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Systemwide Office Column:

Wildlife Conservation in Israel: Goals and Prospects

The history of modern nature conservation in Israel is short. However, unique circumstances make it an important case study for conservation biologists worldwide.

The following article was adapted from a manuscript by Dr. Rafael Nezer, an Israeli geneticist who just completed a sabbatical year with the Department of Forestry and Natural Resources on the Berkeley campus. Dr. Nezer's responsibilities include developing a comprehensive management policy for Israel's system of natural reserves. He would welcome correspondence at: 3 Y. Halevi St., Box 02317, 90805, Mevasseret-Zion, Israel.

Israel is the only Middle Eastern country that has adopted nature conservation policies. Public and governmental institutions take an active role, providing strict protection for endangered species and reserving specific lands in a large system of natural reserves. But we need to increase our effort to understand the various approaches to designing such sites. The lessons learned by Israeli resource managers may lead to wiser planning and operation of California's reserve system as well.

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Mike Hamilton holds the James Reserve videodisc.

Interactive Video Now Simulates James Reserve

If a microscope is an instrument for inspecting objects too small to be seen in detail by the naked eye, then a *macroscope* would be a tool for looking at objects too *big* to be discerned by sight unaided. At the James San Jacinto Mountains Reserve, Director Mike Hamilton has put together such a tool and is busy using it to examine landscape dynamics and other macroscopic features of the natural environment.

At the heart of Hamilton's macroscope is interactive video, an information system that combines the realism of images with the intelligence of a personal computer. "We seem to grasp more information from

an image than from the written word," says Hamilton. "The Macroscope takes advantage of the interpretive value of pictures."

The pictures—3,000 of them so far—reside on a 12-inch videodisc resembling a phonograph album carved from mother of pearl. Recorded and read by a laser beam, the images don't degrade over time as do those stored on film or magnetic tape. If handled correctly, says Hamilton, a videodisc can provide unlimited lifetime to as many as 54,000 individual images, each of which can be accessed via computer in less than 3 seconds.

Included on the James Reserve disc are satellite and aerial photographs of the Hall Canyon watershed, in which the Reserve lies, panoramic views of vegetation and landscapes typical of the region, and close-up shots of common plant and animal species, soil types, rocks, and other ecosystem elements. Hamilton transferred some of these images to videotape from existing photographs; the rest he recorded with a portable video camera.

After he cut the videodisc, Hamilton began the endless process of creating programs to connect the imagery to the Reserve database of information resulting from more than 20 years of research on the ecosystems of the San Jacinto Mountains. Each picture is linked not only to other images that relate spatially or conceptually, but also to a file that contains descriptive information. Thus, the myriad images are stored in an intuitive way, making it easy to find any single picture out of a library of thousands and scan or edit data describing it.

"I'm really interested in building in the connections between the different levels of information, so that you can follow pathways from the macroscopic to the microscopic—from galaxies to genes—and back again all in a matter of minutes," says Hamilton. "These linkages make the disc much more than a slide collection. It becomes a synthetic model of a landscape that can act as a common thread tying many disciplines together."

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Reserve Highlights



No Persistent Oil Spill Effects at Bodega

In November of 1984, an oil slick from the sunken tanker vessel Puerto Rican hit the Northern California coast at the Bodega Marine Reserve (see *Transect*, Fall '84). Short-term impacts were severe. Several hundred oiled birds were found dead on local beaches and a similar number of live birds required cleaning and rehabilitation. Effects on the health of most other aspects of the Reserve's coastal habitats were more difficult to ascertain.

Initially, Bodega Marine Laboratory (BML) researchers feared the spill may have harmed populations of many species of marine invertebrates, as well as seriously affected existing research projects. They immediately began to collect samples of sediment and intertidal invertebrates and initiated studies designed to assess the extent of biological effects on particular organisms or habitats. With most of the results now in, the general message is that the Reserve's biota may have narrowly escaped the worst of the feared results.

