Navigating the Hope (and Hype) around Solar Canals

Public Policy Institute of California, 10/11/23

Placing solar panels over canals is attracting attention in California. Proponents hope such projects will use existing infrastructure to generate renewable energy while reducing water loss from evaporation. But will solar canals live up to the hype—and will they work in California? We spoke with Turlock Irrigation District's general manager, Michelle Reimers, about Project Nexus, a new pilot project that could help answer some of these questions.

Tell us about Turlock Irrigation District's solar canals pilot project. Why is this a novel approach to take?

Turlock Irrigation District aims to supply our customers with 60% renewable energy by 2030 and 100% greenhouse-gas-free energy by 2045. But there are challenges: producing 1 megawatt (MW) of solar takes about 5 acres of land. One of our gas-fired power plants supplies 250 MW of electricity. You can do the math: it takes a lot of prime agricultural land to construct utility-scale solar. So we took a step back and asked if there was another way we could utilize existing assets to achieve more for our customers.

UC Merced has been studying solar-over-canal projects in different countries, so I contacted their researchers and let them know we'd be interested in a pilot project. The California Department of Water Resources (DWR) offered $20 million of funding to construct the pilot, so we created a public-private-academic partnership.

What are you learning-or what do you expect to learn-from the pilot?

For the pilot, we picked two different canal sites, 100 feet wide and 20 feet wide, which together are about 2 miles long. There will be different engineering on each site; we'll see which performs best.

First, we're interested in the possibility of reducing evaporation within the canal system.

Second, we have very hot summers in the valley, and there's a lot of aquatic weed growth in the canals. This is a problem since the canals are gravity-fed—weed growth blocks the gates and can cause serious damage. It's labor-intensive and expensive to clean the canals: we spend a million dollars on cleanup every year. We could potentially save a lot of money if solar arrays can shade the canals and reduce weed growth.

Third, we needed to be sure we could access the canals to service them and the electrical poles that run along them. Producing renewable energy on infrastructure we already own could offer real value to our customers, while possibly providing other co-benefits. And there are no interconnection fees because we're also the electricity provider.

So we're looking at generating solar power, reducing weed growth and evaporation, and evaluating wear and tear on the system. And we'll be looking at scalability—if these pilot projects work, could they be deployed more widely, and be part of our pathway to meet the state's climate goals?

What Hurdles do you expect to face, and when will you know whether the pilot worked?

We faced some hurdles internally. My construction and maintenance manager's first response to the pilot idea was, "What?" But the philosophy here is changing: we're resetting to a "Why not?" mindset. I just ask that before we decide, let's see how it could work. That's when people's creative juices start flowing. Now the staff is really excited about it; they really want to prove the concept. There's a lot of support among employees because they were part of the planning process.

We hope to have the pilot fully functional by the middle of 2024. UC Merced will study it for a full year, and we'll be working with them to study it from March to the end of October—a full irrigation season—to see if we run into any hiccups.

Final Thought?

It's an exciting time. We're hoping for additional grant funding to put floating solar on our regulating reservoirs. The city of Healdsburg's wastewater facilities have floating solar on their ponds. Floating solar actually produces more energy than ground-mount solar—due to more panels installed in the same square footage. And we don't have any battery storage within our system right now; we are also piloting that at the site and integrating it into the grid.

We're also looking at developing an education center near Project Nexus, because the valley doesn't have a lot of off-campus places for schoolkids to go to and learn. This site could teach about solar power and water efficiency at one site. That's why we call it "Project Nexus"—because we're integrating electrical and water issues.

State and Federal Fish Agencies Take Urgent Actions to Save Spring-run Chinook Salmon

California Department of Fish and Wildlife, 10/11/23

UC Davis to safeguard broodstock to conserve threatened species

The California Department of Fish and Wildlife (CDFW) and National Oceanic and Atmospheric Administration (NOAA) Fisheries biologists are pursuing urgent measures this fall to save some of the last remaining Central Valley spring-run Chinook salmon after the numbers returning from the ocean this year fell sharply toward extinction.

Biologists call this year's sharp decline a "cohort collapse" because so few threatened adult spring-run Chinook salmon returned to the small streams still accessible to them. Mill and Deer Creek — two of the three streams that hold the remaining independent spring-run populations — each saw fewer than 25 returning adults this year. Returns to Butte Creek — the third independent population — were the lowest since 1991 and adults further suffered impacts of a canal failure in the watershed.

“We are running out of options,” said Cathy Marcinkevage, assistant regional administrator for NOAA Fisheries West Coast region. “We want this species to thrive in the wild, but right now we are worried about losing them.”

Central Valley spring-run Chinook salmon typically follow a 3- or 4-year life cycle, a strategy that provides some resilience to catastrophic events occurring to an individual year class. While other year-classes (or cohorts) will return in coming years, the 2019-2022 drought impacted multiple cohorts, increasing risks for extirpation.

Biologists will capture juvenile fish from Mill, Deer and Butte creeks to start a conservation hatchery program that will safeguard the genetic heritage of the species. UC Davis will house the captive broodstock at the University’s Center for Aquatic Biology and Aquaculture (CABA) for the next two years until a longer-term facility is identified.

“These drastically low returns come at a time when we’ve already been taking extreme measures to protect salmon strongholds and eliminate existing barriers keeping them from their historic habitat,” said CDFW Director Charlton H. Bonham. “We’ve got to continue to do everything we can to preserve these iconic fish.”

Conservation hatcheries are vital to the protection and recovery of other highly imperiled salmon stocks, including endangered Sacramento River winter-run Chinook and Central California Coast Coho salmon.

“It’s a privilege to work with this species, and I’m glad we have facilities and expertise that can help,” said Nann Fangue, UC Davis professor of fish physiological ecology and director of CABA. “My staff, the students and our partners are all really dedicated to this work and to the goal of conserving native species.”

The remaining populations of spring-run Chinook are declining more than 10% each year and face high risk of extinction, according to an updated viability analysis(opens in new tab) by NOAA Fisheries’ Southwest Fisheries Science Center. One population initially benefited from strong adult returns in 2021, but more than 90% of the fish died prior to spawning when high stream temperatures exacerbated by thiamine deficiency and wildfires fueled a disease outbreak in 2021.

Central Valley spring-run Chinook also face high risk from climate change, since dams have cut off much of the high-elevation habitat where they once spawned in cold mountain rivers. Their survival in lower elevation habitat often depends on releases of cold water from reservoirs that face competing demands for their limited volume of water.

“These cold water fish need cold water and that is going to become more limited in California’s climate future on the Valley floor,” said Dr. Rachel Johnson, research biologist at NOAA Fisheries’ Southwest Fisheries Science Center and lead author of the spring-run viability analysis. Their survival in the high temperatures of lower elevation habitat often depends on releases of cold water from reservoirs that already face competing demands.

Scientists will strive to maintain the genetic diversity of the species through the hatchery broodstock program. As the instream flow requirements and habitat restoration efforts improve the odds of the fishes' survival in the wild, biologists could use hatchery offspring to restore genetically diverse and locally adapted populations of spring-run Chinook in California's rivers.

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