WILDLAND RESOURCES CENTER
ANNUAL REPORT
1997 - 1998

SPECIAL
40th
ANNIVERSARY

CENTERS FOR
WATER AND
WILDLAND
RESOURCES

UNIVERSITY OF CALIFORNIA
WILDLAND RESOURCES CENTER
REPORT No. 46
JUNE 1999
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From the Director

With this report, I complete my final duties as director, a position I accepted in 1989. This year also marked another occasion - the 40th anniversary of the Wildland Resources Center. Coincidentally, the year also was the 40th anniversary of the Water Resources Center. We held a special celebration of these anniversaries in spring 1998 at the Water Resources Center Archives at Berkeley and invited past and current faculty, directors, and supporters to join us. Both Centers operated independently until joined administratively during difficult fiscal times in 1993. At that point, I accepted the position of combined Wildlands, Water, Water Resources Center Archives, Salinity Drainage Program, and Water Quality Program) director. During this period, the first challenge was to unite the programs and begin to manage them in a coordinated way. The union was easier administratively with the staff of the Centers than in other ways. All programs retained their special status under University establishment and governance which meant individual budgeting, separate policy committees, and annual reports. As time passed, however, those outside the University increasingly referred to the collective Centers for Water and Wildland Resources as the entity. Staff members worked on projects and tasks of the Centers, and the lines of budgetary or individual Center origination dropped away as intended. As new people join an organization, the only reality is the current situation.

Reflecting on the origins of the Wildland Resources Center forty years ago, I recalled that one of the primary reasons of the first director, Dean of the School of Forestry, Henry J. Vaux, Sr., for having such a center was to provide a home for projects that extended beyond the confines of any department, school, or campus. The Center would be a place that could marshal the forces of the entire University. At that time, the federal government was embarking on one of the earliest nationwide assessments of natural resources - the Outdoor Recreation Resources Review Commission. The Center obtained a major contract under this program. That study will be remembered more than most studies because in the course of gathering scientific information, the Center also asked non-scientists for ideas. The letter in response from Wallace Stegner (to David Pesonen, program coordinator, December 3, 1960) on the value of wilderness became a classic. "I want to speak for the wilderness idea as something that has helped form our character and that has certainly shaped our history as a people." Stegner included the letter in his collection of essays, The Sound of Mountain Water, but it had become known to many as the singular expression of the meaning of wilderness for America.

There was a long period between that first major work and the Sierra Nevada Ecosystem Project (SNEP) that the Center managed starting in 1993, but the Center was ready to handle a $7 million, 3-year
project that involved hundreds of contributors both from within the University and well beyond. The Center continues to work on the establishment of a permanent research and education program for the Sierra Nevada. The Center also manages approximately $1 million annually in other extramural contracts; not a bad ratio for the UC investment of about $75,000 per year.

At the time of my retirement, the Center is undergoing its scheduled five year review. Whether the notion of a universitywide center for coordinating research and managing large scale projects can be maintained in this era of highly independent campuses with their own centers, remains to be decided. One important characteristic may suggest a longer existence - a universitywide center brings together faculty and researchers from all campuses. These programs remain one of few reasons to think that the University of California as more than the sum of its parts.

I have greatly enjoyed my years as director, my contacts with UC scientists interested in natural resources, the contributions of Policy Board members, the support of many individuals outside the University, and the help of a superb staff.

Don C Erman
In 1958, the Wildland Research Center was established at the University of California on the Berkeley campus to help meet a growing need for concentrated scientific study on the problems of California's wildlands. The Center was originally designated to operate within the University’s statewide Agricultural Experiment Stations. As part of commemorating the 40th anniversary of the Wildland Resources Center, this edition of the Center's Annual Report also recognizes the fine efforts and leadership of all the Center's directors. Although Robert Z. Callaham was the technical coordinator and not a director, he is recognized in this section because of his extensive contribution to the Center.
40th Anniversary Celebration

The Wildland Resources Center celebrated its 40th anniversary with a reception hosted by the Water Resources Center Archives on May 19, 1998. The celebration included the Water Resources Center which also marked its 40 year existence.

Attending the celebration was Henry J. Vaux, Jr., Associate Vice President, University of California, Division of Agriculture and Natural Resources and former Director of the Water Resources Center, Don C. Erman, the current Director of the Centers for Water and Wildland Resources Robert Z. Callaham, former Technical Coordinator of the Wildland Resources Center, John Letey, Associate Director of the Centers for Water and Wildland Resources, Rex Woods, Water Resources Center Academic Coordinator (retired), the staff of the Centers for Water and Wildland Resources, the staff of the Water Resources Center Archives, and several UC faculty and others who have had a long-standing relationship with both Centers.

Director Erman welcomed the guests and thanked everyone for their support of the Centers. His remarks included a brief history of the Centers and his expected role of the Centers in the future.
About the Center

The Wildland Resources Center is a systemwide multicampus organized research unit and special program supported by and reporting to the Associate Vice President for Special Projects and Programs of the Division of Agriculture and Natural Resources. The Center is charged with extension and continuation of activities concerned with terrestrial natural resources. The Center achieves this by staying abreast of current research being done in areas such as GIS, bioregions, ecology, environmental policy and management of forests and wetlands. Leaders in the Agricultural Experiment Stations and Natural Reserve System are kept fully informed about all matters affecting the Center.

The Center is guided in fulfilling its goals and objectives by two types of committees. The Policy Board comprised of twelve members of the academic staff from several campuses and specialists from the Cooperative Extension is the primary advisory body for the Center. Technical panels are formed as needed to help guide specific projects.