Only one study has shown clear population effects. With funding from the Gulf of the Farallones National Marine Sanctuary, BML ecologists Victor Chow, Jon Geller, Laurie Sullivan, and I examined the effects of spilled oil on recruitment and recovery of barnacle populations on intertidal rocks at some of the most hard-hit locations near the Reserve. Population impacts were apparent at these sites, with high mortality of adult

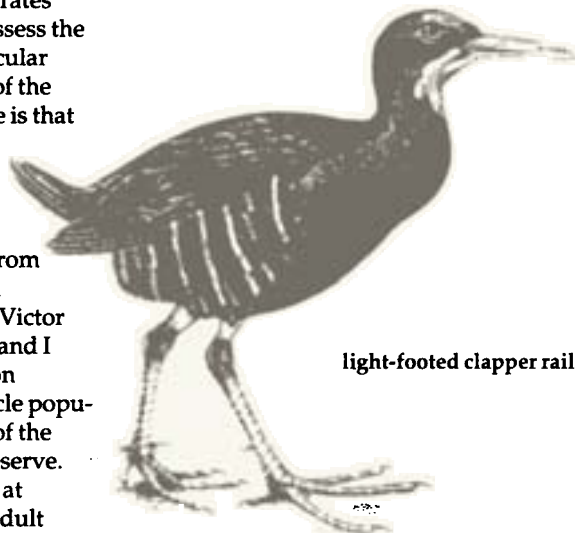
Ecologist Victor Chow examines intertidal areas near the Bodega Marine Reserve to determine the oil spill's effect on barnacle populations.

barnacles continuing for several weeks after the initial oil cleanup. Several species of algal-grazing gastropods also suffered, and probably as a result, algal cover increased at these sites over the next several months.

In a series of experiments with natural and artificial substrates, the researchers also found that recruitment of barnacle larvae from the plankton was greatly reduced at heavily oiled areas, so recovery of the population at these sites will be retarded. The worst sites, however, were confined to regions near the entrance of Bodega Harbor; the Reserve's rocky intertidal zone, which was more exposed to the severe winter storms following the spill, did not retain oil residues for as long. No barnacle mortality was apparent on the Reserve itself.

The oil spill may also have affected some benthic invertebrate populations on the Reserve portion of Bodega Harbor sandflats. Mortality rates in populations of the abundant *Transennella* gem clam were approximately twice normal in oil-exposed portions of the Reserve one month after the spill. The following spring, however, larval Dungeness crabs settled in unusually high numbers. Their foraging almost eliminated some previously abundant invertebrates, including the gem clam. This phenomenon, extremely interesting in itself, also provides an unexpected and fascinating example of a natural effect on populations which far overshadowed the suspected impacts of the oil spill.

—Peter Connors
Bodega Marine Reserve Manager



light-footed clapper rail

Just When You Thought it was Safe to Go Back in the Water...

On Sunday, April 12, more than 65,000 gallons of concentrated raw sewage sludge spilled into a salt marsh in the southeast end of Bodega Harbor from a nearby treatment plant. Bacteria-rich fluid is leaching into the harbor, which fortunately has a daily seawater exchange rate exceeding 50 percent. Though the bacterial contamination could pose a health threat to humans, who were initially advised not to eat local shellfish, it is not expected to affect invertebrate populations, or to alter the ecology of the Bodega Marine Reserve. —ed.

Clapper Rails: The Crash Continues

In January, the State Recovery Team for Coastal Endangered Species published an Emergency Strategy Plan for the light-footed clapper rail. The report highlights the critical situation facing the rail, which could disappear from California if recent population decreases are not reversed immediately. Three NRS sites protect both the habitat the rail depends on and the opportunity for scientists to study how best to manage this dwindling environment for the benefit of the bird.

The light-footed clapper rail (*Rallus longirostris levipes*) is a nonmigratory, secretive waterbird obligately tied to the coastal marsh habitat between Santa Barbara County and San Quintin, Baja California, Mexico. These coastal marshes—originally small, discrete, and confined to narrow river valleys—have shrunk significantly through degradation and conversion. As a result of such habitat loss, each of the three clapper rail subspecies in the state (California, light-footed, and Yuma) are recognized as endangered; the light-footed race was added to the federal list in 1970.

Biologists from the U.S. Fish and Wildlife Service and the California Department of Fish and Game conducted an initial survey of the state's light-footed population in 1974, yielding an estimate of 500 to 750 birds. In subsequent years, 35 marshes throughout the species' range were censused each spring with disheartening results. By 1986, following a population crash that left five marshes completely devoid of clapper rails, only 143 pairs were recorded.

Most light-footed clapper rails are now concentrated in six marshes, including the Carpinteria Salt Marsh and Kendall-Frost Mission Bay Marsh Reserves. Over the past seven years, the number of rails found in these six sites has averaged 89 percent of the state's total population. Of the available 8,490 acres of available marsh habitat along the coast, only 36 percent now harbor the rails. Including one pair recorded at our San Joaquin Freshwater Marsh Reserve, the NRS currently supports 12 percent of the light-footed clapper rail population in approximately 11 percent of the occupied marshlands in California.

