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## NRS Transect

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**tran'sect, n.** A line along which physical and biological data are collected

You won't find this definition in Webster's. It's a meaning unique to field science, with subtle undertones—a cross-sectional slice of the environment under study; a representative sample. In a broader sense, the University's Natural Land and Water Reserves System (NLWRS) is also a transect. It protects a representative cross-section of California's ecological diversity in a system of natural areas reserved for teaching and research use. With this similarity in mind, we have chosen to name our newsletter the NLWRS *Transect*. Through it, we hope to present a cross-section of the wide range of teaching and research activities conducted on NLWRS Reserves.

The newsletter will also be a place to highlight the resources and facilities available on NLWRS reserves; to discuss the natural features of these reserves and the threats to their long-term protection and management; to report on new publications; and to report on new acquisitions and major fund-raising accomplishments. As faculty and students, Regents and administrators, donors and friends, you are a diverse audience sharing a common appreciation of the role the NLWRS plays in supporting field-oriented teaching and research. I encourage each of you to keep us posted on reserve activities and NLWRS news so that this newsletter might reflect the diversity of your activities and expertise. Information on class activities and student research—with photographs, if available—is particularly appreciated.

So, welcome to our newsletter. I look forward to hearing from you.

—Jeff Kennedy, Editor



Studies of the eating habits of the acorn woodpecker, a common resident of oak habitats in California and the American southwest, have shown that animal societies can be structured to enhance the survival of a species.

**Acorn Woodpeckers: Fast Food Junkies of the Animal Kingdom**

It looks like a practice session for a confused power lineman. With ladder and safety harness, a young man has climbed the trunk of a large oak to inspect a gridwork of acorns embedded in the tree. From a distance, the grid looks like a switchboard. The cubbyholes of an automat might be closer to the mark. The man in the tree is Dr. Walt Koenig, the new staff research zoologist at the University of California's Hastings Natural History Reservation.

Nestled among the oak woodlands and chaparral of the upper Carmel Valley, the Hastings Reservation is a 782-hectare (1930-acre) former ranch that is one of the oldest ecological research stations in California. A dirt entrance road leads to an old barn shaded by a large Valley Oak. In the vicinity are several converted ranch buildings providing dormitory and living space for resident researchers while across the road, two spartan cement block buildings house the rudiments of a research station: study specimens, a small library, and simple laboratory space. Hardly the image of a modern research center for scientists on the frontiers of knowledge.

For the past seven years at Hastings, Walt Koenig and others have been studying the acorn woodpecker (*Melanerpes formicivorus*), a species which exhibits unusual breeding behavior. The acorns Walt is inspecting were placed there by this species, and past observations suggest that such storage trees, known as acorn granaries, play an important role in shaping the behavior and social organization of the acorn woodpecker. It's part of a larger inquiry into the influence environmental factors exert on behavior and the evolution and structure of animal societies—perhaps even primitive human societies, as well.

Walt explains: "Acorn woodpeckers are of intense interest to zoologists because of the distinctive system of cooperation they use to raise their young. In this system, more than one breeding pair and several non-breeding helpers will frequently cooperate in raising and feeding young birds at a single nest. Such cooperative group living is not unusual among animals. Wolves and wild dogs hunt in packs, musk oxen provide group protection for young calves,

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## Habitats Degraded? Equipment Damaged? Write Us a Letter!

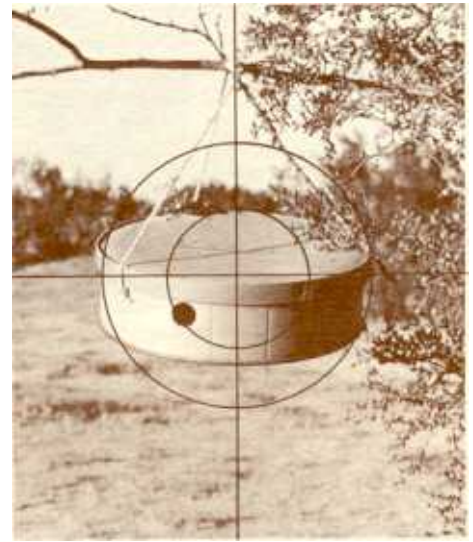
Should you ever ask a researcher about the problems faced in conducting field research, be prepared for a long reply. The problems abound in seemingly infinite variety: habitats are lost or degraded, wildlife populations are disturbed or eliminated, stakes and markers are pulled up, exclosures are torn down, fence lines are cut, equipment is used for target practice—as targets . . . . The stories of these and other problems form a peculiar bond among researchers—a camaraderie of common hardships endured. Unfortunately, only the oral tradition prevails. Few stories survive in written form to document the problem, yet even one good letter can help to correct the situation.

