

# IMPACT

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*IMPACT is a series of publications highlighting how UC Davis' College of Agricultural and Environmental Sciences makes a difference in the lives of Californians. Through research, teaching, and outreach programs, UC Davis research touches almost all aspects of Californian life. Today, millions of people eat safer foods, breathe cleaner air, and drink healthier water with the help of our researchers. We're making discovery work -- for California and the world.*

## BRINGING BACK THE SALMON

### THE ISSUE

The rivers and streams of the Sierra Nevada, coastal mountain ranges, and the Siskiyou-Shasta-Lassen region once teemed with millions of “anadromous” fish that spend part of their life in fresh water and much of it in the Pacific Ocean – chinook and coho salmon, steelhead trout, and related species. Salmon helped sustain the indigenous people of California and historically supported significant commercial and recreational fisheries.

The elaborate network of reservoirs, canals, and pumps constructed in the 20th century to provide water for California cities and farms cut off many salmon migration routes and diverted water from spawning grounds and rearing areas. Erosion and contaminants have degraded water quality and also harmed salmon populations. Many salmon runs no longer exist in their native range, while others struggle for existence.

In some areas, however, the fish are making a comeback. UC Davis scientists, irrigation districts, landowners, farmers, and others are working together to improve water quality conditions, remove obstacles to upstream migration, and restore fish habitat. A major effort to restore nearly 150 miles of the San Joaquin River near Fresno and to reintroduce once-abundant chinook salmon to the river is in progress. Scientists at UC Davis are helping bring renewed life to this natural heritage.



Allen Harthorn

### WHAT WE'RE DOING

One of the most passionate voices for California native fishes – not just salmon and steelhead trout – is UC Davis fisheries professor Peter Moyle. On Putah Creek near UC Davis, Moyle and his students have documented the benefits of returning water to an aquatic ecosystem. They've monitored the impact of increased water flows and restored riparian habitat along the creek. In 1998, fall-run chinook salmon returned to portions of Putah Creek. As many as 80 adult salmon have been observed in Putah Creek in the years since.

“Salmon are spectacular in their own right,” Moyle says, “but a rewatered stream supports a wide variety of other native fish, more native vegetation, more birds – more biodiversity.” Other Central Valley native

fish that benefit include Pacific lamprey, hardhead minnow, Sacramento sucker, Sacramento pikeminnow, Tule perch, and three-spined stickleback. The restoration of once-dry Putah Creek provides crucial information for the San Joaquin River project. Efforts to rebuild salmon populations are also taking place on other rivers in the Central Valley, the Klamath River basin, and coastal areas.

Rebuilding native fish populations requires broad expertise to analyze complex river systems and to design strategies for favorable ecosystem conditions – sufficient water flows, unencumbered migration routes, suitable spawning habitat, and healthy riverside vegetation. The College of Agricultural and Environmental Sciences at UC Davis contributes to this growing area of conservation biology through the work of many faculty members.

Watershed hydrology professor Gregory Pasternack, a specialist in environmental restoration, takes an interdisciplinary approach to rehabilitating streams below major dams. He and his research group work with agency partners on the Mokelumne, Trinity, and Yuba rivers. On the Mokelumne they used 23,000 metric tons of gravel and cobble to reconstitute naturalized riffles, pools, and other habitat elements in partnership with the East Bay Municipal Utility District. Salmon use of the rehabilitated area has grown every year. Now more than one-fifth of the fish spawners rely on the project area for successful reproduction. Link to <http://shira.lawr.ucdavis.edu/> for more information.

Lisa Thompson is a UC Davis Cooperative Extension (CE) anadromous and inland fishery specialist who collaborates with farmers, ranchers, and land managers

to assess the status of fish populations and stream habitat characteristics on rangelands and other agricultural areas. On the Salinas River, for instance, Thompson and local CE watershed advisor Royce Larsen studied how debris from oaks and other trees provides refuge for threatened steelhead. On Cow Creek in the northern Sacramento Valley, Thompson and CE rangeland watershed specialist Ken Tate teamed with livestock and natural resources advisor Larry Forero to collect information for best management practices to improve fish habitat in areas grazed by livestock.

## A SHARED VISION

The work of bringing salmon, steelhead, and other native fish back to California rivers and streams involves many people – government agencies, local water districts, citizen watershed groups, landowners, land managers, and university researchers.

Other UC Davis scientists contributing crucial knowledge to salmon rebuilding efforts include fisheries biology professor Joe Cech, whose knowledge of salmon physiology has improved the design of screens to protect fish from water diversions; soil science professor Randy Dahlgren, who has worked to improve water quality in the Sacramento and San Joaquin rivers; and CE marine fisheries specialist Christopher Dewees, who was instrumental in creating a Spring-run Chinook Salmon Workgroup for the Sacramento Valley.

These UC Davis scientists and others are developing the relationships and the research to restore salmon to parts of their historic range. That's impact – scientists working with stakeholders and resource managers to restore freshwater ecosystems.

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