Located on the Davis campus, the Center is part of the Centers for Water and Wildland Resources. This organization also includes the Water Resources Center, the Salinity/Drainage Program, the Water Quality Program, and the Water Resources Center Archives.

GOALS AND OBJECTIVES

The Wildlands Resources Center seeks to stimulate research and to foster extension of knowledge on the conservation, management, and utilization of wildland resources with a view to their optimum present and future use. Broad general goals are:

* Enhance the capacities and image of the University’s research and extension work related to wildlands;

* Provide liaison among the University’s academic staff and key people in state and federal agencies and organizations concerned with wildland resources and problems;

* Provide coordination and collaboration among the University’s wildlands research and extension activities.

Objectives of the Center change with time. Current efforts include:

* Providing information about the Center to scientists and specialists concerned with terrestrial renewable natural resources;

* Bringing awareness to administrators and the academic staff of the University of the social, economic, and environmental importance of California’s wildlands;

* Augmenting financial support through the Center for the University’s programs in research and extension related to wildlands;

* Informing investigators of availability of research funds in their areas of expertise;

* Building and maintaining directories to expertise and facilities related to wildland resources in California;

* Informing state and federal agencies, public utilities, and environmental groups concerned with wildlands and associated resources regarding the role and activities of the Center and the capabilities of the University to solve their problems;

* Providing facts and information about government agencies concerned with wildlands and assisting the academic staff in contacting agencies for support and assistance;

* Assisting in planning of research, development, and extension programs to solve wildland problems;

* Building an infrastructure to support watershed management research and extension;

* Create new uses of the World Wide Web to provide information about natural resources and their effective management.
The Policy Board

The Center's Policy Board met twice during the fiscal year. The first meeting in December reviewed the program, activities, and finances of the Center. The second meeting in May by teleconference reviewed new and continuing contracts and grants, the Center's publications, and solicited nominations for members whose terms have ended. These meetings establish priorities for the Center and give the Center's program direction.

The Policy Board establishes policy for the Center, advises the Director, and acts as liaison on the campuses and to agencies, citizens, faculty, and students. It is chaired by one of its twelve members who is elected annually at a meeting of the Board. New members are selected from candidates nominated by current Board members and are appointed by the President of the University. Members serve for a three year term and may serve a maximum of two terms. Members of the Policy Board and the year their term ends are:

Richard Church
Geography
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term ends - 2000

Timothy Duane
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term ends - 1999
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The California Environmental Resources Evaluation System (CERES) is an information system developed by the California Resources Agency to facilitate access to a variety of electronic data describing California’s rich and diverse environments. The goal of CERES is to improve environmental analysis and planning by integrating natural and cultural resource information from multiple contributors and by making it available and useful to a wide variety of users. CERES collects and integrates data and information and distributes it via the World Wide Web, tapping into important information sources and contributing to advances in the science of data management and metadata cataloging by encouraging cooperation among government, educational, and private groups.

CERES’ objectives include:

- Information Inventory. Locate, describe, and catalog relevant environmental information sources statewide;
- Information Integration. Increase the value of the California’s investment in environmental information by integrating different data sources into combined products allowing for the reuse of existent information in new efforts;
- Information Infrastructure. Facilitate the creation and maintenance of cost efficient infrastructure with which to store, transmit, and analyze information about California’s environmental resources;
- Public Access. Increase public access to the information used to make decisions which affect the California environment.

The average number of hits to the CERES site per week is approximately 27,000, but during public emergencies, web site accesses almost triples. The inquiries come from commercial, government, educational, and military users throughout the world. CERES has demonstrated there can be economic benefits to distribution of information via electronic format. For example, the release of the Environmental License Plate web site coincides with the reversal of more than a four year decline in revenues generated by this important funding resource.

CERES provides technical support for the Resources Agency including:

- Maintenance of the Resources Agency Local Area Network (LAN) and the workstations in the Office of the Secretary;
- Maintenance and support of server systems for Resources Agency staff which provide for e-mail, web pages, file sharing, calendaring, scheduling, and backup;
- Web development and support for topics of current interest.

CERES also provides training and outreach to facilitate use of the World Wide Web as an information sharing tool as follows:
• CERES made more than fifty presentations at conferences, ex-
hibits, seminars, and workshops in 1998;

• CERES provided web hosting and technical advising services for
qualifying organizations. Currently more than forty groups, in-
cluding the Sierra Nevada Ecosystem Project, make use of the
CERES Guest Web service which enables them to make informa-
tional products available despite constraints in funding and tech-
nical staff.

The CERES Web Page
http://www.ceres.ca.gov

The CERES web page provides a starting point for environmental
information discovery and access to CERES’ many specialized in-
formation systems. New solutions in information sharing, search,
and access were continually integrated into the CERES web in 1998.

Land Use Planning Information Network (LUPIN)
http://www.ceres.ca.gov/planning

CERES’ Land Use Planning Information Network (LUPIN) pro-
vides an aggregate view of California’s land use and environmental
planning information. Developed in collaboration with other state,
federal, and local agencies, LUPIN offers unprecedented access to
planning documents such as general plans and zoning ordinances,
reports and publications, legal and regulatory information, and other
essential data. In 1998 participation from 57 counties and numer-
ous cities and planning groups continued to expand as they pro-
vided additional access to digital information. The project gives
web users the capability to search the database of sixteen years of
records from the Governor’s Office of Planning and Research is
nearing completion.

