

Stewardship Leaders in Agriculture

Reclaiming Lost Land and Water

Terranova Ranch Inc.

Terranova Ranch was established in 1979 in Helm, CA in the central San Joaquin Valley and currently has 5,700 acres under cultivation. Since 1981, Don Cameron has worked as the manager of the ranch and has overseen a complete transformation of the ranch. When he arrived the soil was white, devoid of nutrients, and so heavily loaded with salts that barely three crops would grow. Through patience and hard work Mr. Cameron's application of soil amendments, leaching of salts, and application of chicken litter as fertilizer created soils that now grow 26 different crops. Since 1993, 600 acres has been brought into organic production. His commitment to sustainability continues and in 2008 all 39 irrigation pumps were converted from natural gas to electricity. 2009 saw the conversion to drip irrigation of tomatoes, a process that conserves water and produces higher yields and quality. The plan is to move to 100% drip irrigation of all crops in the coming years.

Forward Thinking Water Conservation

Mr. Cameron's commitment to water conservation continues and in 2011 he began a water banking project that seeks to address two large scale water problems of the King's River Basin. Farmers are currently pumping an unsustainable volume of water during dry years that is drawing down the aquifer from 300 feet to over 900 feet in some areas. The rapid withdrawal of water is causing the land to subside, at rates of over a foot per year, in the region. In high water years, the farms and communities risk floods from rivers that crest their bank. Mr. Cameron wants to store this excess water right where it is needed; in the fields. The idea is that during high precipitation years, excess water will be diverted directly onto the fields flooding them. The water then will slowly sink into the ground and locally recharge the aquifer.

"We're putting it away when there is flood water available, and essentially storing it underground, rather than building a new dam somewhere." - Mr. Cameron

ACHIEVEMENTS

- 2012 Farm Press/Cotton Foundation High Cotton Award Winner
- 80% of all crops on drip irrigation
- Received acclaim from the regional offices of the EPA, USDA/NRCS, San Joaquin Valley Air Pollution Control District, and recently was paid a visit by EPA Administrator Lisa Jackson.
- Conducted first of its kind pilot study on Ground Water Banking

Photo courtesy of Phil Bachand and Don Cameron, Terranova Ranch



Photo courtesy of Sustainable Conservation



Photo courtesy of Phil Bachand and Don Cameron, Terranova Ranch



“Our analyses for Terranova Ranch suggest that allocating 25% or more flood flow water towards in lieu recharge and the rest toward direct recharge will result in an economically sustainable recharge approach paid through savings from reduced groundwater pumping.” - Implications of Using On-Farm Flood Flow Capture To Recharge Groundwater and Mitigate Flood Risks Along the Kings River, CA

PROJECT PARTNERS

Bachand & Associates

California Department of
Water Resources

Sustainable Conservation

King River Conservation
District

Kings River Water
Association

United States Department
of Agriculture Natural
Resources Conservation
Service

UC Davis

U.S. Department of
Agriculture

U.S. Geological Survey

King River Conservation District

The King River Conservation District (KRCD) was formed in 1951 as is a leading resource conservation management agency for the Kings River region, an area of 1.2 million acres spanning portions of Fresno, Kings, and Tulare counties. KRCD works to develop efficient water conservation practices and partnered with Mr. Cameron and Terranova Ranch to begin an on-farm flood capture and recharge project.

USDA NRCS Conservation Innovation Grant

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) provides Conservation Innovation Grants (CIGs) as part of a voluntary program that seeks to stimulate the development and adoption of innovative conservation approaches and technologies that address some of the Nation's most pressing natural resource concerns. The Terranova Ranch pilot project was funded through a CIG.

PROJECT DETAILS

GROUND WATER BANKING

Ground water banking, or On-Farm Flood Flow Capture, seeks to capture flood flows for both direct and *in lieu*¹ water recharge. The pilot study conducted on Terranova Ranch was designed to “determine infiltration rates for different soil series and different crops; develop a water budget for water applied throughout the program and estimate direct and *in lieu* recharge; provide a preliminary assessment of potential water quality impacts; assess logistical issues associated with implementation; and provide an economic summary of the program.”² Substantial flood flow volumes were applied to alfalfa, wine grapes and pistachio fields. A subset of those fields, primarily wine grapes and pistachios, were used primarily to demonstrate direct recharge. For those fields about 50 – 75% of water applied was calculated going to direct recharge.

MEASURING SUCCESS

Ground water banking provides numerous benefits both to the local farm and to nearby communities. Using water diverted from flood flows is nearly three times cheaper than pumping groundwater, and the diverted water will help to offset groundwater overdraft through direct recharge and by reducing the use of groundwater pumping during the flood season of January through July. Furthermore, ground water banking reduces the risk of downstream flooding of high value crops, residential areas, and disadvantaged communities. It will help to reduce the risk of levee failures along the Kings River by reducing periods where flood flows exceed levee capacity. A reduction in flooding of confined animal areas will result in a reduction in nitrate contamination. Flooding of fields will create shallow water wetland habitats that coincide with waterfowl migrations periods.

Two primary challenges were identified in this pilot study. The first is the leaching of legacy salts and nitrates from the unsaturated zone into groundwater. Second, are the farm-scale logistical issues of implementing, managing, and quantifying the effects of a ground water banking program. Despite these hurdles, the pilot study on Terranova Ranch suggests that allocating at least 25% of flood flow water towards *in lieu* recharge and putting the rest toward direct recharge will result in an economically sustainable recharge approach paid through savings from reduced groundwater pumping.

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¹ In-lieu recharge: the practice of providing surplus surface water to historic groundwater users, thereby leaving groundwater in storage for later use.

² Implications of Using On-Farm Flood Flow Capture To Recharge Groundwater and Mitigate Flood Risks Along the Kings River, CA