

A Walk on the Wild Side

RARE and endangered plants and animals at Lawrence Livermore? Perhaps surprisingly, there are a few at the heavily developed main site, even as suburban Livermore edges ever closer. Twenty-four kilometers to the east, nestled in California's Coast Range, the Laboratory's Site 300 is home to many more. Here, at the Laboratory's testing range for high explosives, interesting flora and fauna abound on 28 square kilometers of rolling grasslands and steep ravines.

At the main Livermore site, California red-legged frogs (*Rana aurora draytonii*), a federally listed threatened species, live in a small creek and are regularly monitored. They are also breeding in a drainage retention basin on site for the first time now that Laboratory wildlife biologists have controlled the bullfrog (a nonnative predator) population. The California tiger salamander (*Ambystoma californiense*), which may soon be listed as threatened, has been seen near the Livermore site.

"White-tailed kites (*Elanus leucurus*), a California fully protected bird of prey, are successfully fledging their young most years at the main site," says Livermore wildlife biologist Mike van Hatten. "Typically, we see many of the same birds here that we see in a suburban environment." No rare native plants have been found at the Livermore site.

At Site 300, golden eagles are a common sight and feral pigs wreak havoc now and then on the environment. A variety of plants and animals thrive in the site's grasslands and vernal pools, including a species of poppy discovered in the last decade that was thought to be extinct. Seven other species of rare plants are also found at Site 300 alongside numerous rare species of bats, mice, amphibians, snakes, beetles, eagles, hawks, and smaller birds.

Biologist Thom Kato, group leader for Livermore's Environmental Evaluations Group in the Environmental Protection Department, has overall responsibility for wildlife monitoring and research at the Laboratory. The wildlife biologists in his group conduct monitoring programs required by existing permits and pursue efforts to track the distribution and abundance of rare and endangered species. The majority of their monitoring and research efforts are directed at Site 300, so that staff there can plan appropriately for explosives testing. "Our goal is to be in a

The big tarplant (*Blepharizonia plumosa*) is widespread throughout Livermore's Site 300 but extremely rare elsewhere.



When a controlled fire burns through an area at Site 300, it removes most vegetation but leaves behind patches of unburned ground where big tarplants (*Blepharizonia plumosa*) can mature, flower, and provide seed for the following year.

position to meet constantly changing regulations and ensure overall regulatory compliance,” says Kato. “That requires being fully familiar with all species at Site 300.”

Stalking the Wild *Blepharizonia Plumosa*

Most of Site 300 is undeveloped, and the area has been closed to the public since the testing range was established in the mid-1950s. Biologists cite these factors and the frequency of controlled burns for the existing botanical diversity at Site 300. Of the eight rare plants there, restoration or monitoring activities are being conducted for three of them.

The large-flowered fiddleneck (*Amsinckia grandiflora*) exists in two populations; however, one of these may have been lost as a result of heavy rains in 1997. Just one other natural population is known to exist. An active program is under way to maintain these habitats and establish additional experimental populations because the overall numbers of the large-flowered fiddleneck are shrinking.

Better news exists about the diamond-petaled poppy (*Eschscholzia rhombipetala*). Experts thought this plant to be extinct, but it was rediscovered at the Carrizo Plain (California central coast) in 1992 and then at Site 300 in 1997. Laboratory biologists discovered a second population in 2002, and the number of plants in the original Site 300 population appears to be expanding.

