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DELTA SCIENCE PROGRAM

Addressing Stakeholder Concerns: Pests and Pest Control in the Sacramento River Conservation Area

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SUMMARY

G. Golet/TNC

A 16-year-old restoration site with a nesting box for barn owls.

The Nature Conservancy and U.S. Fish and Wildlife Service are leading efforts to restore an ecologically viable 100-mile stretch of the Sacramento River, between Red Bluff and Colusa. Within the Sacramento River Conservation Area, the river will be allowed to do what rivers normally do – meander, flood, erode and deposit sediment. Native vegetation will also be re-planted to help create much needed habitat (indeed refuge) for some of the region's more than 250 indigenous animal species, including yellow-billed cuckoos, river otters, Chinook salmon and green sturgeon, as well as threatened bat and insect species. The restored wildlife area will also provide valuable educational and recreational opportunities for school-age children and the general public.

The goal of this project was to address walnut growers' concerns that the restoration plan might exacerbate orchard pests in the riparian corridor. In particular, the Delta Science Fellow examined whether the return of native plants and animals increases farmers' problems with weeds, pest insects and pest birds. Based on the project's results, the answer is, no.

PROJECT

There were two main components of the project, the first being a weed study, conducted to determine whether restoration sites might be a source of weeds to neighboring farms. More than 400 soil samples were collected from 23 walnut orchards adjacent to and within 3½ miles of the Sacramento River Conservation Area. The fellow germinated these samples in a greenhouse and identified their species, recording their relative abundances and seed-dispersal modes. Seed distributions were then analyzed in relation to adjacent habitat types and ages.

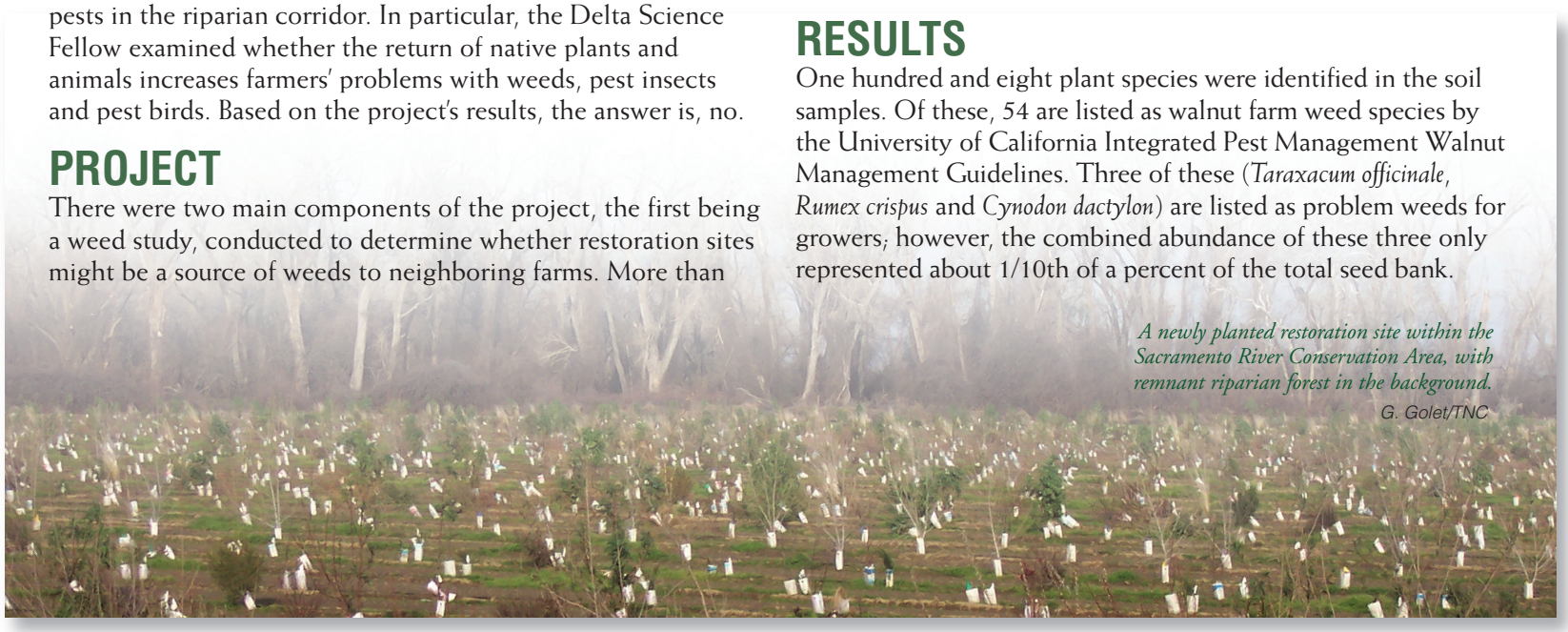
In the project's second phase, the fellow surveyed birds and their insectivorous foraging behaviors (the birds mostly eat insects in their caterpillar life-stage) at orchards and edge habitats of the conservation area; approximately 16,000 birds and 600 observations of foraging were documented at about 800 locations from 2006 to 2007. The fellow then compared counts of birds in relation to proximity to water, tree heights, herbaceous cover and nearby expanses of riparian habitat (both remnant and restored). The goal was to address whether walnut farmers might benefit from there being more insect-eating birds and/or whether their crops might be harmed by a rise in pest birds.