California Flood Information Web Site
http://www.ceres.ca.gov/flood

The Flood Web site offers integrated access to the information of
emergency management organizations. Regional summaries and
graphic representations of data make it possible to obtain a quick
overview of the emergency. During 1998, CERES continued to
maintain and upgrade this service and explore opportunities to ap-
ply this approach for coordinating access to information about other
emergency situations such as fires and earthquakes.

Environmental Law
http://www.ceres.ca.gov/elaw

The Environmental Law web site offers summaries, statutes, guide-
lines, case law, and related materials pertaining to California and
federal environmental law and policy, environmental impact assess-
ment law, and land use law in addition to the California Govern-
mant Attorney’s Resources and links to Online Law Libraries. In
1998, CERES added new material to its environmental law web
site, offering an interactive version of the California Environmen-
tal Quality Act (CEQA) process flowchart, public access to the
CEQA guideline revisions, and many other new resources.
Environmental Education
http://www.ceres.ca.gov/education

CERES' online environmental education web site outlines such diverse curricula areas as natural and social sciences, English and language arts, visual and performing arts, and mathematics for students and teachers. The environmental education web site began in 1995 and was maintained and upgraded in 1998.

Watershed Information Technical System (WITS)
http://www.ceres.ca.gov/watershed

WITS provides information and tools to support local watershed planning, restoration, monitoring, and education. It offers environmental documents, basin plans, visual materials, maps, and contacts with watershed groups.

California Wetlands Information System
http://www.ceres.ca.gov/wetlands

The California Wetlands Information is a compilation of public and private sector information including maps, environmental documents, agency roles in wetlands management, restoration and mitigation activities, regulatory permitting, and wetland policies.

The California Environmental Information Catalog
http://www.cere.ca.gov/catalog

In October 1997, CERES, in cooperation with the California Geographic Information Association, released an online data logging system that may be used from a web browser to create, share, and maintain federal-standard compliant metadata. Catalog entries describe data holdings from state resource agencies, local governments, and university research programs. Outreach efforts are in progress to extend participation. In 1998, the Catalog grew to a corpus of more than 800 metadata records being contributed by approximately sixty organizations and became the focus of cooperative projects to coordinate local and thematic information sources. CERES promotes these efforts with training and customized technical solutions to maximize the discovery of these shared datasets. The Catalog forms the technical basis for information sharing via CERES and its topic- and datatype-specific information systems such as the OCEAN web site and the CalSIP Project.

California Environmental Keyword Thesaurus Project
http://www.ceres.ca.gov/thesaurus

The Thesaurus Project demonstrates techniques and establishes standards for use of controlled vocabularies in web-based information discovery and cataloging. In 1997, the U.S. Geological Survey/Biological Resources Division and the California Resources Agency established a collaborative project for the development of software tools that will allow navigation and searching of networked thesaurus databases including the USGS' Integrated Taxonomic Information System. The resulting standardized method for networking distributed thesauri and user-interface software will enable use of the vocabulary terms from any participating server as keywords in metadata records and data searches. A core set of environmental keywords is being developed from which to guide the user to multiple vocabularies.
California Land Science Information Partnership (CaLSIP)
http://www.ceres.ca.gov/calsip
This five-year grant from the National Aeronautic and Space Administration (NASA) will provide public access to a wide variety of geographic information via the World Wide Web. It will apply innovative software to make imagery and data from NASA’s earth observation system and other federal, state, and local agencies easily accessible for land use planning and emergency response. The first versions of the new system were implemented in 1998. A data server development is underway as well as plans for prototype operations in eight California counties.

California Ocean and Coastal Environmental Access Network
http://www.ceres.ca.gov/ocean
This project is both mandated and funded by the California legislature in conjunction with the California Resources Agency’s Ocean Resources Management Program. The Cal OCEAN web site is a comprehensive online resource developed to support local ocean resource managers with a geographic atlas and catalogs to facilitate access to data as well as contacts to other programs. Released in October 1998, the Cal OCEAN web site and its Ocean Atlas, an online GIS application served by the State Lands Commission, continues to be the focus of collaborative data-sharing efforts with other California Resources Agency departments and federal ocean resource management programs.

California Environmental License Plates
http://www.plates.ca.gov
Developed in cooperation with the Department of Motor Vehicles, this web site provides instant access to current information about customized Environmental License Plates and downloadable forms for placing orders. After its debut in December 1997, the first six months of its operation saw revenues from the sale of environmental plates increased by 6% (approximately $1 million).

Headwaters Forest Web Site
http://www.ceres.ca.gov/cra/headwaters
CERES has made information available to the public regarding the Headwaters Forest agreement. The web site includes maps, hearing transcripts, the draft versions of the Habitat Conservation Plan/Sustained Yield Plan, and the Environmental Impact Statement/Environmental Impact Report for public review, and the recently published the Final Environmental Impact Statement/Environmental Impact Report.

POPULATIONS SERVED:
• Resources Agency and constituent departments, boards, commissions
• Other state and federal agencies
• Resource managers and decision makers
• Regional and local governments
• Nongovernment environmental groups
• Environmental educators and students
• Researchers
• Land use planners, consultants, and stakeholders
Managed ecosystems require investment to maintain their health and the well-being of the communities they include. The purpose of this study is to examine the paths and flows of products from ecosystems as investments, and reinvestments back into ecosystems. This project studied the resource-based economies and local communities in three Northern California bioregions: North Coast/Klamath, Modoc, and the Sierra Nevada. These regions are predominantly forest and rangelands with a mixed pattern of public and private ownership.

