

W.E.O.P.

WATERSHED ECOLOGY OUTREACH PROGRAM

SPRING REPORT
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WATERSHED ECOLOGY OUTREACH PROGRAM

The WEOP is completing its second winter of watershed restoration and education programs. Our restoration projects (Table 1) are outdoor classrooms for hands-on experience in the three primary steps of watershed restoration: changing land use, changing water drainage, and restoring habitats. Watershed restoration is in turn the key to solving the most important environmental problems in the Monterey

Bay area: saltwater intrusion of groundwater, non-point source pollution, and the extinction of species and ecosystems. Watershed restoration increases the volume and residence time of water on the land, permitting greater groundwater recharge. Wetland habitats filter drainage water and improve water quality, reduce soil erosion, increase the diversity of wildlife, and increase storage for flood control.

THREE STEPS TO SUCCESSFUL WATERSHED RESTORATION

1. CHANGE LAND USE

- Exclude grazing animals from wetland
- Make farm buffers around wetland

2. CHANGE WATER MOVEMENT

- Decommission ditch drainage system
- Pond water with ecological engineering

3. RESTORE NATIVE WETLAND HABITAT

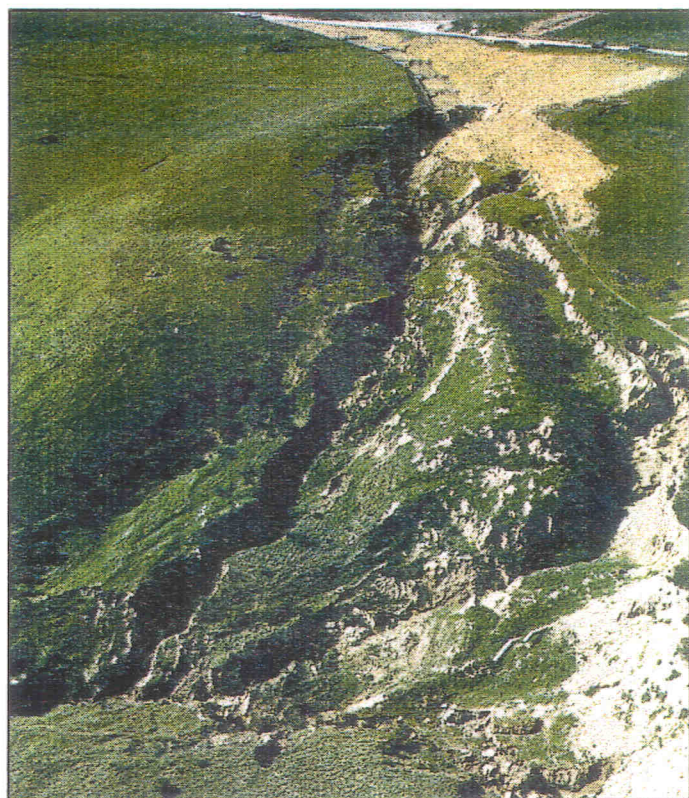
- Control invasive non-native plants
- Plant native trees, bushes, grasses

BENEFITS OF WATERSHED RESTORATION

- *Flood Control*
- *Groundwater recharge*
- *Water quality*
- *Erosion Control*
- *Biodiversity*

WEOP FACILITY DEVELOPMENT

The WEOP has acquired a headquarters building on the new campus for California State University Monterey Bay, next to the Technology Center. We are presently developing a plant propagation facility in the large open field just outside the WEOP building which will serve existing and



13. The Skyline Gully on Fort Ord showing the upper restoration area covered with hay. The gully was formed by the collapse of a road. Eroding soil was captured along the entire gully behind hay dams, resulting in the deposition of an average of 3 feet of soil in the gully bottom and as much as 8 feet at the top.

future watershed restoration. It includes two large greenhouses, several large and small sheds, a shade room, misting area, and copious space for developing native plant gardens, research plots, and grow-out sites for restoration, education, and research.

Much of the design is copied from Elkhorn Ranch, thanks to Paul Kephart, a Working Group member and Elkhorn Ranch Propagation Manager.

