

Yolo's liquid lifeline

Keeping the water flowing is no easy feat

By JIM SMITH/Democrat staff Writer
Daily Democrat

It's about six hours into a nine-hour inspection of water supply facilities for the Yolo County Flood Control and Water Conservation District when General Manager Tim O'Halloran looks over the Clear Lake Dam, watches water trickling from slats near its base and casually notes this is the spot that keeps Woodland from flooding.

It's a dynamic observation, combining the existence of a structure built in 1914, the growing need for water by farmers and communities in the 21st century and the rapidly changing technology which makes delivering that water possible.

Behind it all is an intricate dance involving the complex mathematics of delivering millions of acre feet of water from where it is to where it isn't during periods when needed most, while providing storage for when it's not needed at all.

The system, which includes hundreds of miles of canals and ditches, tons of concrete in three dams, remarkable degrees of computerization and real-time video surveillance often all comes down to whether it's rained enough to supply those in the 195,000-acre district.

Included in the system are recharge points to replenish groundwater; generators to create hydro-electricity; dozens of people to make the water flow smoothly from reservoir to canal to field; and, of course, the farmers who must project their water needs often days in advance so the right amount can be delivered at the right time during the growing cycle of their crop.

Managing the system

O'Halloran has been managing this intricate choreography of supply and delivery since July 2003. Previously, the 50-year-old engineering graduate of Cal Poly, San Luis Obispo, was water master of the Kings River Water Association in Fresno. During his career O'Halloran has specialized in water delivery system planning, design and operation as well as agricultural water conservation planning and environmental program implementation.

He works for a five-person board of directors appointed by the Yolo County Board of Supervisors out of an office located about seven miles west of Woodland on Highway 16.

The district itself has control of nearly 200,000 acre-feet of water. One acre-foot of water is enough to cover one acre of land a foot deep, or around 325,851 gallons. In an average year, the district supplies around 150,000 acre-feet of irrigation water to more than 55,000 acres of agricultural fields.

The average amount of water needed to grow crops, depending on the size of the field, is between two- and three acre-feet each season.

On this day, the inspection starts at the Capay Diversion Dam, the longest inflatable rubber dam in the world. The water is low now and there's scarcely a trickle along Yolo County's primary water artery, Cache Creek.

As he will do throughout the day, O'Halloran points out video cameras that monitor the facility, along with other electronic equipment designed to measure flow rates and sediment. The information is fed back to the district office for calculation.

He also notes areas of the dam in need of repair, including points along the low-lying concrete structure topped by a water-filled, inflatable rubber barrier, which have been undercut by the pounding currents during normal winter months.

An inspection is needed, O'Halloran says while eyeing the concrete, to determine which sites need reinforcement or replacement.

The dam, he explains, is one of the last stops from which the creek can be regulated during times of high water. The math to calculate the release is rigorous, involving as much historical knowledge of the creek as well as water flow mechanics.

Releasing too much water too soon during the heavy winter runoff months could spell ruin for streamside landowners. Releasing too little water too late and water upstream could quickly back up and eventually become a wild, out-of-control torrent with enough energy and inertia to not only ruin fields but devastate Woodland as well.

Water in reserve

From the Capay Dam it's on to the Indian Valley Reservoir, the showpiece of the district. The reservoir is basically a backup storage system.

O'Halloran and the district have called the Lake County reservoir Yolo County's lifeline. Completed in 1975, the six-mile-long, one-mile-wide reservoir has a gross capacity of 300,600-acre feet.

Its purpose is to make water resources less vulnerable to the dry years that often limit supplies to Yolo County.

Clear Lake is Yolo County's primary source of agricultural water. The district obtained rights to store water in the lake in 1967 when it bought the privately owned Clear Lake Water Company and Cache Creek Dam.

That didn't provide enough water to supply farmers during dry years, so in 1974-75, the district built the Indian Valley Dam at a cost of \$9 million, which adjusted for inflation would be \$36.8 million today.

Presently the dam and surrounding area are undergoing a series of visual and physical improvements.

Visually, the campground and public access area are being cleaned up to permit more public use. However, the reservoir is also being upgraded internally with critical water pipes being relined. The new lining will permit better flow into the power-generation room, which during normal operations, allows any extra electricity to be sold into the region's power grid.

O'Halloran stops to overlook the reservoir on a windblown blufftop and is able to display real-time data courtesy of his wireless laptop and video cameras. Logging on to a dedicated site while sitting beneath a broadband transmission tower - one of several built across the district - that contains the camera, O'Halloran looks down on those visiting the lake's campground, zooming in for a closer view.

It's an eerie feeling to look up from the laptop and see two men casually talking near a pickup about a mile down the slope and then look back down at the computer screen and zoom in close enough with the camera to make out the details on their shirts. All the time, the men are unaware they are being watched.

Switching to another camera, O'Halloran zooms in on the power generation room lying within the dam itself, where he checks a variety of monitors. Again, the detail is so fine one can make out the information as clearly as actually being there.

Some of the cameras are expensive, costing several thousand dollars each, but the amount saved by eliminating personal visits along with the security they provide makes them worth the cost, O'Halloran says. Then again, there's also the issue of meeting federal Homeland Security requirements to protect the sites against "terrorism."