Three different valuations methods were used to cover the different goods and services:

1) Type A goods and services are usually traded in open markets where prices are set based on supply and demand. Examples include water-based ecosystem commodities (hydroelectric power, agricultural and municipal water, and commercial fishing), forest products, and agricultural products.
2) Type B goods and services are rarely traded directly, but are embedded in other goods and services that do have market prices. Estimating the value of these services that are typically only a fraction of the overall value of the traded goods and services requires assumptions on what percent of the total value can be apportioned to the ecosystem related goods and services. Examples of Type B goods and services are tourism and developed recreation, undeveloped recreation, and residential amenities that accrue to adjacent residences.

3) Type C ecosystem services are more commonly valued through markets, laws, and political agreements. Examples include landscape preservation through parks and reserves, biodiversity measures, carbon sequestration in forests to reduce global warming pressures, maintenance of water quality, and option values of future uses and values of natural resources.

Market-clearing prices of various resources are used as a basis for calculating the net ecosystem value. When costs are incurred to provide the resources (e.g., roads for access to timber sites, park upkeep for recreation), estimates of the costs are subtracted from the market-clearing price to get at the net ecosystem value. Where no market exists, “market-clearing” prices are estimated as prices that would prevail if those markets existed. Estimated market-clearing prices for non-commercial recreation and agricultural water use were taken from Resource Pricing and Valuation Procedures for the Recommended 1990 RPA Program.

Based on the sectors covered, the annual ecosystem value of products and services is approximately $4 billion. Downstream urban and agricultural water consumption is the leading value and accounts for 40% of the total value. Commercial and non-commercial recreation is second largest sector, followed by timber harvests. Each bioregion has a significantly different ranking among the different sectors. Timber harvests and commercial recreation are the two largest sectors on the North Coast. Water values dominate all other values in the Modoc Region. Water values, commercial recreation, and non-commercial recreation are three main sources of value from the Sierra Nevada.

Regional economic vitality is an important precondition for economic vitality at the community level. High unemployment and poor future employment prospects place a heavy burden on communities and impair their ability to be active stewards of the ecosystem. Employment patterns in these bioregions have changed dramatically since the 1960s when it was not uncommon for timber and other commodity related jobs to account for 25 - 35% of all jobs. By the early 1990s, timber jobs constituted only 5 - 10% of all jobs in the counties that still had a significant timber industry presence. During the 1990s, timber employment declined precipitously in areas where most of the timberland is federal, but stayed relatively constant when there was a large private timber base. None of the counties exhibited any noticeable growth in tourism-related sectors where the was a significant decline in logging activity in the forests. Timber harvesting appeared to be more compatible with recreation than with expanding concerns over residential amenities expressed by new residents.

The project estimated expenditures for a subset of government programs to assess the overall scale and pattern of investments in ecosystems not directly related to commodity production. Restoration and enhancement, research, assessment, monitoring, and fire management were considered to be ecosystem investments. A variety of state and federal resource management programs were examined to provide a more detailed characterization of public
investments in ecosystems in the Klamath/North Coast, Modoc, and Sierra Bioregions. Among the forty-four programs reviewed, the three main strategies for delivering financial capital to landscape activities were the reserve strategy, the intervention/intensive restoration strategy, and the promotion of effective stewardship on the working landscape.

The acquisition and management of reserves is the major type of investment. Restoration projects were also a major type of investment along the coast. The promotion of stewardship on private land or as part of private contracts on state lands is primarily conducted through regulatory standards with relatively limited funding available. The principal source of investment capital in the bioregions is appropriations from federal and state treasuries.

Of the three strategies for delivering financial capital to landscape activities - the reserve strategy, the intervention/intensive restoration strategy, and the strategy of promoting effective stewardship on the working landscape - stewardship received the least investment from public sources. When there is evidence that the ecosystem is still within the bounds of natural or assisted resiliency, a reinvestment framework can provide a conceptual model that clarifies the many linkages between forested ecosystems and the many communities that benefit from them, irrespective of whether they are adjacent to the trees or at the end of the watershed or diversion canal. It can also promote institutional and market innovation since there will be an everpresent need to evaluate if the investments have added to the value of the underlying asset and its ability to create valuable outputs.

CALIFORNIA TAHOE CONSERVANCY PROJECTS

The mission of the California Tahoe Conservancy, an agency within the California Resources Agency, is to preserve, protect, restore, enhance, and sustain the unique and significant natural resources and recreational opportunities of the Lake Tahoe Basin. The Conservancy accomplishes this by implementing seven major programs:

- Environmentally-sensitive land acquisition,
- Land coverage mitigation,
- Public access and recreation enhancement,
- Resource management,
- Soil erosion control,
- Stream environment zone and watershed restoration, and
- Wildlife enhancement.

The Centers for Water and Wildland Resources (CWWR) provide consultant services and project coordination for most of these programs. CWWR consultants participate in all stages of project planning. In general, these tasks include initial project identification and development, monitoring construction oversight/direction of work crews, and post-project monitoring and maintenance.

EROSION CONTROL PROGRAM

Development in the Tahoe Basin has altered natural drainage and runoff patterns. Impervious surfaces, such as roads and roofs, combined with the elimination of natural vegetative cover have increased the volume and speed of
runoff. This has made soils vulnerable to erosion. As a result, approximately 19 times the natural amount of sediment is entering Lake Tahoe. Algal growth due to excessive nutrient input contributes greatly to the loss of Lake Tahoe's world-renown clarity. In order to address this, the Tahoe Conservancy's soil erosion control program supports projects which reduce sources of erosion, stabilize transport of runoff, and treat runoff prior to entering the lake.

The program reviews plans, coordinates erosion controls projects with local jurisdictions, and inspects projects during and after construction. Recent projects include the Angora Creek, Hekpa, and Ski Run erosion control projects.