The greenhouse area is contiguous with a small belt of degraded native habitat extending a block and a half eastward to the hundred-acre natural reserve within the campus. This wildlife reserve extends further east into 20,000 acres of native habitat largely controlled by the Bureau of Land Management. Therefore, the WEOP is perfectly

poised to become the campus gateway to the extensive natural laboratories of Fort Ord. We are beginning to restore campus habitat around the building, down the corridor, and into the wildlife reserve. This restoration is the model for landscaping the entire campus in native habitats with minimal water use and maximum student involvement.

WATERSHED RESTORATION

WEOP watershed restoration focuses on three major sub-watersheds of Monterey Bay in the lower Salinas Valley, Pajaro Valley, and Fort Ord (Map 3 & Table 1). This year we controlled erosion, ponded water, and created wetland habitats with several thousand bales of hay. We planted 10,000 native willow and cottonwood cuttings, hundreds of other native wetland trees and bushes, more rushes and sedges, and spread hundreds of pounds of native grass seeds (including meadow barley, hair grasses, and brome). Plants are the best erosion control and they hold water for use on the surface and below ground.

FORT ORD

A critical restoration need on Fort Ord is the restoration and revegetation of erosion scars produced by drainage failures along the many miles of unpaved roads. The largest erosion scar on the base, Skyline Gully, is over 20 feet deep and more than 1/4 mile long (Pictures 13 & 14). This winter season we fixed the road drainage above the gully, controlled the major watershed erosion, and stuffed the gully with bales of hay from top to the bottom—a several hundred foot drop in elevation. The gully has been shifted from an erosional to a depositional system. As much as six feet of sediment has already accumulated behind hay bales during the most recent winter rains; as the original bales were buried, new bales were

**TABLE 1.
WEOP RESTORATION
PROJECTS UNDERWAY IN THE
MONTEREY BAY AREA**

	<i>Starting Date</i>
FORT ORD	
Skyline Gully	Fall 1994
SALINAS	
Natividad Creek	Fall 1994
CASTROVILLE	
Tembladero Slough (Mo I & II)	Fall 1993
Castroville Slough (Chapin)	Fall 1994
MOSS LANDING: MORO COJO SLOUGH	
Calcagno Marsh	Fall 1991
Dairy Marsh	Winter 1994-95
Rubis Marsh	Fall 1994
Peterson Marsh	Fall 1994
Walker Valley Creek	Fall 1992
MOSS LANDING: ELKHORN SLOUGH	
Porter Ranch	Winter 1993-94
Conservation Fund	Spring 1991
Moss Landing Sand Dunes	Fall 1991
WATSONVILLE	
Hansen Slough	Winter 1993-94
Struve Slough	Winter 1994-95
Cooley Ranch	Winter 1994-95



14. Eroded landscape at the top of Skyline Gully was ripped by a tractor, seeded with native grasses, and covered with hay. Drainage water was diverted by hay berms and collected behind earth dams with hay spillways. Most of the site is now green.

stacked on top (Picture 17).

We planted several thousand willow and cottonwood cuttings along the gully around the hay bales and in all other wet areas. These have rooted and sprouted leaves. We have also sown native grasses along the gully and on adjacent bare ground and covered the seeds with straw. Many grasses have germinated providing a dense erosion control. One grass species is an experimental native selected for erosion control at Elkhorn Ranch. If the grass successfully covers the mix of wet and dry bare ground around the gully, this species is likely to become the premiere erosion control grass throughout the state. Our work is the first practical field test.

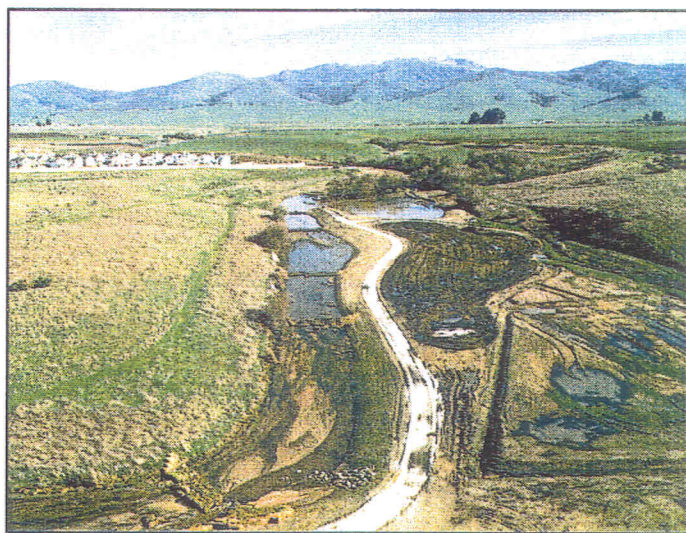
The biological control of gully and road erosion is an important restoration model for Fort Ord. The resulting wetland habitats and developing plant communities will collect and hold more water for downward transport into severely overdrafted aquifers.

