

NRS

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University of California

# Transect

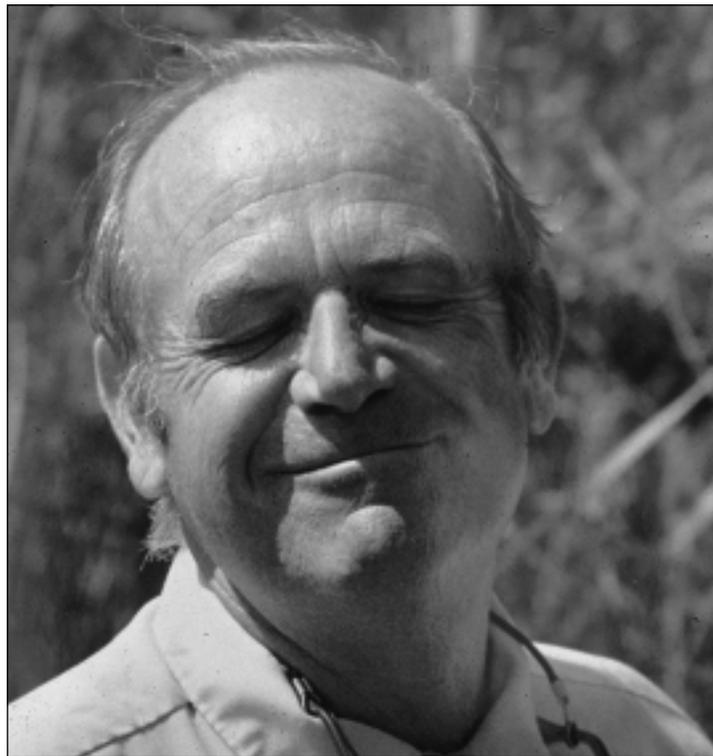
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A few words from the  
NRS systemwide office

**A**s we exit the 20th century, the NRS (now in its 34th year) remains the only university-owned and -operated system of its scope and diversity in the world. And the greatest burden of responsibility for this richly complex organization is shouldered by dedicated individual faculty of the University of California.

UC faculty — beginning with such extraordinary human beings as late NRS founder Ken Norris, whose remarkably productive life is touched upon with gratitude in this issue of *Transect* — conceived of the NRS. UC faculty planned and built the system, site by site by site. Today UC faculty continue to manage the NRS in order to serve the needs of university-level instruction and research in field sciences.

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Ken Norris. Photo by Norden H. (Dan) Cheatham

## NRS founding father took reserve system to the millennium

**T**he University of California Natural Reserve System (NRS) is an ecologically diverse collection of protected natural lands, located throughout the state and maintained in support of university-level teaching and research. It is also the realized vision of a farsighted UC scientist who gave hundreds of students a personal introduction to the natural world and was fondly known as the “Professor of Wonderment.”

Back in the early 1960s, well before Kenneth S. Norris had acquired his international reputation as a distinguished zoologist, he already recognized the growing need for a coordinated, intercampus system of wildland sites protected from population and development pressures. At natural reserves, university faculty

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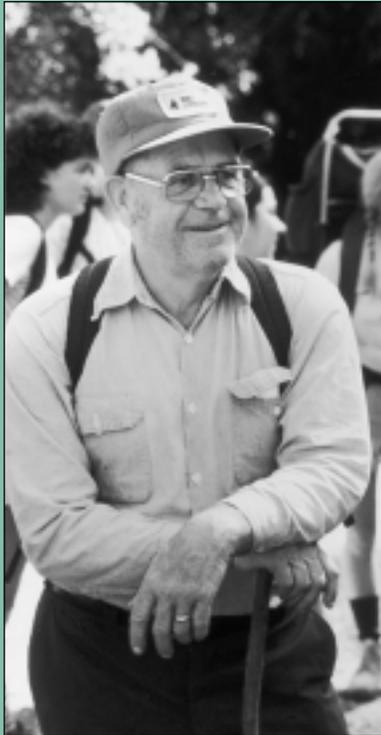


Photo by Don Usner

## Ken-ology 1924-98

- Born August 11, 1924, Los Angeles, CA (not really Angkor, Cambodia, as Ken once claimed to *Who's Who*).
- B.A. zoology from UCLA, 1948. M.A. zoology from UCLA, 1951. Ph.D. zoology from the Scripps Institution of Oceanography, 1959, where he studied under renowned ichthyologist Carl Hubbs. His doctoral dissertation on how water temperatures affect intertidal fish won an award from the Ecological Society of America.
- Founding curator at Marineland of the Pacific, the country's second oceanarium, 1953. Confirmed that dolphins use sound transmission to navigate, a process known as echolocation. First to capture a live whale (pilot whale) for public display.
- Returned to UCLA, 1959, to teach herpetology and continue earlier research on desert reptiles. Discovered circadian rhythms in snakes and the function of color changes in reptiles and amphibians.
- Assumed the UCLA teaching post of his retiring mentor professor Ray Cowles, at Cowles's insistence, 1961. Cowles had the

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## NRS founding father

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would be able to undertake long-term projects with assurance their studies would remain undisturbed. A broad suite of functioning samples of nature would offer unlimited possibilities for investigating the ecological rules that govern both earth and humankind. To this vision Dr. Norris gave a lifetime of inspiration, advocacy, leadership, and hands-on stewardship, because he regarded the NRS's existence as critically linked to the life and health of the planet.