INFORMATION TECHNOLOGY

The purpose of this group is to enable Tahoe Conservancy staff to take full advantage of current information technology. The Conservancy staff now has the computer network system necessary to access the World Wide Web. In addition, e-mail will improve communications between the Conservancy and other agencies. Future projects include creating and maintaining a Conservancy web site.

A Geographic Information System (GIS) is being developed that will support the planning and evaluation efforts of all Conservancy programs. The system combines data about the natural and developed environments, and can be used to coordinate program activities, identify future projects, and evaluate past work.

RECREATION AND PUBLIC ACCESS PROGRAM

The Carnelian Bay Lake Access Project is a $7 million project that provides public access improvements to seven acres of Conservancy-owned lands with more than 1,100 feet of frontage on Lake Tahoe. The project will also restore three acres of critical wetland habitat within the highly developed Carnelian Bay Community Plan Area. Staff funded by CWWR have key roles in the planning, permitting, and construction management of the Carnelian Bay Project, as well as coordinating the North Tahoe Beach Center Project through public review of future options for this Conservancy-owned facility. The Tahoe Basin Road Marker Project has recently been completed in Placer County. When implemented lakewide, this project will unify public recreation facilities throughout the Tahoe Basin by creating clear and consistent public access signage. Significant progress has been made with the help of CWWR-funded staff to plan, grant funds, and oversee construction of several missing critical sections of the Class 1 paved bicycle trail in the Tahoe Basin. Exchange students from Russia participate in the Tahoe-Baikal Institute each summer which is also part of the Recreation and Public Access Program.

RESOURCE MANAGEMENT PROGRAM

The Resource Management Program addresses the Conservancy's mission through three program areas: land management, ecological restoration, and forest management. These activities include the protection, enhancement, and restoration of water quality and the natural environment. Regular property inspection and evaluation identifies Conservancy parcels needing restoration, and develops projects to meet those needs. Environmentally-sensitive lands may be restored through stream environment zone enhancement,
installation of erosion control measures, revegetation of barren and disturbed soils, fill removal, and stabilization of roadcuts. Many of these restoration activities are performed by work crews trained and directed by CWWR-funded staff.

Forest management activities are a high priority under the Conservancy's Resource Management Program. The objectives are to reduce the risk of fire, promote forest health, and enhance wildlife habitat. Due to historical land management practices in the Lake Tahoe Basin, such as clear-cutting and fire suppression, today's forests generally contain a greater number of trees, while lacking species and age diversity more typical of pre-European settlement forests. These unfavorable conditions make forest stands more susceptible to insects and disease, increase the risk of catastrophic wildfire, threaten public safety, and contain diminished wildlife habitat. This program develops, implements, and monitors forest and vegetation management projects including prescribed burns to address these concerns.

The Conservancy's GIS is being used to integrate resource management activities within subwatersheds of the Tahoe Basin. Watershed level planning and evaluation will provide the Conservancy with a more comprehensive understanding of the natural processes that affects its work. Planning within a watershed can improve coordination and increase the effectiveness of program activities.

STREAM ENVIRONMENT ZONE AND WATERSHED RESTORATION PROGRAM

The preservation and restoration of stream environment zones (SEZs) is essential to the health of Lake Tahoe because they provide natural treatment and conveyance of runoff. While SEZs comprise only 5% of the land area within the Tahoe Basin, they are key habitat and migration corridors for wildlife, improve the scenic values of the basin, and provide dispersed recreation opportunities. CWWR-funded staff participate in pre-project activities for the restoration of Snow Creek and the Upper Truckee River (see below), and continue to monitor completed projects at Lonely Gulch and Griff Creek.
Since the Comstock period, the Upper Truckee River and its surrounding wetland have been altered for urbanization and other historic land uses. The most significant of these changes occurred with the development of the Tahoe Keys in the 1950s and 1960s. 450 acres of the original 1,100-acre wetland were dredged and filled into a residential subdivision and marina, creating peninsulas of filled land surrounded by a system of artificial lagoons connected to the lake. The Conservancy now owns 36 acres of this fill-covered wetland, adjacent to 2,000 feet of deep, straightened channel at the river's mouth. The reduced capacity and inaccessibility to the wetland by river overflow have diminished the wetland's ability to filter sediment from river water prior to entering the lake. This has degraded the water quality of the largest tributary and single largest sediment source to the lake. Wildlife and fisheries habitat have also been lost as a result of disturbances to the wetland.

The objectives of the Upper Truckee River and Wetland Restoration Project are 1) Improve the lake's water quality by restoring the river at its mouth and reestablishing the floodplain and wetlands, 2) Create and enhance wildlife habitat, and 3) Provide for public access and recreation. It is the Conservancy's largest restoration project. Since 1994, CWWR-funded staff have provided pre-project research, coordination, and hydrologic/hydraulic analyses for this project.

WILDLIFE ENHANCEMENT PROGRAM

This program includes the Washoe Meadows Wildlife Enhancement Project, the General Creek Wildlife Enhancement Project, and the Tahoe Yellow Cress Monitoring Project. The Washoe Meadows Project involves enhancing 54 acres of meadow habitat including restoration of the historic channel of Angora Creek. The historic channel had been diverted around the existing meadow while the area was operated as a dairy farm. The Washoe Meadows restoration was completed in October 1997 and will be under continual monitoring until the meadow eventually returns to its pre-disturbance condition.

The goals for the General Creek Project include the enhancement and restoration of related riparian and forest habitat, and the improvement of fisheries habitat along a 1.14 mile section of General Creek. The project's goals will be accomplished through various activities, including the removal of instream debris barriers, road removal and revegetation to restore riparian habitat, and other activities to increase vegetative health and diversity in riparian and surrounding habitat.