NATIVIDAD CREEK

The largest and perhaps most important restoration project in the Salinas Valley is a section

of Natividad Creek running through the City of Salinas. The creek was expanded from a 10-15 foot wide drainage ditch into a natural river and wetland system over 200 feet wide in the main nature area. Over 1,000 bales of hay stabilize eroding sediment and create shallow ponds for plants and wildlife (Picture 15 & 16). Thousands of willow and cottonwood cuttings surround hay berms, initiating the ecological process of slowing and holding water. This site is the center of plant propagation and restoration activities for the Return of the Natives Project. More than one thousand Salinas students (K-12) have now visited the site and helped with restoration.

The control of erosion along the new creek and creation of natural river deposits is spectacular. Over 90% of the creek bottom is covered with fine and coarse sand, gravel, and even cobble. This is dramatically different from the section of creek



15. Eroding soil and water was ponded behind hay bale berms in a widened section of Natividad Creek. The former ditch can be seen as a thin line against the left creek bank. Thick sand deposits are evident where the lower hay dam ruptured. These form a natural river bottom and excellent seed bed for plants. While the restoration area was retaining water and sediment, adjacent creek areas were scoured to a hard pan.

below the restoration area where there was no erosion control. Here over 90% of the creek bottom is scoured to hard pan.

WATERSHED EDUCATION

The WEOP watershed education began with the Return of the Natives education program and has been greatly expanded by a grant from the Department of Defense. There are now three complementary education programs.

RETURN OF THE NATIVES

- K-12 watershed & environmental education

FORT ORD WATERSHED RESTORATION INTERN PROGRAM

- High school and college watershed education

BASKET PROJECT

- American Indian environmental awareness, management, and education

RETURN OF THE NATIVES

The Return of the Natives Project has now trained more than 60 teachers representing more than 25 grammar schools. School classes are propagating plants for restoration and helping to plant these at the Natividad Creek restoration site. This project has coordinated a restoration cleanup day involving 425 Salinas students and their families, and many planting days involving more than one thousand students, their teachers and many other helpers. Almost all volunteers were members of local Hispanic communities. These events are exciting, uplifting, and productive.

FORT ORD WATERSHED RESTORATION PROJECT

The purpose of the project funded by the Department of Defense is to train youth and displaced defense workers in environmental restoration. The Fort Ord watershed is the outdoor class-



16. Close view of ponded water and soil deposition around hay bales in the Natividad Creek.

room for a work-based training program. The heavily developed areas and extensive open spaces at Fort Ord provide excellent examples of environmental problems, including training areas for hazardous waste management and landscape and wildland management.

These environmental problems can be solved through watershed restoration. Training experience centers on the conversion of degraded landscape into essential and functional watershed concurrent with the conversion of a military base into civilian use. The purpose of the environmental training is to teach interns the most important environmental problems encountered in the closure of Fort Ord, and to explore the best solutions in a hands-on demonstration project. The main problems are degradation of water quality by hazardous substances entering surface drainage systems as non-point source pollution, contamination of deeper aquifers by hazardous wastes and saltwater, ordinance removal, and overgrazing by domestic animals. The optimal solutions to these problems are directly related to the restoration of the water-



School classes and community members are taking an active role in restoring watersheds.



Intern Training Program targets 16-25 year olds. It includes leadership training for mentor interns.



17. Hay bales collect eroding soil. There are two older layers of hay below these bales infilling the gully bottom here by about 3 feet.

shed—the central theme of the training program.

The watershed is the most important ecological unit of environmental planning, management, conservation and restoration. Therefore, the common goal which links all aspects of the training program is development of a watershed-wide perspective for evaluating and solving environmental problems.