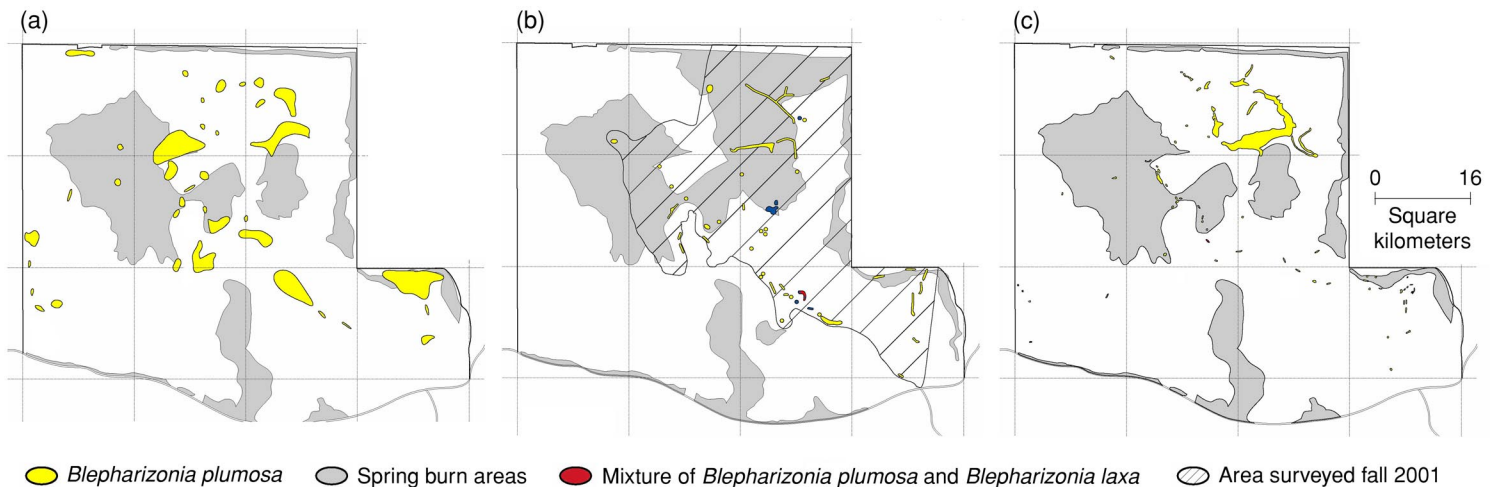
The third rare plant actively monitored is the big tarplant (*Blepharizonia plumosa*), which is widespread throughout the site but extremely rare elsewhere. Monitoring has shown that

populations of the big tarplant were somewhat larger in 2002 than those observed in 2001, particularly in areas burned in the past but not burned in the spring of 2002. Because controlled burns are such an integral part of safety management at Site 300, this apparent correlation with changing numbers of a rare plant warrants attention.

Detailed monitoring has shown that the big tarplants themselves don't survive direct contact with the late-spring and early-summer fires because the fall-blooming plants are still small at this time. But the burns are patchy, so some plants survive in the unburned patches and are able to mature, flower, and provide seed for the following year. The next year's plants have the advantage of reduced competition from other plants in the burned area and often come back in even greater numbers.

Some areas of Site 300 are burned every year for safety reasons, while other areas have burn requirements that vary from year to year. “If there is flexibility with regard to burning, we could explore the possibility of giving an area a rest when the big tarplant population is down so that populations can expand the following year,” says Tina Carlsen, an ecologist. “Conversely, we could burn the population area and see if the tarplant comes back in greater numbers.

“Now, we're working to establish a statistical correlation between the controlled burns and populations of the big tarplant. A challenge is that we must consider many other contributing factors besides the fire itself, such as the time of the fire, weather conditions, other plants and animals in the area, and so on. Every year is slightly different. Ecology is a complicated science.”



The data are not conclusive, but it appears that populations of the big tarplant (*Blepharizonia plumosa*) may come back in greater numbers two years after being burned, as shown in these Site 300 maps for years (a) 2000, (b) 2001, and (c) 2002. Controlled burns are conducted in late spring or early summer, and plants are surveyed in the fall.