The newly revised and approved recovery plan for the light-footed clapper rail sets a goal of increasing the subspecies' breeding population to 800 pairs within 9,870 acres of secure wetland habitat in at least 20 marsh complexes. Full recovery may not be possible; the extant population would need to be increased over fivefold, and occupied habitat nearly tripled.

Carefully controlled research on population dynamics, life history, and ecological requirements of the subspecies is essential to maintain and potentially increase present rail numbers. Immediately imperative, however, are measures to permanently protect and secure marshes with resident rail populations, as well as restore or create new habitats.

—Melinda Pruett-Jones,
Academic Coordinator
UC San Diego Reserves

Report From the Granite Mountains

In the last issue of the *Transect*, we introduced several new reserve managers. After nine months at the Granite Mountains Reserve, Director Philippe Cohen and Cindy Stead, who assists in managing the site and its facilities, filed this report on the Reserve and some plans for its development:

The Granite Mountains are located about 80 miles east of Barstow, just off I-40. The Reserve encompasses 2,200 acres of University-owned land and 6,720 acres as part of an agreement with the Bureau of Land Management (see p. 4). The site lies within the East Mojave National Scenic Area, currently the focus of congressional attention as various interests debate the merits of turning the region into a national park.

The height and location of this range result in highly diverse plant and animal communities with affinities to both the Great Basin and Sonoran Desert. In addition to perennial springs, the Reserve contains habitat types ranging from low-elevation bajadas and washes to high-elevation pinyon-juniper woodland.

The range's biotic diversity complements the dramatic stature and character of the mountains themselves. Composed primarily of quartz monzonite formed during the Mesozoic, the granite boulders exhibit excellent examples of exfoliation. Their scale and grandeur has left a lasting impression on many students and researchers.

Since the site is relatively new to the NRS, facilities are currently limited. A 1950s ranch-style house in Granite Cove serves as both the Reserve office and our home. It has the unique distinction of petroglyphs and pictographs as part of its backyard decor.

The other major facility is a cabin at Dorners Camp, in the northern end of the site. Currently available for researchers and field classes, the cabin sleeps seven to ten people and has a propane stove and refrigerator. In addition, there is a two-person cabin dubbed "Chateau Plateau" in the range's upper elevations and a primitive campground in Granite Cove.

The Reserve has been busy in recent months, with researchers and students logging more than 1,800 user days since September. Teaching use has been broad-based, ranging from an architecture class specializing in solar passive designs to natural history and field geology classes.

In addition, scientists from both UC and public agencies are initiating numerous research projects. These include studies of soil genesis on remnant alluvial fans, root development in heavily compacted soils, vegetation succession in recently burned and grazed areas, and the influence of cattle on Desert Bighorn Sheep.

New developments include a recently installed photovoltaic system and solar-powered well that should provide Granite Cove with an adequate electrical and water supply year-round. Improvements to our residence include a highly efficient wood-burning stove and a Swedish lfo toilet that uses only one gallon of water per flush.

These programs and improvements are part of a long-range plan now being developed to improve the Reserve's capacity for education. It calls for converting the current manager's house into an office, developing a lab and library facility, renovating a

house in the upper part of Granite Cove into our new residence, constructing housing for visiting researchers, and adding dorm and camping facilities for field classes.

On a more personal level, these first nine months on site have been a demanding and entertaining juggling act between rudimentary maintenance projects such as fixing frozen water pipes and more traditional academic activities like hosting classes. As time allows, we've been pursuing our own research interests, which include completing the Reserve's herbarium, working with a bird-breeding atlas project, constructing a resource database, and collecting notes for an oral history of the area. On days off, we often engage in such scintillating social activities as driving 80 miles to do laundry, shop for groceries, and critique the "local" restaurant fare.

We look forward to working with *Transect* readers on educational projects for the Granite Mountains Reserve. If you have questions about working on the site or suggestions for making it more useful to you, please write us at P.O. Box 101, Kelso, CA 92351. To contact us by phone, ask the long-distance AT&T operator to reach Toll Station Granite Cove #1 with two short rings by dialing: mark 887-249, route 213+181.

—Philippe Cohen and Cindy Stead
Granite Mountains Reserve



Prickly pear cactus and agave growing in the Granite Mountains Reserve

Reserve Highlights continued



Gerald Hillier (left) and Theodore Hullar sign the use agreements that add almost 17,000 acres of BLM land to the Granite Mountains Reserve and the Deep Canyon Desert Research Center.