APPLIED SCIENCE ACTIVITIES

RESTORATION MONITORING

All restoration sites are being monitored to document important ecological patterns in plant community and habitat development. Animal communities, mainly birds and amphibians, are being monitored at selected sites representing each type of restoration habitat. All these data are being stored in a Geographic Information System (GIS).

The restoration monitoring is being developed as a regional model for the Coastal Commission and Department of Fish and Game. In addition to documenting the overall success of the restorations, there are many experimental opportunities to test ideas about restoration ecology, from methods of propagation to growth and survival under different field conditions. This work will become a major

focus of education and research activities at the new campus.

NON-POINT SOURCE POLLUTION MONITORING

The WEOP includes a water quality monitoring program to document non-point source pollution (NPSP), primarily from agriculture and towns. Wetland restoration sites are designated as water quality management areas by the Regional Water Quality Control Board. Here, water chemistry is monitored at peak inflows and outflows. Sediment is tested at peak depositional periods. Animal tissues are sampled in a Mussel Watch protocol using a local freshwater clam suspended in each system. Tissues of target resident species are sampled. If water, sediment, or tissue levels suggest accumulation of a toxic chemical, bioassays will target the problem leading to direct control of the worrisome chemical. Systems free of problems will no longer be sampled on a regular schedule, but will be placed in a separate program for surveillance monitoring by randomly selecting a few systems for check-up sampling of the most sensitive water quality indicators at critical times.

FIRE ECOLOGY

Moss Landing Marine Laboratories and the Bureau of Land Management (BLM) jointly sponsored a fire ecology colloquium on Fort Ord. Management recommendations were compiled with WEOP support. These recommendations were immediately used by the Army, which incorporated them into its long-range plan for burning native habitat to remove unexploded ordinances. The plan establishes an applied science program for direct involvement of university interns with fire management and research. Fire has played a dominant role in structuring large regions of native habitat for thousands of

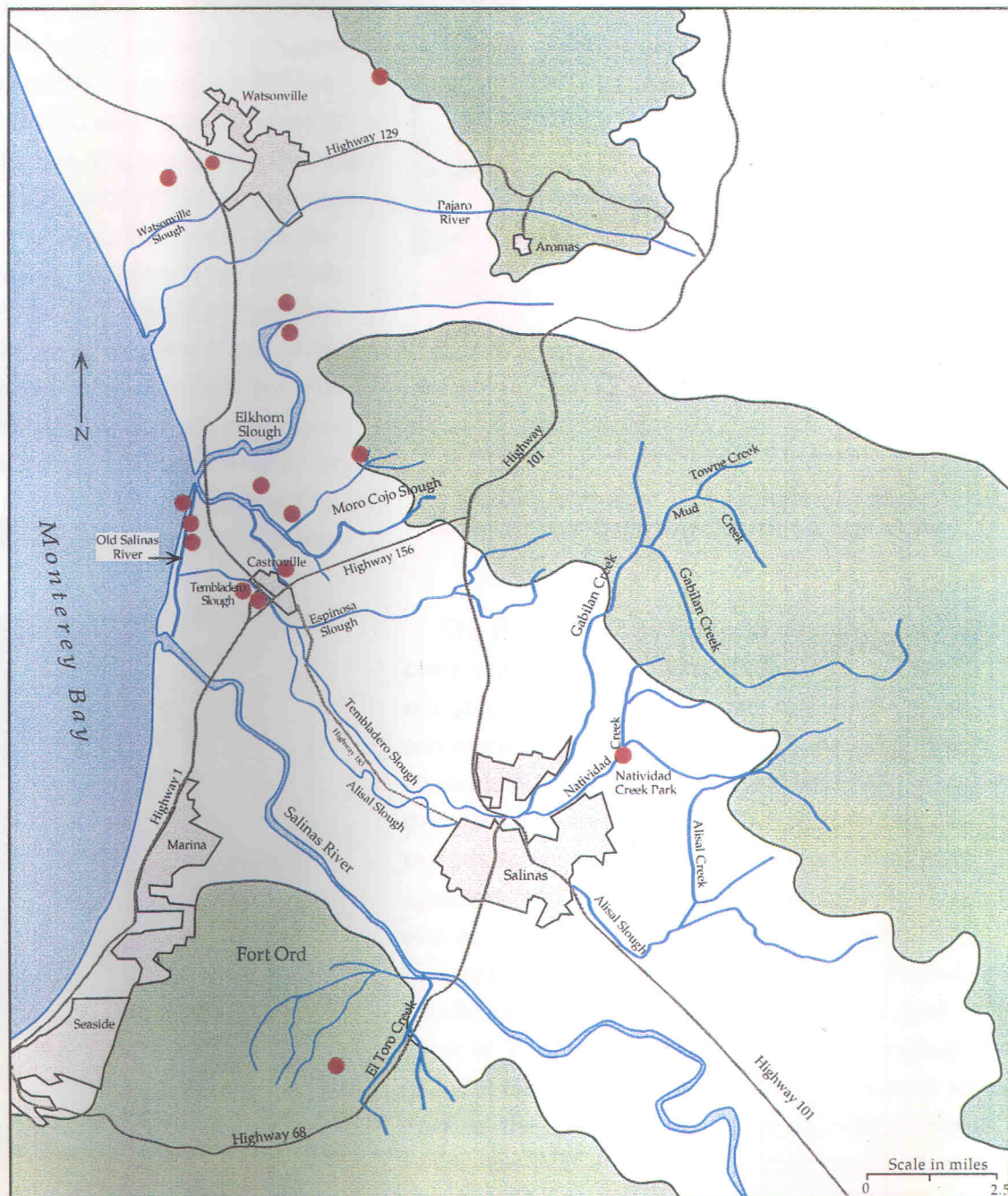
years. Fort Ord can become a model for use of this natural tool to enhance biological diversity and improve the ecological capture of water.