The Tahoe Yellow Cress Monitoring Project is focused on documenting and preserving habitat for the state-endangered Tahoe yellow cress (*Rorippa subumbellata*). The Tahoe yellow cress is a small plant in the mustard family that occurs only along the shores of Lake Tahoe. Surveys are conducted twice yearly to document abundance and habitat condition. Recreational impacts from beach use and fluctuating lake levels are the limiting factors determining the availability of habitat for this plant. With help from participants from the Tahoe-Baikal Institute, the Conservancy has been able to compile survey data from the past twenty years and map current and past plant sites on the GIS. Survey work will continue indefinitely.
Community-based environmental planning and management has become an increasingly popular strategy for resolving local environmental gridlock. Public funding for local partnership projects is increasing yet, while that has had some success and some impasses have been broken, evaluation of the effectiveness of these efforts on a broad scale has not been done. Inadequate assessment of projects, and equally important, inadequate assessment of their social and institutional implications make it difficult for agencies to learn how best to support and participate in these efforts, how to discern when local partnership projects are most appropriate, or how to provide public accountability of project and public expenditures.

This pilot study of three local partnerships is designed to evaluate and refine a methodology for evaluation of partnership groups for a larger study. Specifically, study methodology will focus on a) why groups form, b) measures of success, c) social outcomes including social capital and community capacity development, and d) public agency investment and interaction with groups.

Jonathan Kusel is serving as a technical advisor to the project reviewing data and results from the pilot case studies, assisting in methodological refinement, participating in focus sessions with pilot groups, and developing the larger local partnership research project. This research is being conducted as a part of the legislatively mandated Forest and Rangeland Resources Assessment.

INVENTORY OF BAT SPECIES OF SPECIAL CONCERN IN LATE SUCCESSIONAL/OLD GROWTH FOREST STRANDS IN NORTHWESTERN CALIFORNIA

A growing body of research on forest dwelling bats in western North America has documented the importance of intact old growth areas or "legacy trees" as roosting habitat for many species. The Coast Ranges of northwestern California contain some of the most important timber land in the West, yet virtually nothing was known regarding the distribution and abundance of bat species in this area. The only regional surveys of mammalian distribution had been conducted by the Museum of Vertebrate Zoology in 1916, before currently used survey equipment (e.g., mist nets, bat detectors) was available.

This study focused on lower elevations forests in five major river drainages (the Eel, Klamath, Salmon, Scott, and Trinity) with additional information obtained at both high and low elevation in some of the creek drainages in the Mendocino National Forest (e.g., Dillon, Grindstone, Stony, Little Stony, and Thomas Creeks). All 17 bat species that were expected to live in the area were detected. Seven of these are either currently listed or proposed for listing as Mammal Species of Special Concern by California Department of Fish and Game. Significant range extensions were obtained for these species: the western pipistrelle - *Pipistrellus hesperus*, the small-footed myotis - *Myotis ciliolabrum*, the spotted bat - *Euderma maculatum*, and possibly the mastiff bat - *Eumops perotis*. The silver-haired bat, *Lasionycteris noctivagans*, an obligate tree-dwelling species, was one of the most widespread and com-
monly encountered species, whereas the Mexican free-tailed bat, *Tadarida brasiliensis*, a cave and cliff dwelling species that is common in other parts of California (e.g., the Sierra Nevada), appeared to be very rare in the Trinities. Also, relatively uncommon were three other tree-dwelling species: the long-eared myotis - *Myotis evotis*, the fringed myotis - *Myotis thysanodes*, and the long-legged myotis - *Myotis volans*.

This study illustrated the importance of using multiple sampling techniques (acoustic, mist-netting, and roost surveys) in acquiring distributional information. Three species with distinctive echolocation calls were only detected acoustically. One species was found only at roost sites and others, and although it was detected acoustically, it could only be positively identified through net capture. Mist-netting surveys conducted in 21 foraging areas generally over water yielded 567 individuals of 14 different species. While these data were invaluable in providing information on species composition, reproductive status and foraging habitat requirements, they were not necessarily informative regarding roosting habitat. Many of the tree-dwelling species travel considerable distances to forage, and thus were sometimes captured in areas that were 5 - 10 km from the nearest possible roosting sites.

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**WILDFIRE MANAGEMENT ANALYSIS**

This project continues to focus on development of key data and analytical tools for understanding the changing role of managing wildfire in California's complex social, political, and physical environment. The project has served as the basis for interagency fuel development and has completed surface fuel mapping for northeastern California, south through the Sierra Nevada mountains. Ongoing work is also looking at crown fuel classifications, development of custom fuel models, advanced fuel mapping methods, and exploration of silviculture-hazard interactions. Analysis using FARSITE, a spatial fire spread model, has also aided in understanding the effectiveness of various fuel treatment patterns on landscape fire impacts, including potential watershed disturbance, tree mortality, and costs/losses from catastrophic wildfire. The project has also served as an important source for training in FARSITE which is becoming a tool in fire management nationally.

As human and natural forces modify California's landscapes, public concerns and regulatory mandates drive resource agencies to monitor and assess these changes. The U.S. Forest Service and the California Department of Forestry and Fire Protection have responded by collaborating on a statewide change detection project that provides a seamless picture of land cover change across jurisdictions within regions of California during a five year period. This project uses Landsat Thematic Mapper™ satellite imagery with 30-m resolution to locate land cover change and assess its cause, amount, direction, and permanence. This information supports evaluation of existing policies, programs, management activities, and regulations, particularly their cumulative impact across jurisdictions within watersheds and bioregions.