BLM and UC Celebrate Cooperative Agreements

On April 8, representatives from the University of California and the Bureau of Land Management met on the Riverside campus to execute agreements regarding use and management of BLM-administered land adjacent to two NRS reserves. Approximately 30 people attended the ceremony, where UCR Chancellor Theodore L. Hullar and Gerald E. Hillier, California Desert District Manager, signed the documents.

The agreements grant UC use of about 6,720 acres of BLM land near the Granite Mountains Reserve and 10,200 acres adjacent to the Philip L. Boyd Deep Canyon Desert Research Center for a 10-year term that automatically renews every year. In addition to enlarging and diversifying the land available for teaching and research, the agreements give reserve users long-term control and protection of their studies. They also give the University input as to how the BLM lands are to be managed.

TNC Gives Oasis de los Osos to the NRS

The Nature Conservancy recently gave a 160-acre parcel 12 miles northwest of Palm Springs to the NRS. Known as Oasis de los Osos, this addition to the James San Jacinto Mountains Reserve was accepted by The Regents at their March meeting.

Situated below the steep north face of Mount San Jacinto, the addition looks out across the desert washes of the San Gor-

gonio and Whitewater Rivers to the Little San Bernadino Mountains. It encompasses mountain slopes, landslide deposits, alluvial fan deposits, and a canyon carved by the flow of a perennial stream. The site is located in the ecotone between desert and chaparral and supports semi-desert scrub, cismontane chaparral, and desert riparian woodland communities.

Trails maintained by the Forest Service connect the James Reserve headquarters with Oasis de los Osos, facilitating studies all along the ecological continuum between the two sites. The new property is readily accessible from Interstate 10, and is used regularly by classes from UC Riverside.

A brochure on the entire James Reserve will be available this summer. In the meantime, contact Dr. Mike Hamilton for more information at P.O. Box 1775, Idyllwild, CA 92349, (714) 659-3811.

Younger Lagoon Joins the Reserve System

The Younger Lagoon Reserve became the newest site in the NRS on March 19, when The Regents incorporated 26 acres of the Santa Cruz campus into the System.

Located along the north shore of Monterey Bay, the Reserve is adjacent to the Long Marine Laboratory and less than two miles from the main campus. The lagoon system is one of the few remaining undisturbed wetlands along the central coast, and it supports many resident and migratory water birds.

In addition to a Y-shaped lagoon, the Reserve includes dunes, a small beach, coastal bluffs, and sea cliffs.

A number of researchers already use the site. Over the past 13 years, scientists have banded several thousand land birds to survey breeding and wintering populations and assess their response to surrounding development. The Reserve provides excellent opportunities to study changes in community structure following removal of non-native shrubs and the relation between salinity and temperature stratification in lagoon waters, among other phenomenon.

The lagoon and laboratory properties were given to UC in 1973 by Mr. and Mrs. Donald Younger. The Reserve will be administered by the Santa Cruz campus. For more information, contact UCSC's new NRS Academic Coordinator Dr. Margaret H. Fusari at the Division of Natural Sciences, 391 Applied Sciences, University of California, Santa Cruz, CA 95064, (408) 429-4971.

Macroscope *continued from p. 1*

Though Hamilton has yet to incorporate genes and galaxies into his Macroscope, he has assembled an impressive interactive video atlas of Hall Canyon that enables students to study, managers to monitor, and researchers to analyze the Canyon and its ecological features in a powerful new way. The Macroscope provides a number of capacities to reserve users, including the ability to perform literature searches, analyze biological data, process and analyze digital images, and establish fully automated environmental monitoring systems.

Future issues of the *Transect* will describe the Macroscope's use in resource management and research. The following article—the first in the Macroscope series—details the system's utility in improving the science curriculum of public secondary schools.

The Macroscope as Teacher

Appreciation of nature is a long educational process. It must be incorporated into all subjects, not just taught once before moving on to another class. Some people, through an early association with the natural world, have an appreciation of nature—a type of morality—that determines the way they look at the world. Others don't come with it "hard wired" and must be taught through school. We want to provide the James Reserve videodisc to schools—not to discourage students from going out in the field, but to help start that crucial educational process.

—Mike Hamilton

Imagine sitting down before a video monitor that displays, in color, a sweeping panorama down a rugged canyon in Southern California's San Jacinto Mountains. Next to the monitor, a personal computer screen shows a typeface description of your aspect and elevation, along with a menu of choices that allow you to scan in any direction or zoom in for a closer look.

You press '5' on your keyboard, calling forth a telephoto view of the canopy vegetation below you, along with a description of it as a montane chaparral ecosystem. In this way, you can explore the region, traveling many miles through several ecological levels, without leaving your chair. You can move from an aerial view of an ecosystem to a close-up view of a grass seed found within in a matter of seconds. And in doing so, you achieve one of the primary goals Hamilton has set for his Macroscope: education through exploration.