More than thirty years have passed since the NRS was formally established in 1965, and today's NRS is a Norris dream come true: the only university-owned and -operated wildlands system of its scope and diversity anywhere — with 33 “outdoor laboratories” and “classrooms without walls” that protect over 120,000 acres and support the work of thousands of faculty, students, and researchers from around the world.

Dr. Norris was proud of his role in creating the NRS. And those who continue to coordinate the system are proud to receive the many individual contributions in support of environmental monitoring and education, research grants and fellowships, and laboratory and residential facilities that so greatly enhance reserve use. Such expressions of personal generosity share the Norris vision for this shared planet. — *SGR*

## NRS founding member recalls Ken

*Editor's note: Bill Mayhew, professor emeritus of zoology at UC Riverside, was part of the ad hoc committee that helped to establish the Natural Land and Water Reserves System, the name first given to the NRS. He was also a founding member of the Universitywide NRS Faculty Advisory Committee. He served as chair of UC Riverside's campus NRS committee until his retirement in 1989.*

**F**ringe-toed lizards were the reason I first met Ken Norris. It was 1958. Ken was working at Marineland at the time, but in graduate school he had done his master's thesis on fringe-toed lizards. I was just beginning to look at these lizards and the climatic effects on their reproduction — and I had some questions to ask Ken about field methods and the like.

We kept up our correspondence over the years, and eventually we developed some disagreements about whether these lizards represented three distinct species or were three forms of a single species. We cussed and discussed the matter for quite a while, neither one convincing the other, until we finally decided to set up an experiment.

We found an area of wind-swept dunes near Mira Loma, west of Riverside, where there were no populations of fringe-toed lizards. We located four dunes and dropped one type of the lizard on each of the first three dunes. Then we placed a mix of all three types on the fourth dune to see if the lizards would adjust to habitat outside their range and, if so, if they would interbreed.

However, within a year, all four dunes had been bulldozed and built over for some kind of development.

We commiserated a long time over the loss of that study site and others like it. I might have kept it at commiseration, but Ken — who was by now a young professor at UCLA — decided to go to UC President Kerr with the idea to set aside a network of areas just for teaching and research.

Kerr was interested in the idea and scheduled a meeting, which as it turns out was the day of John Kennedy's funeral. Our committee was made up of representatives from each of the UC campuses, and Kerr asked us to present him with an interim report by February 1964, describing the idea of a system of reserves.

Now this was several years before the first Earth Day, and there was no particular support for the idea of conservation of land, either within the University or among the public in general. Except to those few of us who were actually working in the field, land seemed to be abundant, unlimited. But the interim report made a convincing argument for a reserve system in terms of the mission of the University as a place for research and teaching. Kerr was so impressed with the interim report, he took it to the Regents ... and it passed.

The Natural Lands and Water Reserves System (NLWRS) was officially designated in 1965, with seven reserves.\* For the next several years, we worked to build the system, adding sites to fill in the representative system Ken had designed. I always had four or five nominees each year. Ken accused me of wanting to be governor of the fifty-first state, to be able to walk on UC land from Mexico to Oregon!

But we were always racing the bulldozer. The chance to protect these lands was now or never.

— Wilbur "Bill" Mayhew  
*Professor Emeritus of Zoology*  
*UC Riverside*

*\*The name was changed to the Natural Reserve System (NRS) in 1983. The first seven reserves were: Box Springs Reserve, Dawson Los Monos Canyon Reserve, Hastings Natural History Reservation, Kendall-Frost Mission Bay Marsh Reserve, Boyd Deep Canyon Desert Research Center, Sawyer Trinity Alps Reserve (later sold), and Scripps Shoreline-Underwater Reserve (now called Scripps Coastal Reserve).*

Bill Mayhew (left) and Ken Norris served together for many years on the Universitywide NRS Advisory Committee. Here they are shown surveying a potential NRS site near UC Santa Cruz back in the early 1980s.



## Ken-ology

*Continued from page 2, column 1*

idea for UC to set aside threatened ecosystems for teaching and research — Norris would later carry out this idea.

- Appointed by UC President Clark Kerr to chair an ad hoc intercampus committee, created October 1963, to explore preservation of ecological communities for teaching and research. Committee reports to the UC Regents led to the formal establishment of the NRS, January 1965.

- Chaired NRS Advisory Committee 1965-67. Spent the better part of 1966 surveying the state for potential reserve sites and developing an acquisition plan.

- Successfully negotiated a \$500,000 matching grant from the Ford Foundation in 1967, giving the NRS much-needed early impetus and recognition.

- From 1968 to 1971, served as founding scientific director of the Oceanic Institute of Hawaii and helped to establish Hawaii's Natural Land Reserve System.

- Scientific advisor to U.S. Marine Mammal Commission, helping to write the Marine Mammal Protection Act of 1972.