Take the letter sent by Dr. Susan Gordon (see the box). After losing a year's field work at California's largest state park due to habitat disruption from uncontrolled public access, Dr. Gordon wrote to describe the problems she faced conducting field research in an unprotected area and to express her appreciation for six years of work successfully completed at an NLWRS reserve near Palm Desert. Her letter has been extremely useful in explaining to government officials and the general public the sensitivities of teaching and research as a land use and the need for a system of natural reserves which is managed specifically for such use.

To the field scientist, Dr. Gordon's story is all too familiar. Beyond the fraternity of field researchers, however, these problems go unrecognized. Indeed, it is a widely held belief that in a state where almost 50 percent of the land is in federal or state ownership—much of it as parks, forest, and wilderness areas—a University reserve system is a luxury at best. Yet as Dr. Gordon's letter illustrates, multiple-use management of public lands can effectively preclude teaching and research use. As California's population grows and as unprotected sites are lost to development, the need to maintain the integrity of NLWRS reserves increases. Letters from you will help us to document these problems and counter the threats to reserve integrity.

Problems of particular concern include: (1) lost or degraded habitats, (2) decreases in species diversity, (3) reduced rates of reproduction, (4) extinctions or shifts in wildlife populations, (5) behavioral changes in wildlife, (6) pollution, (7) lost or damaged equipment, and (8) reduced confidence in the integrity of collected data. Translation of these problems into losses in time, and money (including grant funding losses, and increased travel costs to more protected sites) is especially helpful. Many people do not appreciate how teaching and research are financed and how much time is invested. Particularly needed are examples of *inadvertent* losses due to a lack of appreciation of the sensitivities involved (as opposed to vandalism and other willful or malicious acts). This is especially needed

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Insect traps such as this one hanging from a creosote bush are used to collect insect population data. They are frequently damaged by vandalism, making data analysis difficult.

## Equipment Vandalism Can Be a Sticky Business

Dr. Vern Stern, an entomologist with the Agricultural Experiment Station at UC Riverside has been studying the population dynamics and dispersal of the pink bollworm moth (*Pectinophora gossypiella*), a devastating cotton pest that invaded the desert valleys of Southern California in 1965—see *California Agriculture* 32(7):4-5. To monitor this pest, a 900-mile-long trap line was established in the Mojave Desert encompassing an area of about 30,000 square miles.

The traps consisted of small round boxes with a fly-paper-like coating on the inside, much like the traps used to monitor the Mediterranean fruitfly. These were suspended from desert trees and shrubs, and in some cases from poles stuck in the ground. Predictably, many of the traps became shooting targets for desert "recreationists" and were thus destroyed. Other losses came from simple curiosity, as Dr. Stern explains:

*"The bottom of each trap was coated with a material called Stickum®. When the pink bollworm moths entered the trap and landed in the Stickum they couldn't get away. Stickum is messy and can only be removed from your fingers with paint thinner. People would see the traps, take off the lid, and put their fingers in the Stickum. So they had this gunk on their fingers and couldn't get it off. That must have made them mad. They would then cut the strings of the trap and stomp on it."*

Some days, it just doesn't pay to be a field scientist.

### A Letter to the NLWRS Director

After six years of graduate field work under UCB's Dr. Frank Pitelka, a new Ph.D., Dr. Susan Gordon, wrote in August of 1978 about discovering the Philip L. Boyd Deep Canyon Desert Research Center as a field site for her study of the food and foraging ecology of a desert harvester ant:

*"When I began my studies, I established sites in the Anza Borrego Desert State Park, assuming that in a state park I could work without disturbance. The rangers were helpful, but as I found out . . . there are vast areas which must remain unsupervised and unpatrolled. I had several different study sites, and in most I suffered disturbance and interference from off-road vehicle riders, who not only disrupted my study plots, but in some cases damaged equipment of mine. The ants and rodents I was studying are sensitive to disturbance, especially since I was attempting to perform controlled baiting experiments with them. Thus, even hikers and campers with no malicious intent sometimes hindered my efforts to gain accurate data, even though their only purpose was enjoyment of the recreational activities in which they were engaged.*

*At the end of my first year of work in the desert, I heard of the Boyd Center because of the book written by George and Jeanette Wheeler on *The Ants of Deep Canyon*. I applied for use of the Boyd Center facility, and moved my study to that site where I could have a protected area in which to work, and where I could build upon the foundation of the Wheelers' work."*

With protection assured, and with the added benefits of interaction with other researchers, and the relative luxury of on-site lab, housing, and library facilities, Dr. Gordon was able to complete her thesis research on schedule.

# News and Notes

## Fires.

**Big Creek** Two fires in the summer of 1981 burned approximately 1,600 hectares (4,000 acres) of the Ventana Wilderness in the headwaters of the Landels-Hill Big Creek Reserve. Approximately 80 hectares (200 acres) of the reserve were burned including a stand of the rare Santa Lucia fir (*Abies bracteata*). All of the burned area was south of the 1977 Marble Cone fire and most had not burned for 75 years. The fire was slow and relatively cool, mimicking the effects of a prescribed burn. Only the understory of the north-facing slopes and canyon bottoms burned, while most of the dry south-facing slopes burned completely. No significant erosion or sedimentation impacts are expected, and the quality of the wildlife habitat is expected to improve. A study of post-fire vegetation recovery is being conducted by Dr. Steven Gliesman at UCSC. Doctoral research on the local trout populations may provide baseline data to evaluate the fire's impact on local streams.

