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STANFORD STUDY OF GROUNDWATER SUPPLY NOW PUBLISHED IN *GEOPHYSICS JOURNAL*

Airborne electromagnetic (AEM) imaging verified Marina Coast Water District's ample fresh water supply

MARINA, Calif.–September 16, 2020: An extensive study of groundwater in the northern Salinas Valley, conducted by Stanford University in partnership with the Marina Coast Water District (MCWD), has now been published in the journal *Geophysics*. The study used airborne electromagnetic (AEM) technology to map fresh water, saltwater, and sediment types in the region and produce a 3D model of the subsurface to use for groundwater management.

Specifically, the AEM study set out to discover: 1) the amount and distribution of groundwater in the dune sand aquifer (DSA) and the 180-foot aquifer with low enough salinity to be classified as a source of drinking water; and 2) the extent of saltwater that had reached the 400-foot aquifer from the 180-foot aquifer. MCWD draws from all aquifers to supply its customers with fresh water.

“The AEM study showed that there's a lot of good groundwater that we need to protect as part of our sustainable groundwater management,” said Keith Van Der Maaten, MCWD general manager. “For the first time, we’re able to see in three dimensions what is happening below the surface.

According to Dr. Rosemary Knight, one of the lead authors of the Stanford study, the AEM technology was “an incredible opportunity to get a tremendous data set” and helped MCWD put together an accurate model of the distribution of fresh water and salt water in the subsurface, as well as the various sediment types (such as sand, gravel, and clay). Because sediment type controls the movement of salt water and fresh water, studying its electromagnetic signature was a key component of the study.

The researchers collected data in two phases—first by injecting current directly into the subsurface with electrodes along a 25-mile stretch of Monterey Bay Beach and mapping out the change in electrical properties. In the second phase, together with Aqua Geo Frameworks, researchers collected subsurface data using the SkyTem system. With SkyTem, a large transmitter loop hangs beneath a helicopter and current is sent through that loop, generating a magnetic field that goes through the ground and is converted to current that can be tracked. Collecting data via two methods at two different time periods allowed the team to gauge changes based on factors such as pumping and groundwater management.

The study collected geophysical data by imaging approximately 395 line-miles to a depth of 1000 feet. MCWD was previously limited to samples taken directly below wells, which are comparatively shallow. Through AEM, the extent of fresher water in both aquifers was mapped as extending farther toward the coast and farther south than was interpreted using previous well data. The study also found that the “increased head of the groundwater mound acts as a hydraulic barrier to saltwater intrusion.”

The AEM study also helped MCWD understand the potential impact of the proposed desalination project by California American Water, and indeed indicated the project would lead to more saltwater intrusion, jeopardizing currently abundant sources of fresh groundwater. MCWD is urging the California Coastal Commission to deny Cal-Am’s proposed desal project because the presence of slant wells would disrupt the natural barrier to saltwater intrusion discovered in the AEM study.

“The desal project is actually going to exacerbate seawater intrusion by pulling groundwater out and replacing it with seawater,” explained Van Der Maaten. “Groundwater plays a critical role in serving our customers and keeping rates low, so we are very interested in ensuring that that water is sustainable.”

The AEM study, titled “Using an airborne electromagnetic method to map saltwater intrusion in the northern Salinas Valley, California,” was authored by Ian Gottschalk, Rosemary Knight, Theodore Asch, Jared Abraham and James Cannia. Read the published study in *Geophysics* here: <https://library.seg.org/doi/10.1190/geo2019-0272.1>

A second AEM study entitled “Final Report on the 2019 Airborne Electromagnetic Survey of Selected Areas Within the Marina Coast Water District” covering 543.9 line-miles was conducted by Dr. Theodore Asch of Aqua Geo Frameworks LLC in April 2019. The second study expanded the study area, used additional monitoring well data for calibration, and confirmed the results from the initial AEM study.

AEM studies have been conducted in San Luis Obispo County, Santa Cruz County, Butte County, Tulare County, and Kern County. The California Department of Water Resources is participating with local agencies in conducting AEM studies in support of the Sustainable Groundwater Management Act and aligns with the Governor’s Water Resilience Portfolio.

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About Marina Coast Water District and MCWD Groundwater Sustainability Agency

The Marina Coast Water District (MCWD) was formed in 1960 as the Marina County Water District by a group of local citizens. It was first a municipal-owned water system with boundaries to coincide with the existing Marina Fire District. In 1966, voters authorized the sale of water bonds to acquire a privately-owned water company serving the area. With the closure of the Fort Ord military base in 1997, the Army contracted MCWD to operate its water and wastewater systems and, in 2001, officially transferred the systems to MCWD. Today, MCWD is an exclusive groundwater sustainability agency (GSA) in both the Monterey sub-basin and the 180/400 sub-basin, responsible for developing groundwater sustainability plans. MCWD is governed by a five-member board of directors elected by the voters. For more information, please visit www.mcwd.org.