- Served as director of UC Santa Cruz's Center for Coastal Marine Studies (now the Institute of Marine Sciences), 1972-75. Worked with biology professor William Doyle to secure land and funding for what is now the Joseph M. Long Marine Laboratory. Set the standards for humane capture and study of marine mammals.

- Worked with his children to design the family home in Santa Cruz, 1973. Later raised sheep there (which he acquired *before* he learned how to shear them), including the founding Lamb Chomsky.

- Designed a whale harness, 1974, that could carry an early datalogger and expand to continue to fit a growing young whale for up to one year.

- Named "Man of the Year" by the American Cetacean Society, 1976.

- Received the California Academy of Sciences' Fellows Medal for his studies on marine mammals, 1977.

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## Ken-ology

*Continued from page 3, column 2*

- Chaired task force responsible for preparing systemwide NRS plan; wrote most of plan, 1977. Also chaired UCSC (campus) NRS Advisory Committee, Academic Planning Subcommittee of the Systemwide Committee, and Big Creek Advisory Board. Named faculty reserve manager, Landels-Hill Big Creek Reserve.
- Chaired UC Santa Cruz's Environmental Studies Department, 1977-79; founded and coordinated the Environmental Field Program, providing financing for undergraduate research. Took part in rearing California condors for release to the wild.
- Nominated "Professor of the Year," 1980, by the Council for the Advancement and Support of Education (CASE).
- For a decade, taught UC Santa Cruz's popular "field quarter" class, drawing many students to UCSC for the chance to study with him and launching careers for many undergraduates and graduates.
- Received grants, by 1984, from the Franklin Institute, National Science Foundation, National Institutes of Health, NASA-Ames Laboratory, Jans Foundation, National Oceanic and Atmospheric Administration, Office of Naval Research, and U.S. Marine Mammal Commission.
- Visited the People's Republic of China, 1987, to join in a study of river dolphins in the Yangtze River, making the trip as a member of a committee appointed by the International Union for the Conservation of Nature to investigate problems affecting river dolphins around the world.
- Led a national campaign, 1989, to reduce the numbers of dolphins killed in tuna-fishing nets, an effort that attracted worldwide attention and led to reforms in fishing practices and the labeling of tuna cans. Designed tuna nets that enable dolphins to escape.
- "Retired" from UC Santa Cruz, 1990, after 18 years as professor of natural history and started the seventh iteration of his career as a writer.

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## First NRS director remembers Ken

**A**s director of the UC Natural Reserve System for nearly 25 years, I was well aware of the skill of Kenneth S. Norris as an administrator, innovator, articulate advocate, and trailblazer in the best sense of the word.

In the early 1960s, Ken recognized that "outdoor laboratories" long used by members of the faculty and students for field work were quickly disappearing through rapid urbanization. Research projects were being interrupted by vandalism, conflicting land uses, and irresponsible land management. Many faculty members were frustrated when their requests for acquisition of areas were turned down. Ken realized that only a coordinated, systematic, and statewide approach would succeed and prepared a plan of action that was ultimately approved by the Board of Regents.

He was named the first chairman of the Universitywide NRS Advisory Committee and, in that capacity, covered thousands of miles to inspect potential reserve sites, negotiate initial acquisitions, and raise private support funds. When Ken assumed the managership of the Landels-Hill Big Creek Reserve on the Big Sur coast, he spent an inordinate amount of time developing a management plan, overseeing resource inventories, making improvements, and relating to external and internal parties. The approach taken and policies pursued under his leadership served as models for all NRS reserves, as well as other natural reserves administered throughout the state, if not the country.

I also experienced firsthand Ken's contributions to the land use and management policies of public agencies and private conservation organizations. He served on numerous advisory panels, and, through a remarkable combination of intellect, commitment, and personality, was an extremely effective voice.

The highlight of my career with the University was spending two days in the field with Ken and his students. I was tremendously impressed with the learning process as it evolved, as well as with Ken's impact on the students. Ken was called "Professor of Wonderment" — and if ever there was an apt title, that was it.

Ken was truly a remarkable human being — one who compiled an enviable list of accomplishments, one who gave unselfishly in pursuit of causes, and one who endeared himself to legions of students, colleagues, and friends. I have known few, if any, about whom I could write with greater admiration.

— *J. Roger Samuelsen*  
*Director Emeritus*  
*Natural Reserve System*  
*(Retired from NRS 1991)*



Ken with his field students.  
 Photo by Don Usner



Photo by Don Usner

*The most basic rules of the world — the ones we all live by — are ecological rules. You can't study them or even perceive them very well in a classroom or laboratory. It is imperative to go out on the mountainside, watch the rain fall over a valley, dig into the earth beneath a fallen tree, or wade a creek for cobbles with sources upstream.*

*The best work in the natural disciplines all starts with observations in nature. We need those wild places where we can study nature firsthand, places where all the intricacy and marvel of the natural world is intact. Everywhere, including California, those places are becoming fewer — and more precious.*

— Kenneth S. Norris, Founder of the UC Natural Reserve System

[*Editor's note: A Ken Norris oral history will be published this fall through UC Santa Cruz. See page 10 for information on how to order this tribute volume.*]