An emergency U.S. Forest Service helicopter pad and several handbuilt fire lines will be put to good use in the future in support of the University's planned prescribed burn program for the reserve under the California Department of Forestry's Chaparral Management Program. The U.S. Forest Service spent \$1.5 million fighting the fire with 1,325 firefighters, 6 helicopters and 10 air tankers. Prescribed burning for the same area would have cost less than \$40,000.

**Motte Rimrock Reserve** Scientists at the Motte Rimrock Reserve, twenty minutes south of the Riverside campus, were de-

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## Write Us a Letter

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for coastal zone habitats where the desire for greater public access leads to increasing conflict with teaching and research use. Photographic documentation helps to communicate the magnitude of these problems

Please send your letters and photographs to the following address:

Jeff Kennedy, Reserve Planner  
University of California  
Natural Land & Water Reserves System  
2111 Bancroft Way, Room 544  
Berkeley, CA 94720

Excerpts from these letters will be given in a future issue of the newsletter.

lighted with two recent wildfires that burned through the reserve, one in September of 1979 and another in June of 1981. Although the fires burned the coastal sage scrub community to the ground, botanists and zoologists at Riverside were overjoyed with the opportunity to study how this plant community recovers from fire, a phenomenon that has not been recorded in the literature. What makes this opportunity special is the four years of prefire *quantitative* baseline data on the plants and animals collected by undergraduate students in field botany (Botany 131 A) and field zoology (Biology 163) classes from UC Riverside. Because of the multi-disciplinary nature of the prefire data, an unusual interdisciplinary analysis of the post-fire recovery is possible.

To take advantage of this research opportunity, six UC Riverside faculty have been funded to develop an Undergraduate Instructional Improvement Project to involve undergrads in long-term research on the ecology of post-fire vegetation recovery in coastal sage scrub. The data will be extremely useful in testing a wide range of largely untested hypotheses in population and community ecology. The boundaries of the fire have been staked in the field, permanent observation plots have been established, and classes have been mobilized to collect the data. Student and student-faculty publications of the research results are expected, and one masters and one doctoral research project are currently underway.

## In Memoriam

On January 4, 1982, Lewis Ryan passed away after a brief illness. He was 82. Lewis and his wife Frances donated their 15-acre homesite to the University of California to establish the Ryan Oak Glen Reserve in 1974. Although small, the Ryan Reserve features the highest density of habitat types per unit area of any reserve in the NLWRS, including a rare combination of hillside seeps and springs in an otherwise dry chaparral community. It also features a small grove of rare Englemann oak (*Quercus engelmannii*). The Reserve is a half-hour drive north of the San Diego campus, close enough for afternoon field classes. Mr. Ryan was a well-known artist whose prints were often used on the covers of *Westways* and the *Los Angeles Times* Sunday magazine. The Huntington Library and Art Gallery in San Marino has acquired Mr. Ryan's art work as an important part of its California collection.

Frances Ryan is the daughter of a pioneer family which settled in the Escondido Valley in the 1860s. A teacher in the area for over

30 years, Mrs. Ryan has written three books on the history of Escondido, illustrated by her husband. Lewis' warm smile and artistic creativity will be sorely missed, but his respect for the land will live on in the Ryan Oak Glen Reserve where Mrs. Ryan continues to live.



At the request of the University of California, the San Bernardino National Forest is recommending that the entire drainage area above the James San Jacinto Mountains Reserve and adjacent downstream areas be designated the Hall Canyon Research Natural Area (RNA). The area has long been used by University researchers based at the 12-hectare (29-acre) James Reserve in the heart of Hall Canyon. Considerable baseline data exist on the area, making it valuable as a control in assessing the impacts of other land uses in the National Forest. Creation of the Hall Canyon RNA will protect the area from firewood collecting and selective logging which have adversely affected nearby areas.

The RNA encompasses the transition zone or ecotone between low elevation chaparral communities and higher elevation mixed oak and conifer forests. A nesting population of the rare spotted owl (*Strix occidentalis*) is also found in the proposed RNA. The site is of considerable interest to geneticists and population ecologists because of the transition zones between plant and animal populations encompassed by the area. Designation as an RNA is being endorsed by local chapters of the California Native Plant Society, the Sierra Club, and the Audubon Society. Our thanks to Professor Bill Mayhew and Reserve Steward Ken Berg for working closely with the Forest Service and local conservation groups on this important project.

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Acorn granaries are an important habitat component for acorn woodpeckers, providing critical food reserves for large communal breeding groups of this species.