"There's been a cry for University people to become more involved in getting their research findings down to public schools," says Hamilton. "Using videodiscs, we can store our data, our maps, and all the rest of our information resources in a way that the schools can use.

"Even if teachers use only a fraction of the data in their curricula, it's still worth it to let students have access to the disc. Kids these days are videophiles—they're already familiar with the media. Those who grasp it and move on to the next step will have a huge database to explore."

Hamilton plans to give students access to the data this fall, when he will begin distributing a disc of 50,000 images for about \$100. In the early 1980s, Apple Computer, Inc. gave a personal computer to every public primary and secondary school in the state. For less than \$1,000, a school could add the components necessary to turn that computer into an interactive video workstation, allowing its teachers to take advantage of the growing number of commercially available videodiscs. According to Hamilton, there are currently dozens in the arts and physical sciences, fewer in the life sciences. His will be the first to present an ecological perspective.

Once the disc is cut, he will begin writing lesson programs to utilize its images. The Explorer, described above, is a prototype. Hamilton has also written two other demos—the Naturalist and the Ecologist. Whereas the Explorer follows a geographical matrix, the Naturalist follows a conceptual one, letting users examine the Reserve ecosystem by ecosystem, species by species.

The Ecologist organizes the information in yet a third way—along ecological gradients. Using this program, a student can compare, say, old-growth vegetation on a sun-bathed slope at 7,000 feet to that at 5,000 feet, or to vegetation in an area that has recently burned.

"The Explorer, Naturalist, and Ecologist are three different ways of looking at the same set of pictures, but with different audiences and different goals in mind," says Hamilton. "That's what makes interactive video so flexible. We could publish an



Mike Hamilton

The Macroscope, powered by a newly installed photovoltaic system, lives in Lolomi Lodge, built by the Reserve benefactors in 1950. "It's the ultimate electronic cabin," says Hamilton.

endless series of lessons that all use the James Reserve videodisc."

Hamilton also hopes that once they start using the disc, teachers will write their own lesson programs for it using software designed to enable educators who are not programmers to create interactive curricula. Such software allows the author to communicate with the computer, telling it what information to display, what questions to pose, how to evaluate the viewer's response, and what part of the program to branch to as a result of that evaluation.

Thus, a teacher can create lessons that force students to interact with information, rather than merely respond to it. After all, with interactive video the user, by definition, cannot be passive.

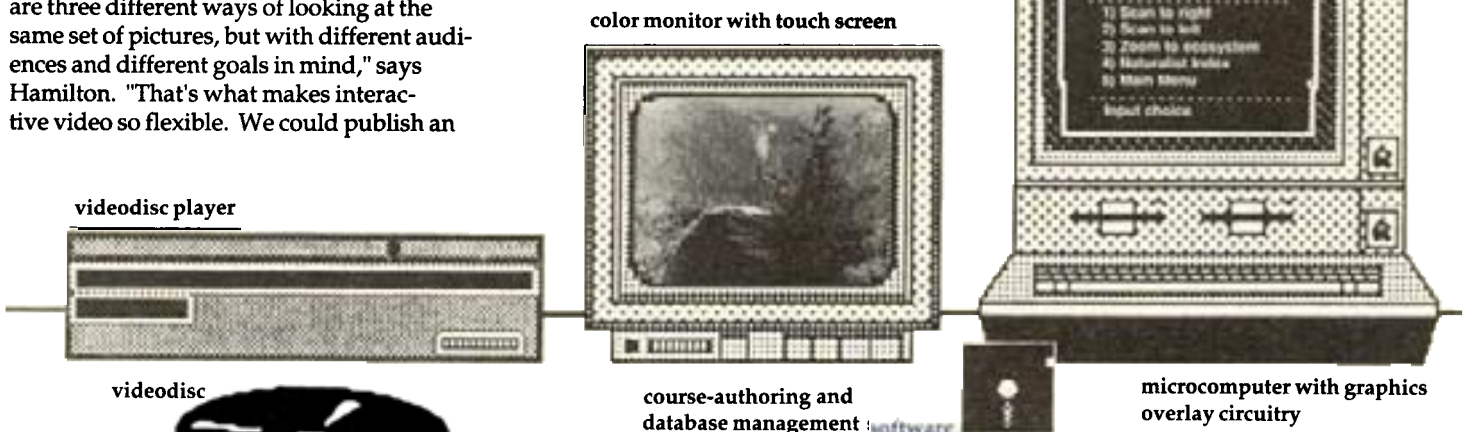
Hamilton hopes this approach will provide the same sense of exploration and discovery that he remembers feeling on field trips. "How many species lists do we have at reserves? They're one of the most common pieces of data collected, but what

value are they? You don't bring a species list into a classroom and say 'Here, this is science. The kids are going to go 'Ho hum, when's recess?'