GRAZING MANAGEMENT

Second only to the ditching and draining of wet areas are the severe impacts of livestock grazing. Grazing degrades and destroys wetland habitats, especially riparian corridors on sloping landscapes. Many grazed areas now devoid of wetland habitat were once essential recharge sites for deep aquifers. In the southern Monterey Bay area, including Fort Ord, deep aquifers are now severely impacted by salt water intrusion.

Grazing often leads to erosion problems throughout the watershed. While the erosion scars are obvious, the destruction of wetland habitat and water resources are rarely appreciat-

ed. Therefore, the WEOP and BLM are planning another colloquium on Grazing Management in Fort Ord. This topic is of particular concern to BLM, because grazing practices on BLM-managed public lands represent the most significant national problem faced by this federal agency. BLM manages all grazing land on Fort Ord.



Map 3. WEOP restoration sites (red dots) in the Monterey bay area. The green areas are hillsides above 400 feet.

THE B.A.S.K.E.T. PROJECT

Led by Chuck Striplen, from the Mission San Juan Bautista Mutzún Tribe, local and regional Indian groups are developing the B.A.S.K.E.T. Project:: Beginning Again with Sustainable Knowledge, Ethics, and Tradition. This project focuses on managing culturally significant basketry, medicinal, and food plants using traditional knowledge, technologies, and people. Arroyo willow, creekside dogwood, and sedge are primary wetland plants used in basket weaving by numerous California Indian tribes. As a part of this project, these resources will be managed and utilized in traditional ways for the first time in this century. They will be propagated at the WEOP greenhouses for further expansion in other local wetlands for harvest and education by basketweavers and ethnobotanists. The B.A.S.K.E.T. Project represents outstanding potential for management and protection of natural resources by the original stewards of this land, but furthermore promotes an important and seldom-acknowledged value system: an ecologically sustainable lifestyle based upon the ethic of being a part of the earth, rather than simply living on it.



18. Jacquelyn Ross - 1994 California Indian Basketweavers Gathering. Starting a new basket.

The B.A.S.K.E.T. Project will develop watershed curriculum for the Return of the Natives school education program, participate in the WEOP environmental internship program, sponsoring Indian students interested in traditional land management practices, and present seminars/lectures featuring experts active in the field of traditional land management. We will also be coordinating with other similar organizations, such as The Cultural Conservancy and the Native American Fish and Wildlife Society. Jim May (Keetooah Cherokee), Dean of Information, Resources, and Technology, and Bill Head, who is the primary planner for science on the new campus, are spearheading efforts to link the WEOP B.A.S.K.E.T. Project and other American Indian programs to the CSUMB curriculum.