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## Fast Food Junkies

*Continued from page 1*

and California gulls nest in colonies. But cooperative breeding is the most extreme form of cooperative social behavior among animals, and breeding more than any other phase of behavior is a major determinant of the evolutionary success or 'fitness' of a species. Cooperative breeding is relatively rare, worldwide, and the acorn woodpecker is the only native California bird species with this unusual breeding system. The study of unusual phenomena frequently results in theoretical breakthroughs, so this species seemed to be a good subject for study."

### Thirteen-Year Study

Studies of the acorn woodpecker have been continuously underway at Hastings since 1969. For their detailed observations and depth of inquiry, they rival the long-term work done by Jane Goodall and Diane Fossey on chimps and apes in Africa. From his studies at Hastings, Walt knows that as

long as adequate acorn stores are available, four out of five breeding groups will successfully raise young to fledging. Without them, only one group in five will be successful. Clearly, acorn granaries play a key role in the survival of this bird as a species. Walt and his colleagues hope to understand why.

Once every two months for six years, Walt climbed each granary, estimated the number of acorns present, and analyzed his acorn samples by species, weight, nutrition, energy content, and degree of insect damage. He also monitored the woodpeckers' culinary tastes. The resulting data were confusing at first. Acorns constituted only about one-fourth of a diet that included insects, wild oats, fruit, small vertebrates, tree sap, oak buds and catkins. Pretty cosmopolitan fare. Moreover, the granary acorns supplied only ten percent of the estimated energy needs of individual birds when acorns were not available as a standing crop, an eight-month period that includes the breeding season. How could such a small dietary component so strongly influence breeding success? To confuse matters further, a few breeding groups were successful *without access to stored acorns at all*.

It was the study of these atypical groups, together with a key observation of feeding behavior, that solved the riddle.

### Empty Calories

The first significant observation was that groups which bred successfully without acorn stores were all small. Only two to four adults per group. "As our observations of feeding behavior began to accumulate," continued Walt, "a curious fact emerged. Fledgling woodpeckers were only rarely being fed stored acorns. Their food was dominated by insects, particularly beetles and ants. [Interestingly, the species name of the Acorn Woodpecker, *formicivorus*, means 'ant eater.'] Although acorns have a relatively high energy content, they are low in protein compared to insects." Insects are apparently better baby food than acorns, if you're an acorn woodpecker. Despite this reliance on insects, analysis of the length of time acorns remain in the granaries revealed an almost unheard-of perfect correlation between breeding success of the population and the presence of stored acorns in June. Sort of a statistical hole-in-one. June is the month of greatest demand for insects to feed the young fledglings. A pattern began to emerge.

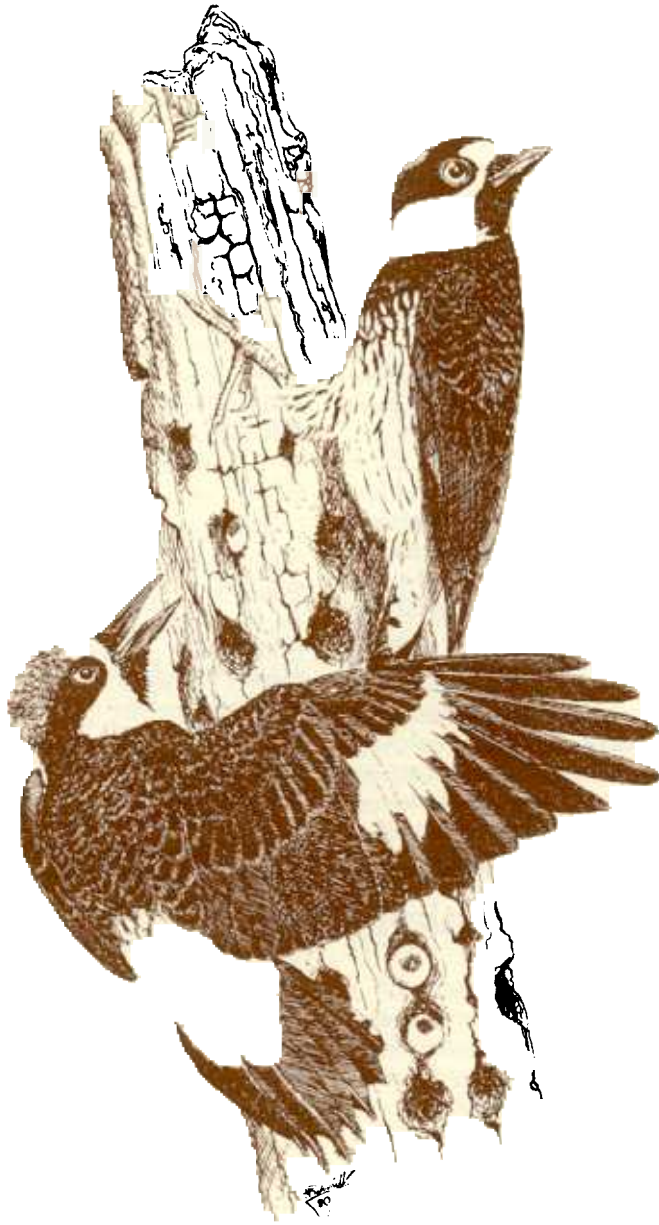
"If breeding groups remain small, the feeding demand on the insect supply is reduced," says Walt. "There are enough insects to feed *both* fledglings *and* adults, so stored acorns are not as critical. But if the size of the breeding group increases,