Maximizing use

A few minutes later and O'Halloran is driving through the lake campground, showing off a newly remodeled restroom and other facilities, all designed for the use of tourists.

It's an idea that O'Halloran stresses throughout the tour: Maximizing use of water storage sites as a means of telling the district's story. The more people who use the lake for fishing, camping, boating and recreation, he feels, the greater their understanding.

After an inspection of the parking area, O'Halloran drives across the dam and then down to a spot below the earthen barrier to what appears to be a small shed. In fact, it's the entryway to a multi-story underground power room, where electricity is created during much of the year by the flowing water.

The system is shut down on this day as maintenance crews reline a pipe that's 60 inches in diameter. The thought of people crawling inside a tube more than a mile long - through which thousands of acre-feet of water normally rush - is eerie. But it's the only way to apply a protective polymer paint that will add years to the pipe's lifespan from the pummeling it receives.

The power room is also quiet. Of three turbines, only a single small turbine is turning, water provided by a secondary pipe only a few feet in diameter. Two other larger turbines - usually fed by the monster 60-inch pipe - are silent. O'Halloran points out the camera through which he was able to read the gauges minutes earlier via his computer monitor.

A bit of water history

From Indian Valley it's a long drive to Clear Lake and the county's primary water source.

But before the visit to the Clear Lake Dam, O'Halloran offers a little history about the Grigsby Riffle. The riffle is a natural rock sill created by volcanic action from ages past, located at the confluence of Cache and Seigler Creeks, near the community of Lower Lake and at the southern tip of the lake itself.

The site is less than awe-inspiring, considering how many people and businesses are affected by water provided downstream. Homes line the waterway, which looks sleepy and somewhat dreary this winter day.

But it's an important junction literally hidden beneath the slow-moving water. In 1872, a Captain Rumsey established the low point of the sill over which water must flow before it heads off into Yolo County and the Sacramento Valley.

The sill is, in effect, a barrier and Clear Lake's only outlet.

"Zero Rumsey" is the point at which the lake stops draining over the sill. "Zero Rumsey" is equal to 1,318.257 feet above sea level. A full lake is achieved when measurements reach 7.56 feet on the Rumsey Gage - 7.56 feet above 1,318.257 feet.

When Clear Lake is full, it contains 1,155,000 acre-feet of water.

The level of Clear Lake is controlled by the Rumsey Dam, built in 1914. Through a series of court decisions, the district can draw as much as 7.56 feet of water on the Rumsey Gage - unless there are severe storms in which case the level can go up to 9 feet - but for no more than 10 consecutive days.

For example, according to the district, a full lake limits the outlet capacity at the Rumsey Dam to 2,540 cubic feet per second. During some past heavy storms, however, more than 37,400 cfs have been released. That's been allowed in order to prevent significant lakeside flooding.

Overall, the district is limited to 150,000-acre feet from a full lake. If Clear Lake is lower, however, then by court decree no water is released, which is why the Indian Valley Reservoir was constructed to maintain a consistent supply.

O'Halloran offers this background complete with charts and graphs before making his way to the Cache Creek Dam.

It's a little thing, really, as far as dams go, stretching around 100 yards long and about 50 feet high. It looks aged and somewhat dilapidated, but it functions well. O'Halloran said studies have shown that despite its age, the dam is solid.

Green moss grows from along the downstream side of the dam and a small but steady stream of water flows from an outlet into Cache Creek. Due to the recent cold, there are also long icicles hanging from some portions of the structure, which draws O'Halloran's attention.

But the icicles don't signify any structure problems. They are in fact, a curiosity created by water slowly seeping out of spillways.

O'Halloran instead turns his attention to old cabins and a small hydroelectric plant and talks about putting a study together to see if the hydroelectric power is worth the cost of its production.

That's in the future, however, as are O'Halloran's plans to clean up the area and make it more presentable for visitors.

With a little work, he says, the place could be great for picnickers, even those who might want to camp out.

The future

Heading back to Yolo County and Woodland, O'Halloran moves away from talking about dams and delivery systems and into groundwater recharge, as well as the beginning of an effort to help supply cities such as Woodland with at least some extra water when available.

In the past few years, the district has spent more than \$500,000 to recharge the aquifers within the district itself. By importing more surface water supplies the district is trying to maintain a balance between the use of groundwater and surface water, so it can stabilize the groundwater levels and prevent an overuse of groundwater thus helping to prevent subsidence of the topsoil.

District information indicates measurements taken from more than 150 wells throughout the county show an improvement in groundwater supplies over the past 40 years.

In fact, the data can be tracked, showing that in those years when little or no water was available, groundwater tables have dropped compared to periods of plentiful surface water that allows a recharge of the county's groundwater basin.

All of these issues weigh on O'Halloran's mind, as well as those of the district's board of directors. The challenges, O'Halloran feels, lie not with merely providing water for growers in a county that has been called "water deficient," but in figuring out how to maximize the use of supplies to accommodate urban growth as well.

In fact, squeezing more use out of a finite amount of water may be the district's, and O'Halloran's, greatest challenge yet.