"But if you make them explore and generate a species list by going to many different places, which can be spatially derived like different elevations or temporally derived like seasonal changes, they're going to feel much more involved. And the more involved they are, the more they'll learn."

—Sarah Steinberg Gustafson
NRS Editor

This summer, Hamilton will teach a UC Riverside Extension course entitled "Interactive Video for Educators: A Survey of Hardware, Software, and Laserdisc Technology." This two-unit course will be held at the James Reserve July 18-19. For more information, contact UCR Extension at (800) 442-4990 or (714) 787-4105.



Basic components of the James Reserve Macroscope

News and Notes

People

Janzen Receives Berkeley Citation at Recent Seminar

Dr. Daniel H. Janzen, Professor of Biology at the University of Pennsylvania, was presented the Berkeley Citation for his contributions to international conservation as part of a recent seminar on the Berkeley campus. Janzen was at UCB April 27 and 28, visiting classes and meeting with students and faculty. He also gave two public lectures, one on the importance of natural history studies in modern society and another, entitled "How to Grow a National Park," about a program aimed at saving and regenerating tropical dry forest in Costa Rica.

Janzen's visit was sponsored by UC Berkeley and the NRS. It was part of a larger effort to generate support and interest within UCB's undergraduate program for curricular improvements and activities that relate to biodiversity and conservation science.

In Memoriam

Henry C. Duffield, Jr., Ranch Manager for the Santa Cruz Island Company, died November 23 at the age of 65 after a brief illness. He was a close friend of Dr. Carey Stanton, President of the company and long-time benefactor of the Santa Cruz Island Reserve. Duffield visited the island in 1960 and remained there for the rest of his life, seldom leaving his island home.

The Henry C. Duffield, Jr. Memorial Fund has been established to benefit the Reserve. Donations may be made to the fund c/o Santa Cruz Island Reserve, University of California, Santa Barbara, CA 93106.



beach primrose

Additions

Scripps Reserve Gets a New Pier and a New Name

On March 2, UC San Diego began constructing the Ellen Browning Scripps Memorial Pier on the Scripps Coastal Reserve, located adjacent to the Scripps Institution of Oceanography. Expected to open in January 1988, the new concrete pier will replace the wooden Scripps Pier erected in 1916, which lies immediately north of the construction site.

At 1,084 feet long and 22.5 feet wide, the new pier pilings will provide a significant new recruitment area for marine flora and fauna. Upon completion of the new pier, the old one will be demolished and its piling probably used to create an artificial reef off the coast of San Diego.

On another front, the Scripps Shoreline-Underwater Reserve was redesignated the **Scripps Coastal Reserve** at the March Regents meeting to reflect the addition of two terrestrial canyons and the knoll between them.

SNARL Opens New Lab Space

The Sierra Nevada Aquatic Research Laboratory (SNARL) recently completed a 900-square-foot addition to its laboratory facilities and renovated an existing 250-square-foot lab building. The addition consists of two large laboratories, one of which contains an 80-square-foot walk-in cold room where temperatures from -20 to +30 °C can be maintained. The new buildings tie together existing facilities, making winter-time access to the entire complex more convenient.

This facilities-improvement project also includes a housing unit that accommodates up to 28 people, which was completed last March. Funding for both additions came from the National Science Foundation, the Santa Barbara Campus, and the systemwide NRS office. For information on using SNARL's facilities, contact Shirley Clarke, Marine Science Institute Trailer 342, University of California, Santa Barbara, CA 93106, (805) 961-4127.

Big Creek Gets New Tractor

In January, the Landels-Hill Big Creek Reserve acquired a Kubota four-wheel-drive tractor, along with a trailer, a front loader, and a box scraper. The tractor, which can maneuver the steep terrain and tight turning radii demanded by this rugged Reserve, is being used to maintain the site's 13.2 miles of roads and will be put to work in the construction of new reserve headquarters.

Contributions

A Lot of Help from Our Friends

In the last six months, 10 public and private sources have contributed a total of \$135,800 to the Natural Reserve system:

California Coastal Conservancy — \$50,000 in matching funds to enhance and restore wetlands in and adjacent to the Coal Oil Point Reserve on the Santa Barbara Campus. This project is part of the Storke and Devereux Campus Wetland Enhancement Plan (see *Transect*, Fall '86).