The scientist also quantified abundances of codling moth and naval orangeworm, both serious pest insects, at and around the orchards, in relation to their proximity to riparian habitat.

The project's emphasis on weeds, insects and birds was designed to complement a parallel study led by The Nature Conservancy to determine whether restoration might increase abundances of small mammals at nearby orchards. This study found that remnant riparian habitats and older restoration sites (in which re-planting occurred a decade or more ago) are unlikely to introduce mammalian pests to nearby farms, although young restoration sites may attract California voles.

RESULTS

One hundred and eight plant species were identified in the soil samples. Of these, 54 are listed as walnut farm weed species by the University of California Integrated Pest Management Walnut Management Guidelines. Three of these (*Taraxacum officinale*, *Rumex crispus* and *Cynodon dactylon*) are listed as problem weeds for growers; however, the combined abundance of these three only represented about 1/10th of a percent of the total seed bank.



A newly planted restoration site within the Sacramento River Conservation Area, with remnant riparian forest in the background.

G. Golet/TNC

CA Dept. of Water Resources

An aerial view of the Sacramento River Conservation Area taken in 2005. Note the mixture of land uses.

Consistent with walnut growers' concerns, weed seeds were more abundant in "edge habitats," where orchards abut with newly restored forest. But, this effect was spatially limited; 50 meters inside an orchard, weed seed densities were unaffected by proximity to restored forest.In other words, large areas of natural and restored habitat do not lead to a greater penetration of weed species into agricultural areas.

In addition to weed seed penetration being limited, remnant riparian areas (older than 13 years) had much lower densities of weed seeds, suggesting that weed problems might dissipate over time, similar to what was found for small mammalian pests.

H. Golet

A threatened yellow-billed cuckoo. Habitat for the species is being restored.

The bird study suggested that restoration has the potential to actually benefit walnut growers by increasing habitat for birds that feed on walnut pests and by decreasing densities of pest birds. There was, at the very least, no observed negative effect of restoration on abundances of two key agricultural pests, the codling moth (infamous for infesting walnuts in the Central Valley) and navel orangeworm (a primary pest of almonds, one of the region's most valuable crops).

APPLICATIONS

In excess of 98 percent of riverside forests along the Sacramento River, the source of about 80 percent of fresh water flowing into the San Francisco Bay-Delta, have been destroyed by farming, development and levee construction. The Sacramento River Conservation Area seeks to protect a meaningful representation of this now rare habitat. Findings from this project are being used to educate stakeholders about the true risks/benefits of restoration. In line with this, the study was incorporated into a report to the Colusa Subreach Planning Advisory Workgroup and presented to the Sacramento River Conservation Area Forum Technical Advisory Committee.

The Nature Conservancy is also itself using the results of this study and others to guide its restoration strategies. "Restoration designs are often altered to accommodate landowner requests," says ecologist Gregory Golet of The Nature Conservancy in Chico and a community mentor on the project. "However, we also are committed to addressing concerns with sound science."

COLLABORATORS

The Nature Conservancy; PRBO Conservation Science; U.S. Fish and Wildlife Service, and Cerus Consulting, Chico.

PUBLICATIONS

Langridge, S. 2010. Limited effects of large-scale riparian restoration on seed banks in agriculture. Restoration Ecology. In press.

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MENTORS

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