Photo by Kevin Kilpatrick

## Ken-ology

*Continued from page 4, column 1*

- Served as wildlife representative on an advisory board for the U.S. Bureau of Land Management's comprehensive desert management plan, 1990.
- Sent around the world by *National Geographic*, 1991, to gather material for an article on dolphins in crisis. Responsible for much of what is now known about whales and dolphins, particularly their social patterns and echolocation skills.
- Honored by his former students, who donated funds to create the Kenneth S. Norris Scholarship Fund, 1991, to support undergraduate field studies relating to California's natural environment.
- Received the prestigious John Burroughs Medal, 1992, for his book *Dolphin Days: The Life and Times of the Spinner Dolphin*, a personal account of his research (which spanned about 30 years). Also responsible for several books on whales, dolphins, and porpoises, including *Dolphin Societies: Discoveries and Puzzles* (as editor), *Whales, Dolphins, and Porpoises* (as co-author), *The Porpoise Watcher*, and *The Hawaiian Spinner Dolphin* (as co-author).
- The NRS received from the David and Lucile Packard Foundation, 1998, a \$4-million endowment awarded in response to a proposal Ken initiated. As a tribute to his leadership, the gift was named the Kenneth S. Norris Endowment Fund for the California Environment.
- Passed away peacefully, August 16, 1998, at UC San Francisco Medical Center, surrounded by his family. — *EMB*



Photo by Susan Gee Rumsey

## NRS plays the national stage at AAAS annual meeting

The NRS introduced itself to the world earlier this year at the 1999 annual meeting of the American Association for the Advancement of Science (AAAS) in Anaheim, CA (January 21-26). The AAAS is the world's largest federation of scientists from a variety of disciplines, with more than 143,000 members and 282 affiliated societies. Its yearly gathering attracts scientists, social scientists, and journalists from around the globe.

Showcasing the NRS and its broad spectrum of activities was a half-day AAAS symposium entitled "UC Natural Reserve System: Managing Resources, Preparing for the Future." Featured speakers included long-time NRS researchers Mary Power, Walt Koenig, Tim Bradley, Michael Hamilton, and Frank Davis. Their investigations offer insights into biological, geological, physical, and chemical processes on natural lands that influence productivity, sustainability, and biodiversity.

Mary Power, professor, Department of Integrative Biology, UC Berkeley, and faculty reserve manager, Angelo Coast Range Reserve (Mendocino County), addressed the importance of natural disturbances in ecosystem health and conservation. Floods, fires, and landslides maintain biodiversity and webs of interactions among species. As human population grows and interferes with natural processes, it becomes more difficult to find natural areas large enough to study the interactions between disturbances and ecosystems. Power discussed the importance of NRS reserves in this role and how they can help guide us toward wise ecosystem management.

Walt Koenig, research zoologist, Hastings Natural History Reservation (Monterey County), explained the

complex social systems and mating behavior of the acorn woodpecker. Long-term ecological and behavioral studies like Koenig's depend on secure field sites such as those offered by the NRS — free from threats by trespassing and development.

Tim Bradley, professor and chair, Department of Ecology and Evolutionary Biology, UC Irvine, as well as faculty reserve manager of San Joaquin Freshwater Marsh Reserve (Orange County), described mosquito-control research underway on site. This research addresses mosquito-control mechanisms compatible with protecting endangered species, enhancing biodiversity, and protecting the public from mosquito-borne disease.

Michael Hamilton, resident reserve director, James San Jacinto Mountains Reserve (Riverside County), demonstrated how NRS scientists who are engaged in long-term ecological studies are coordinating with resource managers and planners. When science and technology are joined with planning efforts and day-to-day management, forest health improves, wildland fire risks are reduced, and small communities become more ecologically aware.

Frank Davis, professor, Bren School of Environmental Science and Management, UC Santa Barbara, and faculty reserve manager, Sedgwick Reserve (Santa Barbara County), described the California "GAP Analysis Project." GAP is a geographic database of the distributions of terrestrial plant communities, vertebrate species habitats, and land ownership/management. Davis analyzed different systems of reserves — the UC Natural Reserve System, The Nature Conservancy, the National Park Service — and their contributions to protecting biodiversity. He highlighted species, communities, and environments that should be high priorities for conservation.

This first-ever event for the NRS was organized by NRS Director Alex Glazer (who also moderated) and UC Berkeley Professor Mary Power. — *SGR*

*For more information about the AAAS, contact:*  
American Association  
for the Advancement of Science  
1200 New York Avenue, NW  
Washington, DC 20005

Ellen Cooper  
News and Information Office  
Phone: 202-326-6431  
E-mail: ecooper@aaas.org  
AAAS website: <www.aaas.org>

### Web resources

To find out more about the researchers and investigations featured at the NRS's symposium at the 1999 AAAS meeting, check the following websites:

*On Mary Power* —  
<<http://ib.berkeley.edu/faculty/powerm.html>>

*On Walt Koenig* —  
<<http://ib.berkeley.edu/faculty/koenigw.html>>

*On Tim Bradley* —  
<<http://ecoevo.bio.uci.edu/faculty/bradley/index.html>>

*On Michael Hamilton* —  
<[www.digitalnaturalist.com/](http://www.digitalnaturalist.com/)>

*On Frank Davis* —  
<[www.bren.ucsb.edu/~fd/](http://www.bren.ucsb.edu/~fd/)>

(And *on the GAP Analysis Project*.  
<[www.biogeog.ucsb.edu/projects/gap/gap\\_proj.html](http://www.biogeog.ucsb.edu/projects/gap/gap_proj.html)>)

## NRS Mathias winners reveal a rich research future

**F**or over a decade now, the NRS systemwide office has awarded grants in support of student research. Since the academic year of 1988-89, the Mildred E. Mathias Student Research Grants program alone has funded 149 students with a total of approximately \$215,000.