the food needs of the group exceed the insect supply. Insects are reserved for feeding the young, apparently because of their higher nutritional value. If acorns are unavailable, insects must be shared by all, and fledgling mortality soars. To meet their own energy needs, the adults turn to the fast 'empty' calories provided by the stored acorns. The acorn granaries seem to serve as fast food outlets for the adults: the Mei's Drive-Ins and Burger Buckets of the bird world." One acorn burger to go—hold the insects!

Walt's data suggest a complex interaction between acorns, insects, and climatic variations affecting these two foods, which strongly influences breeding behavior and the social structure of acorn woodpecker levels, the capacity and spacing of acorn granaries limit population levels. In effect, the granaries determine the quality and productive capacity of a breeding territory for most years. Only in years of exceptionally poor acorn production do other dynamics come into play.

### Of Acorns and Sex

This study of food webs and energetics is just a small part of a larger comprehensive study of the acorn woodpecker by Walt Koenig and Ron Mumme, a graduate student at Berkeley who began working on the project in 1978. Other study components are producing additional insights. According to Dr. Frank Pitelka, Walt's mentor and research colleague, these birds do not appear to choose cooperative breeding freely, they seem to be forced into it by limited habitat. Frank explains: "When population levels are high, year-old birds forced out of their home territory would be doomed to die without reproducing. All high quality territories with acorn granaries would be occupied, and the insect resources of territories without granaries could only support the small groups already there. To prevent this die-off, acorn woodpeckers have developed a social system that allows older offspring to stay on their home territory as breeding helpers so long as they don't breed themselves. It's a woodpecker version of hiring your teenager to babysit in exchange for room and board. In this way, Walt found that the number of young produced *per group* is maximized—up to a point." In effect, more acorn woodpeckers can be produced in a given area when birds breed cooperatively. "But when Walt measured the number of young produced *per individual*," continues Frank, "he found that the simple breeding pair is the most efficient reproductive unit for this species." In an era of limited resources, acorn woodpeckers are apparently forced to compromise individual productivity for the greater



productivity of the group—and the species.

There is a curious and somewhat straight-laced aspect to this social system. Young helpers do not breed in the presence of a parent of the opposite sex. These sexually frustrated helpers form a reproductive reservoir with a strong incentive to quickly fill breeding vacancies in nearby territories. Since there are more helpers than breeding vacancies, there is intense competition to fill them. The extensive overt aggression which results from this competition is of great interest to researchers like Walt. Such behavior has not been reported for other species of cooperative breeders. Further studies should help us to better understand the relationship between aggression and the environment in which it occurs.

### Protection from Disturbance

With simple tools, sophisticated analytical techniques, and much patience, Walt Koenig, Frank Pitelka, Ron Mumme, and their colleagues have made significant advances in understanding animal behavior and cooperative breeding. Tangible results for Walt have included a doctoral degree, five published papers, and a full-time research position. Such advances would not have been possible without the facilities and resources of the Hastings Reservation. As Frank Pitelka points out, "The acorn woodpecker is a fairly widespread inhabitant of oak habitats in California. Indeed we can find acorn woodpeckers in the watershed lands just east of the Berkeley campus, but we couldn't possibly have conducted our study there. Past researchers have experienced habitat disturbance and equipment vandalism there that make long-term research impossible. Even seemingly minor changes in the environment can invalidate research data. At Hastings, we have complete management control and on-site personnel to ensure that our research is not disturbed."

Frank might have added several other factors, as well: the existence of long-term baseline data on the climate and acorn productivity of the reserve; on-site housing and lab space; an on-site library of past research papers and field notes; and resident staff researchers in botany and zoology who provided invaluable observations and advice.

Long-term studies such as this on acorn woodpeckers are relatively rare in science. They are eminently feasible at reserves in the Natural Land and Water Reserves System. The results of such studies expand our knowledge in new and unexpected ways. Certainly, comprehensive long-term studies of the acorn woodpecker have given new meaning to the phrase "free as a bird," and a fuller appreciation of the role limited resources play in the environment we share with our feathered friends.



The Hastings Natural History Reservation looking south over the headquarters area.

# NLWRS Publications

A wide range of publications have resulted from work done at NLWRS reserves. The majority of these are technical articles in scientific journals, and several annotated bibliographies summarize these publications for a few of the more heavily used reserves. However, a growing proportion of NLWRS publications is represented by books, resource inventories, species lists, and descriptive brochures which focus exclusively on the natural features of NLWRS reserves. The following publications have significantly enhanced the usefulness of their subject reserves for teaching and research.

