basin Management Plan. The complete list of BMP projects and other BMP information can be found at this link: http://www.pvwma.dst.ca.us/committees/ad_hoc_bmp_committee.shtml

Water Board/PVWMA Coordination

The Central Coast Water Board has limited authority to deal directly with overdraft and seawater intrusion problems. However, through coordination with the State Water Resources Control Board, the collective Water Boards organization has the authority and the responsibility to intervene in these matters (which includes its jurisdiction to adjudicate pumping in the basin) when the local agency is unwilling or unable to develop and put in place solutions that solve the problem. Consequently, the Water Board is pursuing this discussion with PVWMA and to progress toward active steps to halt intrusion.

Water Board staff has been coordinating with the PVWMA. Roger Briggs and Harvey Packard met with PVWMA staff in March 2011 to discuss the problem and possible solutions. Water Board staff also sent two letters to the PVWMA, encouraging them to consider agricultural irrigation efficiency in the BMP review process (see Attachments 2 and 3). The BMP committee subsequently added irrigation efficiency to the list of projects that will be considered.

CONCLUSION

Seawater intrusion is a serious water quality problem in the Pajaro Valley. PVWMA is taking action to decrease seawater intrusion. Adequacy and feasibility of these current efforts are questionable. Water Board staff will continue to coordinate with the PVWMA and assist where possible.

ATTACHMENTS

1. Pajaro Valley Water Management Agency Overview
2. Water Board letter to PVWMA dated August 9, 2011
3. Water Board letter to PVWMA dated July 5, 2011

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