Mathias grants not only encourage students to conduct research, but also give them practical experience in applying for grants, meeting deadlines, and managing budgets. Awardees are expected to submit a report to the director of the NRS.

The maximum amount for a single award is \$2,000. An annual call for proposals is generally issued in September; awards are announced in December. Applications for Mathias grants may be obtained directly from an NRS campus representative (see sidebar this page, column 2, above) or through the NRS systemwide office.

In the 1998-99 cycle of Mathias awards, 17 graduate students were selected from the eight general UC campuses to share a total of \$20,960. These awardees, their projects, and research sites include:

### From UC Berkeley —

- Jonathan Levine, *Effects of plant diversity on community invasibility in a Northern California riparian system*;
  - Frances Camille McNeely, *Macroinvertebrate species richness along an environmental productivity gradient in a Northern California river*;
  - Elizabeth Pine, *Genet [Individual] size of late-stage ectomycorrhizal fungi*;
  - Judy P. Sheen, *Reproductive cost in northern and southern alligator lizards*.
- All four UCB student researchers will be hosted by the Angelo Coast Range Reserve (Mendocino County).

### September 1999

**will bring the next call for Mathias proposals. To obtain a grant application, contact your NRS campus rep through our website:**  
<<http://nrs.ucop.edu/info/grants.html>>.

(Or contact the systemwide office:  
Mathias Research Grants  
UC Natural Reserve System  
1111 Franklin Street, 6th Floor  
Oakland, CA 94607-5200  
Phone: 510-987-0150)

### From UC Davis —

- Christy Brigham, *Is the Allee effect involved in extinction of isolated patches of *Mimulus nudatus*?* at the McLaughlin Natural Reserve (Napa and Lake Counties);
- Maria Melendez, *Cross-cultural examination of aesthetic and ethical concerns in the preservation and restoration of California grasslands*, at the Bodega Marine Reserve (Sonoma County) and Jepson Prairie Reserve (Solano County).

### From UC Irvine —

- Denise M. Franke and Allan G. Ellis, *Analysis of selection and gene-flow across a cline: flowering time in *Brassica rapa**, at the San Joaquin Freshwater Marsh Reserve (Orange County).

### From UC Los Angeles —

- Shawna J. Dark, *Potential impact of three-dimensional forest modeling and geographic information systems on the conservation of wildlife species*, at the James San Jacinto Mountains Reserve (Riverside County);
- Aviva Liebert, *Division of labor and reproduction in *Polistes wasps**, at the Stunt Ranch Santa Monica Mountains Reserve (Los Angeles County).

### From UC Riverside —

- Michael A. Patten, *Role of mate choice and habitat use in reproductive isolation of two song sparrow subspecies in Southern California*, at the Boyd Deep Canyon Desert Research Center (Riverside County).

### From UC San Diego —

- Lisa M. Angeloni, *Sexual selection and hermaphroditic strategies in a sea slug*;
- Arja T. McCray, *Halophyte responses to soil variation: comparisons between natural salt marshes of Southern California and a constructed salt marsh in Mission Bay, San Diego, CA*.

Both studies will be hosted by the Kendall-Frost Mission Bay Marsh Reserve (San Diego County).

### From UC Santa Barbara —

- Noah G. Fierer, *Effects of periodic rainfall events on soil microbial processes and microbial community structure*;
- Emmanuel Gabet, *Stochastic sediment supply model for a mountainous, semi-arid landscape*.

Both studies will take place at Sedgwick Reserve (Santa Barbara County).

### From UC Santa Cruz —

- Jennifer A. Brown, *Determining the relative importance of protected embayments and open coast nursery habitats to the maintenance of adult flatfish populations*, at four NRS sites: Bodega Marine, Carpinteria Salt Marsh, Coal Oil Point, and Kendall-Frost Marsh Reserves (Sonoma, Santa Barbara, and San Diego Counties).
- Dawn Page Noren, *Changes in blubber and body composition of northern elephant seal (*Mirounga angustirostris*) pups during the postweaning fast*, at Año Nuevo Island Reserve (San Mateo County).

Congratulations to all! — SGR

## When instruction becomes research: Concepts seek completion in Bodega-based course

**U**C Davis professor of entomology Rick Karban has discovered a way to ease the pressure, anxiety, and fear that afflict new graduate students when they embark on that long, lonely road to completing a thesis project. Central to his strategy is the terrestrial ecology field course he teaches each spring at the NRS's Bodega Marine Reserve.