## Philip L. Boyd Deep Canyon Desert Research Center

This reserve has ten reserve-specific publications. *Deep Canyon, A Desert Wilderness for Science*, edited by Irwin P. Ting and Bill Jennings (1976), provides a 177 page comprehensive overview of the natural history of the Deep Canyon region. It also features a portfolio of 22 photographs by Ansel Adams. A ten-page reserve brochure by Sheridan Warrick (1981), provides a summary of the reserve's natural features together with information on facilities and regulations of interest to reserve users. *An Annotated Bibliography of Deep Canyon Research* by Jan Zabriski (1979) provides abstracts for over 130 scholarly works, including books, dissertations, monographs, and journal articles produced since 1959. Seven additional publications focus on specific topics: *Mammals of Deep Canyon, Colorado Desert, California*, by R. Mark Ryan (1968), 137 pages covering 60 species; *Ants of Deep Canyon*, George C. Wheeler and Jeanette Wheeler (1973), 162 pages covering 59 species; *Bird List for the Boyd Center and Deep Canyon Transect*, Wilbur Mayhew, Jan Zabriskie, and Colin Wainwright (1974), 10 pages covering 122 species—an expanded list with text is currently in press; *Plants of Deep Canyon and the Central Coachella Valley, California*, Jan Zabriskie (1979), a 175-page habitat description and flora covering 619 species with a section on climate; *Arthropods of Deep Canyon*, Saul Frommer (1981), 124 pages; *Vertebrates and their Habitats on the Deep Canyon Transect*, Wilbur Mayhew (1981), 32 pages discussing 317 vertebrate species in 13 different habitats; *Line Transects and Photo Sites on the Deep Canyon Transect*, Wilbur Mayhew (1981), 34 pages covering 32 line transects in an area 34 kilometers (21 miles) long by 19 kilometers (12 miles) wide over an elevation gradient

ranging from 9 meters (30 feet) to 2,657 meters (8,716 feet) above sea level.

**Landels-Hill Big Creek Reserve** Four publications discuss the features of this reserve: *Vegetation and Flora of the Landels-Hill Big Creek Reserve, Monterey County, California*, Charisse Bickford and Paul Rich (1979), 109 pages covering 344 species in 16 habitats, with an introduction discussing climate, geology, soils, and topography; *Terrestrial Vertebrates of the Landels-Hill Big Creek Reserve, Monterey County, California*, John Carothers, Rebecca Cull, Laurie Daniel, David Melchert, and Roland White (1980), 86 pages covering 144 species; *In the Rough Land to the South, An Oral History of the Lives and Events at Big Creek, Big Sur, California*, Susan Gorgette (1982, 2nd ed.), 68 pages; *A Guide to the Interpretive Trail at the Landels-Hill Big Creek Reserve*, Sheridan Warrick (1981), a 26-page guide to an interpretive trail available by reservation.

**Granite Mountains Reserve** The 363-page *Granite Mountains Resource Survey*, edited by Bruce Stein and Sheridan Warrick (1979), discusses the geology (10 formations), vegetation (8 communities), flora

(391 species), vertebrates (189 species), cultural resources, and land use patterns of this diverse desert mountain range and reserve—a high elevation habitat “island” surrounded by a “sea” of desert habitats.

**Bodega Marine Reserve** *Coastal Ecology of Bodega Head*, Michael Barbour, Robert Craig, Frank Drysdale, and Michael Ghiselin (1973) describes, in 338 pages, the ecological and energy relationships of 247 plant species and 152 vertebrate species in five different communities. An eight page brochure summarizes these natural features, together with facilities and regulations of interest to prospective reserve users.

**Año Nuevo Island Reserve** *The Natural History of Año Nuevo*, edited by Burney Le Boeuf and Stephanie Kaza (1981), 425 pages, provides a comprehensive overview of the history, geology, terrestrial and marine plants (168 and 211 species, respectively), intertidal animals (302+ species), birds (232 species) and seven marine mammal species, with emphasis on the northern elephant seal (*Mirounga angustirostris*).

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## NLWRS Contribution Series

In the seventeen-year history of the NLWRS a significant volume of scientific work has been published which was based at least in part on work done on NLWRS reserves. While we have accurate records of who has used the reserve and for what purpose, we have almost no record of which work resulted in a scientific publication. To remedy this situation, we have established an NLWRS Contribution Series which assigns a Contribution Series number to the publication. The phrase “Contribution No. \_\_\_ of the University of California Natural Land and Water Reserves System” then appears in the publication—usually in the Acknowledgements section or the Preface.

This recognition program serves the dual purpose of advertising the habitats and facilities of the NLWRS while providing a mechanism for centralized record-keeping of all published research. The program started in 1980 with little advertisement, and five papers have been recorded to date (see list that follows). It is hoped that a retrospective list of published research can be developed in the future.