This project covers California in five separate project areas. The first project area in the southern Sierra Nevada Mountains was completed in 1996. The second project area in the northeastern portion of the state was completed in 1997. Currently, analysis in the Southern California area is being conducted and analysis of the north coast area and the Central Valley will occur in 1999 and 2000 respectively.
Since 1997, this project has conducted the assessment phase of the Five County Salmonid Conservation Plan. Five counties in Northern California (Humboldt, Del Norte, Siskiyou, Trinity, and Mendocino) have joined together in this unique conservation planning project. These five counties are within the "Transboundary Evolutionarily Significant Unit (ESU)" for the threatened coho salmon. Being so, land use and development activities occurring within them could be subject to constraint due to the federal Endangered Species Act. Soon after this listing of the coho salmon, supervisors from the five counties met and concluded that the economies of the counties were at stake unless they developed a conservation plan that would meet the requirements of the National Marine Fisheries Service. A Memorandum of Understanding was developed to formally join the counties for the purposes of evaluating strategies for protecting anadromous fish and their habitats while minimizing disruptive impacts on local land uses and economies. The result is the ongoing Five County Salmon Conservation Plan.

The Five County Salmonid Conservation Plan is a joint project of the University and the above-mentioned five counties. Richard Harris is responsible for performing an assessment of existing county policies and procedures in terms of their potential impacts on anadromous fish and their habitats. This involves 1) Review of all written policies (e.g., general plans, ordinances), 2) Review of development project case studies (e.g., subdivisions and commercial projects), and 3) Field assessment of land development regulation and of county road and flood control maintenance practices. This phase of the project was completed in July and a draft report was released in late August. The field assessment of more than 50 sites in the five counties was performed by a team consisting of county planning and public works personnel, a fisheries biologist, a geologist, and University Cooperative Extension scientists. Once the report has been reviewed and accepted, it will be used by the counties to develop inventory of the fish as well as developing management and educational programs for improving fish habitat conditions. A comprehensive plan is due for completion in late 1998.

The Five County Salmonid Conservation Plan is an innovative approach to solve endangered species management problems from the local level rather than from the top down. It is viewed by many observers as a model for other counties and states. In fact, a similar approach is being used in the six counties comprising the Central California ESU: southern Mendocino, Sonoma, Marin, San Mateo, Santa Cruz and Monterey.

PUBLIC ACCESS TO SIERRA NEVADA ECOSYSTEM PROJECT (SNEP) DATA

Since its submission to congress in 1996, the report of the Sierra Nevada Ecosystem Project (SNEP) has served as the single most comprehensive assessment of critical aspects of the Sierra Nevada ecosystem. In addition to the more than 3,000 pages of text, the report also includes a variety of digital databases available through SNEP web sites. Recognizing the existence of numerous potential users of SNEP data, and realizing that data and its use
would benefit greatly from further organization, modification, and explanation, the Centers obtained funding to enhance SNEP data in several ways. By the end of 1998, the initial efforts of the SNEP data improvement project were nearly complete. These include a more complete directory to date, better organized and labeled files, a more logical display of data by themes, and an addition of data coverages not initially available on the web sites. In addition to better public access to the data, users will also have the added capability to more easily download data as well as view maps and geographic information system (GIS) products specific to their areas of interest.
## Contracts

Contracts for Fiscal Year 1997-1998 are:

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<tr>
<th>Project Description</th>
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<td>CALIFORNIA ENVIRONMENT RESOURCES EVALUATION SYSTEM</td>
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<td>STATEWIDE POTENTIAL YIELD LOSSES OF EXPOSURE TO AMBIENT ZONE</td>
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<td>CARNEILIAN BAY LAKE ACCESS PROJECT, NORTH TAHOE BEACH CENTER</td>
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<td>by California Department of Forestry and Fire Protection</td>
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**INVENTORY OF BAT SPECIES OF SPECIAL CONCERN**
by California Department of Fish and Game

**WILDFIRE MANAGEMENT ANALYSIS**
by California Department of Forestry and Fire Protection

**EFFECTS OF COUNTY LAND USE REGULATIONS AND MANAGEMENT ON ANADROMOUS SALMONIDS AND THEIR HABITATS - FIVE COUNTY STUDY**
by California Department of Forestry and Fire Protection

**PUBLIC ACCESS TO SNEP DATA**
by California Department of Forestry and Fire Protection

**TOTAL ALL CONTRACTS**
$1,179,468
Collaboration and Projects

CALIFORNIA BIODIVERSITY COUNCIL

The Director continues to represent the University on the California Biodiversity Council as the alternate for Division of Agriculture and Natural Resources Vice President W. Reginald Gomes. The Council, chaired by the Secretary of the California Resources Agency, is comprised of 26 members including state and federal agencies with land management responsibilities in California and all county government associations. The Council meets quarterly in various California regions to hear local groups describe their resource planning activities and inform the Council about measures needed to improve environmental and economic conditions. The charge of the Council is to 1) promote information sharing at local and regional levels, 2) increase awareness of opportunities for cooperative working relationships, and 3) coordinate efforts of state and federal government to promote efficiency by avoiding duplicate efforts. During the past year, the Center assisted implementing these meetings and has managed the Council’s finances. Mike Oliver has served as staff to the Council. The Council continues to focus on facilitating local land use planning and improving biodiversity research, education, and outreach.