The purpose of Karban's course is to simulate the process of constructing an entire thesis project: from deciding upon a topic of study, to posing testable hypotheses, to completing fieldwork, to writing a paper and giving an oral presentation. All this in the space of a 10-week quarter.

"Graduate school is really about doing research," says Karban. "Yet, most of our curriculum is presenting facts without necessarily teaching students about the processes that allow us to uncover those facts." He notes that, at the start of the course, many students have no idea what they could conceivably research, understand, and write about in a solid thesislike paper within 10 weeks.

The course, offered jointly between the departments of ecology and entomology at UC Davis, was designed to get students out into the field where they can see that there are no limitations to the topics they can choose for their projects. After one classroom session — an overview of the natural history of Bodega, which is located on the Sonoma County coastline — the group is turned loose at the reserve to discover the innumerable ecological questions awaiting answers.

Karban discusses questions that other students and researchers have asked

and encourages students to formulate testable hypotheses that interest them. He acts not only as an idea machine, but as a springboard for how students may develop their own ideas. Although his own research as an entomologist focuses on plant/insect interactions, he does not push students toward his field of study. In fact, over the 13 years he has taught the course, he has enjoyed the huge diversity of topics chosen by his graduate students — for example:

- how trail disturbance affects plant diversity
- how group size affects spittlebugs
- how rotting fish affect insect diversity
- sex ratios, sexual dimorphism, and mate choice in stink beetles
- how lupine cover affects habitat selection by deer mice
- competition between nonnative iceplant and endemic flora
- adaptive strategies of the Pacific tree frog in a fluctuating environment
- niche separation among spiders.

These and other efforts by Karban's graduate students have all been archived in the Bodega Marine Laboratory library at Bodega Marine Reserve.

Karban is passionate about the importance of teaching natural history and ecology in the field. He laments:

"Students are exposed to less and less natural history. Field courses and even laboratory classes are required less frequently for students in the biological



UC Davis Professor Rick Karban (right) introduces graduate students in his terrestrial ecology course to the charms and complexities of pursuing science research in the field.

sciences. This trend is dangerous for the continued progress of our science. What will be the source of our intuition if not from our natural history observations? If students merely work on questions supplied by their major professors, or from their readings, or from theoretical models of nature, our field will stagnate."

In this context, Karban emphasizes that the NRS offers unique opportunities for students to learn about the natural world. "NRS reserves are easily accessible and provide protected sites where experiments can be conducted without fear of vandalism. And they allow students to tap into the considerable expertise and sophistication of other biologists who have worked at those same sites in the past." — *PP*

*For more information, contact:*  
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## When research becomes resource management: Students tackle Santa Cruz Island's fennel challenge

For a few days every spring, two dozen natural history students set aside their binoculars and field guides to help tackle Santa Cruz Island's "fennel invasion." This nonnative plant, *Foeniculum vulgare*, has become a dominant feature of the island's landscape, forming near-monocrops over acres of former grazing land in its central valley. Without some intervention, native vegetation stands little chance of regaining a foothold in these areas. The dilemma facing island managers: how can fennel be controlled on Santa Cruz Island without opening the way to other nonnative species that are even more difficult to manage?

It's a conundrum that's long interested Stephen R. Gliessman, a professor of environmental studies from UC Santa Cruz. In the late 1960s and early 1970s, Gliessman did his graduate work at this California Channel Island located off the coast of Santa Barbara. Since 1981, he has been bringing the UC Santa Cruz "field quarter" class (Natural History of California) to the NRS's Santa Cruz Island Reserve. He says: "When The Nature Conservancy (TNC) [which owns and manages 90 percent of the island] proposed an aggressive herbicide program to control fennel [in the late eighties], I was concerned that other alternatives weren't being considered."

In 1990, Gliessman and his students set up long-term study plots to test the impacts of several nonherbicidal control strategies. Each year the class surveys the plots for fennel abundance and identifies other nonnative and native plants, then sets to work on the treatment options — mowing and removing the fennel (either once or twice per year), cutting and leaving it as a mulch, or digging it up by the roots. As part

of a TNC grant, the class also monitors study plots that have been burned and treated with herbicides.

Complicating the picture of native plant recovery is the island's burgeoning population of feral pigs, the descendants of farm animals brought to Santa



UCSC field quarter student digs up fennel roots in a "dig and remove" treatment plot (May 1990). Photo by Stephen R. Gliessman



UCSC field quarter students clear mowed fennel from the "mow and remove" treatment plots (May 1993). Photo by Stephen R. Gliessman

Cruz in the last century. Two winters ago, former field quarter students Laura Ruiz and Wes Colvin installed a pig exclusion fence around the study plots to see whether keeping pigs out would increase native-plant recruitment. When surveys conducted a year later turned up oak seedlings and other native species growing in the protected sites, these results confirmed what Gliessman had long suspected: removing pigs from the island will be critical to any restoration effort.

Last fall's survey also revealed that although TNC's burning/herbicide treatment had killed some fennel stands, many of the plants were regrowing. Worse, in several areas where fennel had been eradicated, another aggressive, nonnative species — star thistle (*Centaurea solstitialis*) — had filled in the gaps. The UCSC study plots told a similar story: where fennel had been dug up and removed, star thistle and Mediterranean grasses had moved in.