To record your research paper, phone the systemwide office of the NLWRS (415/642-2211; ATSS 8/582-2211) to have a number assigned prior to submitting your paper or book to the editor for final typesetting and proofing. Be the first in your department to

get your very own Contribution Series No!

### No. Publication

- 1 Vasek, Frank C. 1980. Early Successional Stages in Mojave Desert Scrub Vegetation. *Israel Journal of Botany* 28:133-148.
- 2 Weathers, Wesley W. and Wilbur W. Mayhew. Time of Day and Desert Bird Censuses. (Submitted to *Western Birds* in January 1981).
- 3 Beedy, Edward C. 1981. Bird Communities and Forest Structure in the Sierra Nevada of California. *Condor* 83:97-105.
- 4 Chickering, Sherman, Rexford Palmer, Michael Barbour and Roy Woodward. (1982). A floristic checklist for the headwaters basin of the North Fork of the American River, Placer County, California. (Submitted for publication to the *Wasmann Journal of Biology*, 18 Dec. 1981).
- 5 Howald, Ann M. and Bruce K. Orr. 1981. *A flora of the Valentine Eastern Sierra Reserve Part I, Valentine Camp, Part II, Sierra Nevada Aquatic Research Laboratory*. Publication No. 1 of the Herbarium, Department of Biological Sciences, University of California, Santa Barbara.

## News and Notes

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### Construction

**Trailfinders' Lodge** Less than one-third of the reserves in the NLWRS have built facilities beyond basic roads, trails, or fencing. One reserve with on-site support facilities is the James San Jacinto Mountains Reserve where a 20-bunk dormitory and classroom facility was recently completed. The Trailfinder's Lodge was constructed primarily with money raised by alumni of a boy's school and summer camp operated for many years by Harry and Grace James. The architectural design was donated by Eugene Geritz, an alumnus of the Trailfinder School for Boys, and the construction was done at cost by the Tilden-Coil Construction Company of Riverside, California. The 12-hectare (29-acre) James Reserve, surrounded by the San Bernardino National Forest, has long been used by University faculty as a stopover point on multi-day field trips which provide an ecological grand tour from Pacific shoreline habitats across the Los Angeles Basin to the habitats of the San Jacinto Mountains and the Sonoran and Mojave Deserts beyond. Prior to construction of the Lodge, a primitive campsite and log cabin were used by classes staying at the Reserve. The reserve has also been used for many years for the annual Southwest Population Biology Conference. Other such conferences can now be comfortably held at the James Reserve. Our thanks to the many, many donors who made this building possible.



The new Trailfinders' Lodge at the James San Jacinto Mountains Reserve.

**Deep Canyon** A recent expansion of the Philip L. Boyd Deep Canyon Desert Research Center added a much-needed classroom and study to this facility. The new addition also houses a small collection of journals and reference materials, including materials from four professional libraries which have been donated by private individuals. The Center's storage yard was also expanded. Both improvements were made possible by generous gifts from Mr. and Mrs. Philip L. Boyd. Mr. Boyd is a former Regent of the University of California.

**Big Creek** Over the past three years, a trail network and three field camps with tables, latrines, and spring-fed water supplies have been developed at our 1600-hectare (4,000-acre) Big Creek Reserve on the Big Sur coast. These developments

will enable multi-day field classes to hike an elevational transect from sea level with its gray whales, sea otters and harbour seals to the 1,570-meter (5,155-foot) summit of Cone Peak in the adjacent Ventana wilderness with its forests of ponderosa pine, sugar pine, and rare Santa Lucia firs. Two former homesteads are being refurbished to provide primitive shelter and work space for long-term researchers.



The Channel Islands Field Station looking towards the sleeping porch, on Santa Cruz Island.

### NLWRS Publications

Continued from page 6

**Valentine Eastern Sierra Reserve** A *Flora of the Valentine Eastern Sierra Reserve, Part I, Valentine Camp*, by Ann Howald and *Part II, Sierra Nevada Aquatic Research Laboratory*, by Bruce Orr (1981), 97 pages, provides a comprehensive discussion of the 247 vascular plant species in five plant communities at Valentine, and 146 species in three plant communities at SNARL. A discussion of geology, soils, topography, and climate is also included.

**Reserve Brochures** In addition to the brochures for the Deep Canyon and Bodoga reserves mentioned previously, brochures also exist for our Santa Cruz Island and San Joaquin Freshwater Marsh reserves. An abbreviated brochure is also available for the Santa Monica Mountains Reserve Complex. Brochures for Big Creek, Granite Mountains, and the Hastings Natural History Reservation are being prepared for future publication.

**Systemwide NLWRS Brochure** A 24-page brochure by Jeff Kennedy (1980) provides a detailed overview of the NLWRS featuring a table which summarizes location, size, elevation range, habitats, facilities, and the addresses and phone numbers of the reserve managers. Information is also given on the history, organization, and purpose of the NLWRS.