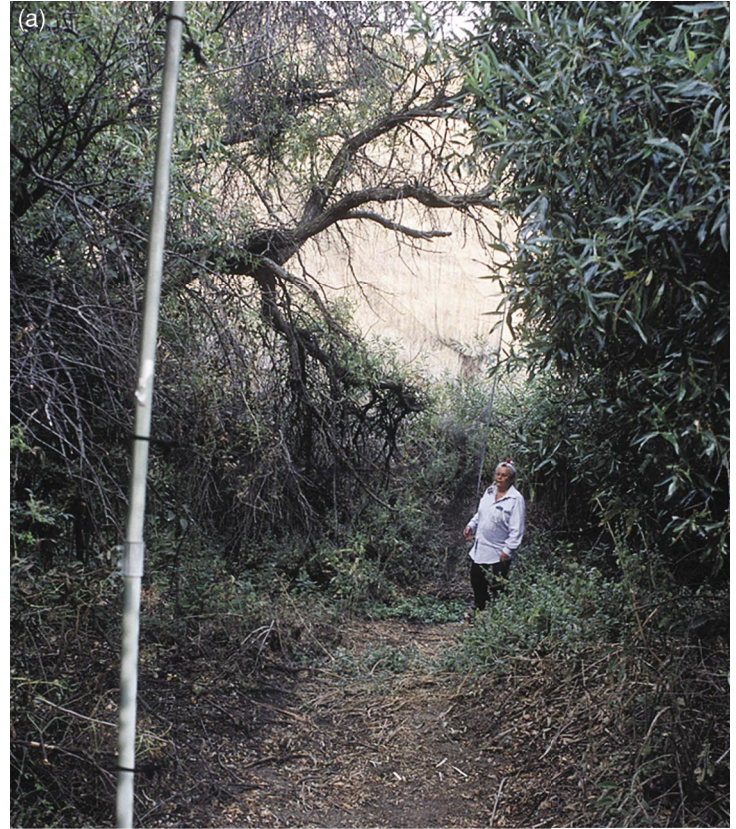
For the Birds

In 2002, the Laboratory began to prepare a new Environmental Impact Statement (EIS) evaluating the environmental consequences of continuing operations. An important aspect of the EIS is providing up-to-date information on sensitive ecological resources at the Laboratory. As part of gathering this broad array of ecological data, a census was started of bird species at Livermore. Gathering this information helps to ensure that mission activities at Site 300 go on as planned and are not interrupted by regulatory requirements aimed at protecting declining populations of migratory and other bird species. Because too little was known about Site 300 bird populations to adequately prepare the EIS, van Hattem started a program to count resident and migratory birds. A team of biologists and volunteers has identified 103 species, of which 24 are state or federal species of special concern and two, the Swainson's hawk (*Buteo swainsoni*) and willow flycatcher (*Empidonax traillii*), are listed as California-threatened and endangered species.

The team elected to use an established and well-defined national protocol known as the Monitoring Avian Productivity and Survivorship (MAPS) Program. MAPS was created in 1989 by the Institute for Bird Populations (IBP) of Point Reyes Station, California, to assess and monitor the vital rates and population dynamics of more than 120 species of North American land birds in order to provide critical conservation and management information on their populations. Since its first season, MAPS has grown nationally from 16 to 570 monitoring stations and has received the support and endorsement of many federal agencies and conservation groups. Because MAPS is a widely accepted methodology, the Laboratory is able to defend the information that it collects and bases its decisions on, and can provide important information to a much broader national effort.

Birds are captured in mist nets, banded in accordance with a permit from the Bird Banding Laboratory (BBL) of the U.S. Geological Survey Biological Resources Division, and released unharmed. Information on the habitat, sex, and estimated age and health of banded birds goes to the BBL. Working with biologists all over the country, the BBL and the IBP have established an unprecedented storehouse of data on birds available to all citizens and agencies.

"Site 300 is on the Pacific Flyway—one of the four major North American migratory routes—so we get all kinds of visitors," says van Hattem. "We've banded a varied thrush (*Ixoreus naevius*) found usually in the redwoods and a black-throated sparrow (*Amphispiza bilineata*) that belongs near Mono Lake on the eastern side of the Sierra Nevada." Van Hattem has also directed a search of nesting sites for the tricolored blackbird (*Agelaius tricolor*), a



(a) A mist net is set up near the Elk Ravine Bird Banding Station at Site 300.
 (b) A female common yellow-throat (*Geothlypis trichas*) is trapped in the mist net, then later banded and released unharmed.

federal species of concern whose numbers are declining throughout its range.

While continuing to provide important data needed to fulfill environmental protection requirements, these and other avian monitoring programs will allow wildlife biologists to identify and describe patterns of bird populations across time and space, not only at Site 300 but also in broader geographic areas. Researchers can then begin to identify how these patterns are related to the ecological characteristics and population trends of various species, their habitat characteristics, and the ever-unpredictable weather. Working with Site 300 staff, wildlife biologists can also suggest ways to carry out programmatic activities while ensuring that site activities have minimal direct effect on migratory birds and do not result in violations of regulations protecting some species. Efforts to integrate management actions and conservation strategies with programmatic activities may even help to reverse the decline of bird populations and maintain stable or increasing populations.

A Safe Haven

“As time goes on, there will be more concern about the health of our ecosystem,” Kato says. “We have the unusual and important task of helping to ensure that the Laboratory performs its primary mission while at the same time contributing to the conservation, and potentially to the eventual recovery, of endangered species at Livermore.”



Two male tricolored blackbirds (*Agelaius tricolor*) in the wild. A search for the nesting sites of these birds is ongoing at Site 300.

By offering a safe haven for rare flora and fauna, Livermore is helping some of the rich diversity of our world to survive and thrive.

—Katie Walter

Key Words: birds, *Blepharizonia plumosa* (big tarplant), endangered species, plants, threatened species, wildlife.

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A captured male Luzuli Bunting (*Passerina amoena*) about to be released.