Gliessman now thinks that light disturbance of fennel stands, such as mowing and raking cuttings into windrows, combined with pig removal and native plant reintroductions, may help jump start the recovery of native vegetation. Conversely, if the disturbance is too great and the pigs are not removed, then other introduced exotics may take over from fennel and suppress native species even more dramatically.

"We've learned that management can't be focused on the idea of eliminating fennel on the short term," says Gliessman. "Instead, we need to focus on understanding what the successional processes are that will allow natives to eventually return. By under-

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standing these processes, we may be able to speed them up.”

Gliessman also sees the research providing students with valuable lessons: “They’re learning the importance of natural history field work and long-term studies, as well as the complexities of protecting natural resources when different management approaches are involved,” he says. “The bottom line is: good field science is critical to helping solve these problems.”

— *Martha Brown, Senior Editor  
Center for Agroecology &  
Sustainable Food Systems  
UC Santa Cruz*

*For more information, contact:*

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## In memoriam

**M**uch missed by the NRS is Homer Angelo, who died in August of 1998. A generous, long-time supporter and friend of the NRS, Angelo had deep roots in UC. He was an esteemed international law professor at UC Davis, having completed his bachelor’s degree in 1931 from UC Berkeley before attending Boalt Hall.

He was a son of Heath Angelo, who, along with his wife Marjorie, acquired a vast tract of old-growth Douglas-fir forest in Mendocino County to protect it from logging. The Angelos later sold it to The Nature Conservancy (TNC) in 1959, making it the first TNC preserve in the western United States. In 1994, the NRS accepted the site from TNC and dedicated it as the Heath and Marjorie Angelo Coast Range Reserve. — *EMB*

## Angelo Reserve funded for new environmental sciences center

**T**he NRS received a gift this past fall of \$1.2 million from the Richard and Rhoda Goldman Fund. The award will fund construction of a center for environmental sciences at the Heath and Marjorie Angelo Coast Range Reserve, an NRS site located on the South Fork of the Eel River in Mendocino County.

This gift will enable the Angelo Reserve to greatly expand its research, its university-level education, and its public outreach, which includes K-12 nature programs. The new environmental sciences center will include a headquarters building with library, a computer room, storage space for flora and fauna collections, and offices, as well as a laboratory, researcher housing, a greenhouse, and a forest canopy walkway.

Administered through the Berkeley campus, the Angelo Reserve encompasses 4,415 UC-owned acres and is buffered by more than 3,500 acres

managed in partnership with the U.S. Bureau of Land Management (BLM). Angelo is one of the NRS’s most diverse sites, with four aquatic and at least 26 terrestrial habitat types, including redwood groves and the state’s largest virgin Douglas-fir forest community.

The Angelo Reserve has a long history of community involvement that emphasizes K-12 outreach. Each year, the reserve is visited by as many as 200 children from nearby schools in Laytonville, Ukiah, and Willits. These students develop an appreciation for the forest community and its inhabitants. The site offers 23 miles of trails available for day use.

The Richard and Rhoda Goldman Fund is a private foundation based in San Francisco. The foundation supports programs of nonprofit organizations that benefit the environment, population, Jewish affairs, children and youth, and the elderly. — *SGR*

## Norris oral history coming soon!

**T**he Regional History Project of the University Library of UC Santa Cruz has announced the fall 1999 publication of *Kenneth S. Norris: Naturalist, Cetologist, Conservationist, 1924-1998*.

This 400-page, illustrated oral history discusses the genesis of the NRS, Norris’s scientific legacy, and the UCSC Natural History Field Quarter. It includes an index, an introductory essay by documentary historian Randall Jarrell, and features oral history interviews with: Kenneth S. Norris (in his own voice), Robert M. Norris, William N. McFarland, William F. Perrin, J. Roger Samuelsen, Shannon M. Brownlee, Lawrence D. Ford, Donald J. Usner, and Stephen R. Gliessman.

To order a copy of this tribute to Ken Norris’s life, contact: Regional History Project, McHenry Library, University of California, Santa Cruz, Santa Cruz, CA 95064; phone: 831-459-2847; e-mail: ihreti@cats.ucsc.edu. Until November 1, 1999, this limited-edition volume is available for \$20 (includes shipping, but CA residents must add \$1.60 for tax). After November 1, the book will be available for \$24. Checks should be made payable to The UC Regents. — *SGR*

## Generous donors make sure the reserve system is well grounded

Over the past couple of years, individuals, foundations, and corporations have given the NRS gifts and services that total well over \$5 million. In addition, half a dozen reserve sites have recently been enhanced by land gifts with a combined value of over \$1.5 million.

The 160 acres that the Angelo Coast Range Reserve (Mendocino County) received from Dean Edell and Sharon Johnson protect an important viewshed, as well as a previously unbuffered, old-growth redwood grove. Additionally, 20 acres were donated to the reserve by Eleanor H. Power, protecting this land as well from future development.