**Future Publications** Two publications, other than brochures, are in preparation at this time: A flora of Carpinteria Salt Marsh, being prepared by Wayne Ferrin of the Herbarium of the UC Santa Barbara campus, and a flora of the Chickering American River Reserve and environs in the North Fork headwaters, being prepared by Michael Barbour at UC Davis.

Information on the cost and availability of these publications can be obtained by contacting the systemwide NLWRS office in Berkeley (415/642-2211; ATSS 8/582-2211) or the reserve managers listed in the Systemwide NLWRS brochure.

**Santa Cruz Island** Expanded facilities at the Santa Cruz Island Reserve are currently being developed with funding from the National Science Foundation. The first to be developed will be a 12 x 36 foot trailer containing a wet lab, darkroom, and storage facility, air, water purification, and temperature control equipment, dissecting microscopes, a spectrophotometer, and facilities for wet chemical analysis. A second, 12 x 24 foot trailer will then be installed to house a small library, a conference room holding 12 people, and four private quarters for long-term senior researchers. The two trailers will ultimately be linked by a small, partially covered deck. The trailers will greatly expand the usefulness of the existing research station which has no formal lab space. Housing for researchers is currently limited to an Army-style 20-bunk sleeping porch. Installation of the trailers should be completed by June of 1983 at the latest.

Continued on page 8



# The NLWRS—A Valuable Resource For Field Science

Although laboratories and greenhouses can be invaluable in the study of many biological phenomena, nothing can replace direct observation of organisms and natural environments in the field. Indeed, many phenomena, such as the ecology of acorn woodpeckers featured in this issue of the *Transect*, can *only* be studied in the field. The ecological diversity of the California landscape provides both faculty and students with an unmatched opportunity to field-test hypotheses and to study and observe natural phenomena which cannot be duplicated in a classroom or laboratory. Realizing that this invaluable educational resource could one day be lost to the inroads of development, The Regents created our system of natural reserves in 1965 to serve as "living laboratories" for field teaching and research. In a sense, the 26 reserves of the University's Natural Land and Water Reserves System (NLWRS) constitute an ecosystem library of California's natural diversity available to any qualified student or researcher worldwide.

It is not an unfounded boast to say that the NLWRS is the envy of many great universities, for it is the only university-affiliated program of its kind and scope in the United States. Recently, when the North Carolina Chapter of The Nature Conservancy and Duke University were exploring the possibility of establishing a university-managed reserve system, they turned to our system as the model.

This interest exists because availability of a resource like the NLWRS results in both enhanced learning and increased research productivity. Students come away from their field experiences at NLWRS re-

serves with an intense appreciation of the intricacy and beauty of natural systems and a strong motivation to learn more about them. The founder of the NLWRS, Dr. Kenneth Norris, summed it up nicely: "The students are electrified like none I have seen or taught in a classroom. Learning in the field doesn't come from a teacher *telling about* the world outside while he leans on the lectern of a cement-walled classroom, it comes from direct observation outside in reality."

As for research productivity, a recent bibliography of published research at our Philip L. Boyd Deep Canyon Desert Research Center describes 94 journal articles and 36 dissertations, books, and monographs produced since 1959 by that reserve alone. Comparable productivity is found at many of our other major reserves including the Hastings Natural History Reservation, Santa Cruz Island, Año Nuevo Island, Bodega Marine Reserve, the James Reserve, Scripps Shoreline-Underwater Reserve, and the Sierra Nevada Aquatic Research Laboratory.

To many of you, the existence of the NLWRS may be a revelation in itself. The system has kept a low profile as it concentrated on acquiring and protecting key habitat types before they disappeared to development. Now the emphasis is shifting to the management and protection of the existing reserves and to improved communication of what the NLWRS has to offer. The development of this quarterly newsletter is a major step in this direction.

—J. B. Kendrick, Jr., Vice President—  
Agriculture and University Services



Mission Bay marsh in the City of San Diego. The location of the new lab is circled.

## Construction

*Continued from page 7*

**Mission Bay Marsh** A 12 × 60 foot trailer was recently installed at the Kendall-Frost Mission Bay Marsh Reserve to serve as a modest research and observation area for the last remaining marsh in Mission Bay. The facility will contain a laboratory workroom, a smaller wet lab with sinks, a bathroom-shower facility, and a storage room. An 8 × 25 foot observation deck faces the marsh. The new lab will permit on-site monitoring of marsh biota over longer observation periods than previously possible, as well as facilitate diving and wading access, and provide space for equipment storage. On-site microscope inspection of plant and animal specimens will now be possible, enabling specimens to be returned to the marsh immediately after examination.

## Free Subscriptions

The NLWRS *Transect* is published three times during the academic year. To subscribe to the *Transect* write or phone the systemwide NLWRS office with your name, title, address, and phone number and you will be placed on our mailing list. (415/642-2211; ATSS 582-2211)

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