Chevron Corporation — \$20,000 to build a footbridge across Big Creek that will make the four-mile interpretive trail at the Landels-Hill Big Creek Reserve more accessible.

California Department of Fish and Game Duck Stamp Fund — \$19,900 to restore vital open water areas in the San Joaquin Freshwater Marsh Reserve.

A. E. Stewart Chaffey — \$19,000 for the Big Creek Reserve that will be used to convert a storage shed into a temporary laboratory and to fund site planning for a permanent Reserve headquarters.

Giles W. & Elise G. Mead Foundation — \$10,000 to be used as seed money for research projects.

Edwin W. Pauley Foundation — \$5,000 in unrestricted funds.

James S. Copley Foundation — \$5,000 to write and produce a brochure for the Kendall-Frost Mission Bay Marsh Reserve.

The San Francisco Foundation — \$2,900 to fund production of a brochure describing the Año Nuevo Island Reserve.

Security Pacific Foundation — \$2,000 in unrestricted funds.

TRW, Inc. — \$2,000 in unrestricted funds.

The Natural Reserve System depends on such contributions for many of its resources and programs. We thank those listed above for their generosity and support.

Reserve Benefactors Help Sites Expand

Three reserves grew this past winter as long-time donors gave gifts of property:

Fanny Hastings Arnold conveyed 60 acres of oak woodland to the Hastings Natural History Reservation, located in Upper Carmel Valley.

Charles L. and Ottie Mae Motte donated 30 acres to the Motte Rimrock Reserve on the west edge of Perris Valley.

Ida Dawson contributed six more acres to the Dawson Los Monos Canyon Reserve in San Diego County near the city of Carlsbad.

Thank you, one and all!

Events

UC MEXUS to Hold Seminar on Conservation Science

UC MEXUS will host a symposium on the role of biological reserves in research and conservation June 14-18 as part of the AAAS meeting in San Diego. Speakers will include representatives from Mexican and American universities and public agencies.

Directed by Dr. Arturo Gómez-Pompa, UC MEXUS is a Universitywide program that promotes academic interaction between Mexico and the United States. The NRS is currently working with UC MEXUS to establish a formal conveñio with Mexico's natural reserves in order to facilitate academic exchanges and comparative research projects.

For more information on the symposium, contact Dr. Ronald Carroll in the systemwide NRS office (see back page).

Join the Friends, See the Reserves

Spring and summer are the busy seasons on most NRS reserves, and 1987 is no exception. Scheduled *Friends of the NRS* activities include tours of the Jepson Prairie Reserve, an open house at the Valentine Eastern Sierra Reserve, lectures at Bodega Marine Reserve, canoe trips, bird walks, and workdays at the San Joaquin Freshwater Marsh Reserve, and a course on fire ecology at the Landels-Hill Big Creek Reserve. For more *Friends* information, contact the systemwide NRS office.

Israel continued from p. 1

Problems faced by conservation biologists worldwide are particularly extreme here. In surrounding countries, which lack regulations preventing the destruction of resources, wild animals are scarce. Israel's wildlife populations are further isolated by military barriers protecting its borders.

Considering these factors, we may assume that for certain taxonomic groups Israel is a "terrestrial island" in the Middle East surrounded by a huge fence and an area virtually devoid of wildlife. We therefore may apply to Israel the theories of island biogeography that have special implications for biological conservation.

The main factor in this concern is the low to nonexistent migration rate between Middle Eastern populations. This severe abridgement interrupts potential gene flow and decreases chances of recolonization in case of random species extinction. To compound the problem, development of urban centers and massive conversion of wildland to agricultural uses have destroyed most of Israel's natural habitats and isolated those that remain, reducing gene flow within Israel as well.

In addition, most Israeli populations of large ungulates and predators are descendants of relatively few "founder" individuals that survived until protection and management were instituted a few decades ago. These populations have recently passed through dramatic genetic bottlenecks.

On a more theoretical level, we lack a consensus concerning the optimum size of reserves. Large areas are likely to contain more habitats, increasing habitat and species diversity. Large reserves with large populations also are preferable in order to minimize inbreeding and delay extinction.

In contrast, several smaller reserves may encompass more species than a single large site. Small reserves in distinct habitats allow for different local adaptations and consequent genetic differentiation between populations. The result is increased total genetic diversity, which may prevent catastrophic extinction. But this design must be balanced by the consideration that reserves must be large enough to maintain critical population size.