The Boyd Deep Canyon Desert Research Center (Riverside County) will benefit from 160 acres, plus easements and funding for additional water sources and laboratory/housing facilities, promised by Lowe Development Corporation. Lowe, which is developing a large housing complex adjacent to and north of the reserve, will further support Boyd through a portion

of future sale revenues donated to the UC Riverside Foundation.

The Dawson family has enlarged the Dawson Los Monos Canyon Reserve (San Diego County) by 16.6 acres, bringing that site's total acreage up to about 234. Meanwhile, Gertrude Emerson donated 10 acres to enhance the Emerson Oaks Reserve (Riverside County), now 255 acres. Such gifts are all the more crucial in the midst of the rapid development taking place throughout the two counties in which these reserves are located.

Valentine Camp, a component of the Valentine Eastern Sierra Reserve (Mono County), received a 2.3-acre parcel of adjacent land from Stuart Wilson, Michael Wilson, John Wilson III, and Theresa Wilson Flynn, the great-grandchildren of one of the site's original owners, Henry O'Melveny.

Finally, the Motte family, continuing their long-standing support of the Motte Rimrock Reserve (Riverside County), contributed an important easement to the site's entrance. — *SGR*

## A few words

*Continued from page 1*

After more than three decades, the reserve system and its importance as a whole to the University and to the world beyond is still greater than a simple sum of individual campus interests. Yet integrating the teaching and research potential of a system that comprises 33 diverse sites into the academic structure of a multicampus university is no small challenge.

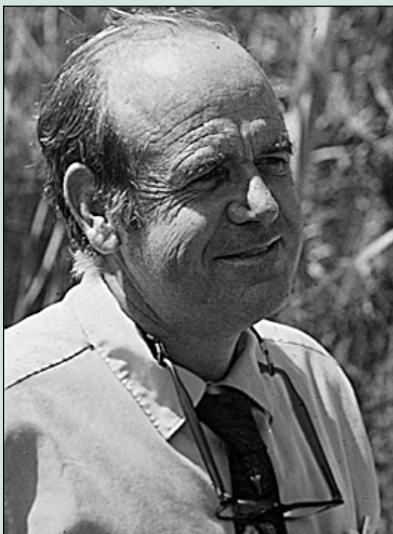
While individual reserves require daily, intimate campus contact, the overall network of field sites requires strong central guidance. At both levels, UC faculty play principal roles. Often it is the very same faculty managing at both levels of involvement.

At the grassroots, each NRS site is assigned to a faculty reserve manager, who oversees — often in a very hands-on fashion — its instructional and research activities. This supervisory responsibility is shared with a staff reserve manager, who sometimes resides at the reserve.

Meanwhile, ongoing and overall system guidance is provided by the Universitywide NRS Advisory Committee to the NRS systemwide office director and staff. Most Universitywide NRS Advisory Committee members are UC faculty, and they represent each of the eight general UC campuses, as well as a variety of disciplines. A committee term runs three years. The current roster for UC faculty on the committee includes:

- *From UC Berkeley* (which manages four NRS sites): David B. Wake, Museum of Vertebrate Zoology (as both chair and Berkeley representative);
- *From UC Davis* (which manages six NRS sites): Susan Harrison, Environmental Studies;

*Continued on page 12*



Since last fall, more than \$12K have been donated to the Kenneth S. Norris Scholarship Fund, created in 1991 with donations from grateful former students. The Norris Fund supports undergraduate field studies relating to California's natural environment. A portion of funding recently received was given to complete publication of the Ken Norris Oral History (see page 10, opposite). Photo by Norden H. (Dan) Cheatham

## A few words

*Continued from page 11*

- *From UC Irvine* (which manages two NRS sites): Peter A. Bowler, Ecology and Evolutionary Biology;
- *From UC Los Angeles* (which manages one NRS site): Richard F. Ambrose, Environmental Sciences and Engineering;
- *From UC Riverside* (which manages six NRS sites): John T. Rotenberry, Biology;
- *From UC San Diego* (which manages four NRS sites): Joshua R. Kohn, Biology;
- *From UC Santa Barbara* (which manages six NRS sites): Scott D. Cooper, Ecology, Evolutionary and Marine Biology; and
- *From UC Santa Cruz* (which manages four NRS sites): Daniel P. Costa, Biology.

The committee also includes two at-large members who are faculty: former chair Mary E. Power, Integrative Biology, UC Berkeley; and UC president appointee John A. Endler, Biological Sciences, UC Santa Barbara.

The managerial involvement of faculty members at particular reserves tends to be an outgrowth of having used those sites to instruct their classes or conduct their own research. Yet taking that quantum leap to the next level of responsibility for site and system becomes public service of the first order.

UC faculty are world-class and often recognized with professional awards — but NRS work confers little visibility. Everyone knows faculty must publish — but NRS work competes for the time available to pursue the usual avenues of academic achievement. A difficult and time-consuming business, NRS work is also mostly voluntary, in the very best *pro bono* sense of service.

Yet this free labor by perhaps two score of dedicated UC faculty members is what supports this reserve system, which in turn enables so many other teachers and scientists (literally, thousands each year) to carry out their own work — just as Ken Norris and all the original NRS founding members first intended. The NRS systemwide office salutes their unsung service. — *SGR*



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