In December 1998 at a reception for members of the California Biodiversity Council, Director Don C. Erman was presented with a Special Recognition Award for “outstanding contributions as a member of the California Biodiversity Council” by Doug Wheeler, Secretary of the California Resources Agency. This award recognized several Council members and many others for their contributions to the Council and its activities during the past seven years. John Hopkins of the Institute for Ecological Health has been contracted by the Centers to do an assessment of the fallow lands inventory in California and to summarize opportunities currently available through various agency incentive programs in order to increase and link fallow land acerages. His preliminary assessment of conservation projects started by a few farmers shows the potential for providing more habitat, especially streamside vegetation, small patches of native grasses, small wetlands, and hedgerows. Broad adoption of these practices would provide major benefits for many wildlife species, improve ecosystem health in the Central Valley, and provide a variety of benefits to farm operations. However, a number of changes are needed in farmland habitat conservation policies, financing, and implementation activities in order to achieve widespread adoption of these techniques. Cost for this project is $14,000.

SIERRA NEVADA NETWORK FOR EDUCATION AND RESEARCH (SNNER)

The Sierra Nevada Network for Education and Research (SNNER) is a project funded for $85,365 through the Centers by the University of California, Office of the President. The need for coordinated conservation planning in the Sierra Nevada has resulted in region-wide discussions and analyses of goals and operating principles for such an effort. The SNNER initiative is also a part of the planning effort for the new UC campus at Merced and will help form the foundation of a renewed research emphasis on the Sierra Nevada. The SNNER will contribute to the UC Merced planning through facilitating communication among parties who are both interested and invested in coordinated research and planning for the Sierras, and who intend to participate in watershed projects. The watershed projects will bring the University’s scientific resources to bear on conservation issues in collaboration with interested federal, state, local regulatory bodies, landowners, and citizen groups.

The project has its roots in a recommendation echoed repeatedly since the beginning of this decade. This recommendation stipulates that the Sierra Nevada would benefit greatly from a University-administered focal point for database management, research coordination and facilitation, and educational and outreach efforts. Building on this recommendation, SNNER proposes to emphasize the benefits of a network approach to serving the needs of the range as a way to enhance the two-way flow of information and resources vital to sustaining ecosystem components and processes while also providing for human needs.

FALLOW LAND PATCHES AND ECOSYSTEM HEALTH IN THE AGRO-ECOSYSTEM

Johns Hopkins of the Centers for Ecological Health in Davis, California has been contracted by the Centers to do an assessment of the fallow lands inventory in California and to summarize opportunities currently available through various agency incentive programs in order to increase and link fallow land acerages. His preliminary assessment of conservation projects started by a few farmers shows the potential for providing more habitat, especially streamside vegetation, small patches of native grasses, small wetlands, and hedgerows. Broad adoption of these practices would provide major benefits for many wildlife species, improve ecosystem health in the Central Valley, and provide a variety of benefits to farm operations. However, a number of changes are needed in farmland habitat conservation policies, financing, and implementation activities in order to achieve widespread adoption of these techniques. Cost for this project is $14,000.
Staff and Facilities

STAFF

Don C. Erman, Director
Gwen Oliver, Program Assistant
Mike Oliver, Assistant to the Director

FACILITIES

The Wildland Resources Center was combined administratively with the Water Resources Center and moved to the Davis campus in September 1993. Both centers, along with the Salinity/Drainage and Water Quality Programs, and the Water Resources Center Archives became the Centers for Water and Wildland Resources. This administrative consolidation provides a greater efficiency in program administration for all programs, as well as providing a more efficient use of personnel, computers, software, office space, and materials.

The Office of the Director is in Room 1323, Academic Surge. In addition to the Director’s office, there are six additional rooms in Academic Surge used by the Centers from assigned space of the Department of Wildlife, Fish, and Conservation Biology. These offices are used to house Centers’ staff conducting program support, computer support, program/personnel administration, accounting, publishing, and conference planning.

Web Sites and Publishing

DIRECTORY OF WATER AND WILDLAND EXPERTISE WEB VERSION

In March 1997, the Center’s database of wildland expertise was combined with experts from the Water Resources Directory of Expertise and became available on the World Wide Web. It is called the Directory of Water and Wildland Expertise and it is found as a link on the Centers for Water and Wildland Resource’s web site, http://cwwr.ucdavis.edu.

This Directory of Water and Wildland Expertise is a searchable, comprehensive database of specialists, their affiliations, and areas of expertise. It lists scientists conducting research aimed at solving a broad array of scientific and practical problems concerned with managing and conserving wildland and water resources, as well as those experts actually managing these resources. The Directory of Expertise has more than 2,000 listings of faculty and staff from the University of California, the California State University, and experts from state and federal agencies all of whom are involved with wildland-related/water-related research and resource management in California.

The Directory of Expertise is searchable by keywords or by individual names. Anyone wishing to register as an expert may do so directly online. Any of the listed experts may also revise their listing directly online.

The Directory of Expertise was developed by the Centers for Water and Wildland Resources and traditionally was published periodically in printed form. This online, web-based version was developed at The National Center for Ecological Analysis and Synthesis, University of California, Santa Barbara for the benefit of the Centers for Water and Wildland Resources and anyone interested in water and wildland expertise in California.

WILDLAND RESOURCES CENTER WEB SITE

The Center’s web site, http://cwwr.ucdavis.edu, describes the Wildland Resources Center and lists Center staff, the Policy Board members and their addresses, the minutes of the most recent Policy Board meeting, and the list of the Center’s publications.

PUBLISHING

The Center published three reports in 1997-1998:


LIST OF PUBLICATIONS

**Conserving wildland resources through research: Introductory report from the Wildland Research Center. October 1, 1959. 64 pp.


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