One of our specific concerns regards re-introduction, which may be a wise way to compensate for low migration rates and lack of recolonization. But among the many complex problems it poses are that the animals may migrate, introduced animals may carry diseases, and introduction may lead to hybridization. Assuming that different populations may accumulate different genetic characteristics, the artificial mixing



Aerial view of the new Younger Lagoon Reserve and the adjacent Long Marine Lab (see page 4)

of populations may lessen those characteristics more favorable to the local habitat.

Population size and management is also a concern, since genetic and demographic processes have thresholds both for big and small populations. Overpopulation by one species can destroy both its own and other species' resources. For instance, the absence of natural predators and strict protection from humans have allowed gazelle populations in the Lower Galilee and the Golan Heights to increase rapidly during the last few years. The result has been severe damage to agricultural lands surrounding the gazelle's natural habitats, creating a situation where local farmers demand immediate solutions.

In some cases, we need to create better conditions for habitats that have deteriorated. Habitat manipulation may take such forms as seeding, creating new water reservoirs, or constructing new nesting facilities.

But any effort toward preservation by artificial means must be first justified by biological analysis. Appropriate measures must then be taken to simulate natural conditions and monitor management endeavors.

It is clear that, at a minimum, we must preserve and manage *habitat* if our wildlife is to survive. Current conservation practices provide only for the welfare of single species. Our efforts must shift in emphasis toward community conservation to ensure long-term success. In time, Israel's wild populations may serve as sources for re-introduction and colonization of the vast deteriorated lands around us. These challenges make our responsibility even greater.

Opportunities

Immediate Job Opening: Reserve Steward at VESR

The Valentine Eastern Sierra Reserve is now advertising for a full-time Reserve Steward. The steward will be responsible for maintenance and custodial duties at the Sierra Nevada Aquatic Research Laboratory, located in the Eastern Sierra near Mammoth Lakes.

The Reserve is looking for someone with maintenance and/or construction skills and experience. Contact Dan Dawson at (619) 935-4334 for details on the job itself. For application information, call the UC Santa Barbara Personnel Services Office at (805) 961-3166. *Act fast—this job will close soon.*

Itching for Research Funds?

The UC Mosquito Research Program has money available for mosquito-related research, particularly studies related to nonchemical methods of control. The San Joaquin Freshwater Marsh Reserve is available as a field site. In addition to supporting an ample supply of research subjects, the Reserve contains a system of diked ponds where researchers can control the system's water regime in order to perform experimental studies. For more information on the grants program, contact Bruce Eldridge, UC Mosquito Research Program, 375 Briggs Hall, Davis, CA 95616, (916) 752-6983.

By the way...

Marine-related research in the Natural Reserve System includes 56 sponsored projects on seven reserves involving 54 faculty and 50 graduate students and postdoctoral researchers.



Publications

Get Your New Brochures Here

Brochures for two reserves recently came off the press: Hastings Natural History Reservation and Año Nuevo Island Reserve. Designed for prospective reserve users, these publications describe the natural resources of the sites and contain information on access, facilities, and use. Also available are brochures for Pygmy Forest Reserve, Ryan Oak Glen Reserve, San Joaquin Freshwater Marsh Reserve, Philip L. Boyd Deep Canyon Desert Research Center, and Santa Cruz Island Reserve. Contact the systemwide NRS office for free copies.

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Wish List

Is furniture cluttering your attic? What about those unused dishes or hand tools? Your throwaways might find new usefulness in the hands of a reserve manager. If you have any of the following items or others to contribute, please contact the systemwide NRS office:

- hand tools
- floppy discs, either 3 1/2" or 5"
- pots, pans, and utensils
- office furniture, file cabinets, or lamps
- pieces of new carpeting or vinyl flooring larger than 10' by 10'
- small boats (skiff, canoe, or kayak)
- vehicle, of any type, in good condition
- house trailer (adequate for 2 people)

Remember: the pipewrench gathering dust in your basement today could save a water system in the Mojave Desert tomorrow!

Free Subscription

tran • sect (tran'sekt), *n.* 1. *Field Science.* A line along which physical and biological data are collected. 2. *Tech. Slang.* A cross-sectional slice of the environment under study.

In a broad sense, the Natural Reserve System is also a transect. It encompasses a cross-section of California's natural diversity in a system of natural areas and field stations specifically reserved for teaching and research. Recognizing this, we have chosen to call our newsletter the *Transect*.

For a free subscription—two issues per year—write or phone the systemwide NRS office: (415) 644-4211; ATSS 8-532-4211.

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