



*Figure 1. Among the many needs for native plants at Lake Mead National Recreation Area is the restoration of abandoned roads. Routine automobile traffic and camping took their toll on this desert campsite in the creosotebush plant community. Closed by the park years ago, the site has since undergone restoration.*

## Reflections on a desert nursery operation

Need native plants for restoration projects? Establishing a park nursery is one solution, but should be considered carefully

By ALICE C. NEWTON, PHOTOS BY THE EDITOR

**L**ake Mead National Recreation Area (Nevada and Arizona) encompasses 1.5 million acres of which 1.2 million are land-based. The park is managed for conservation while providing recreational and other outdoor opportunities. Spanning three of the four great American deserts—Great Basin, Mojave, and Sonoran—this national recreation area is rich in natural resources, many of which are poorly known biologically. This incredible coverage of the Southwest allows for great diversity in plant communities, such as yellow pine and pinyon-juniper woodlands, creosote-bursage scrub, Joshua tree woodland, desert riparian woodland, alkali meadows and aquatic herb, and gypsum barren scrub. Providing native plants to meet the needs of various resource management projects in these plant communities has become quite a challenge.

At Lake Mead, we use native plants for landscaping and restoration work. Our plant selection guidelines state that only native plants (with certain exceptions) will be used for landscaping and restoration in park housing, campgrounds, and other visitor ar-

eas. Concessionaires and private property owners within the park are also encouraged to use native plants obtained from the National Park Service. Restoration projects to date have involved primarily off-road vehicular damage, road and utility corridors, abandoned roads (fig. 1), and riparian areas following eradication of the nonnative tamarisk. Future restoration projects will also include vast areas of overgrazed scrub and grassland.

### Opportunity

In 1991, I was hired to remove native vegetation from and later restore approxi-

mately 12 miles of Lakeshore Road that were being widened, rebuilt, and in some places, moved (fig. 2, a & b). The position was classified as “temporary, not-to-exceed four years” because this was the anticipated duration of the road project. This project, funded by the Federal Highways Administration, was a catalyst for the park to begin addressing its



*Fig. 2. (a., above). Reared in the park nursery, native plants such as ash and desert willow (b., right) were used to landscape the margin of the road serving the visitor center. The nursery resulted primarily from native plant needs brought about by a major road construction project.*





*Figure 3. Protected from strong desert sunlight by a shade cloth laid over a steel frame, the Lake Mead nursery currently provides space for approximately 3,000 plants. The plants get their start in the greenhouse (upper middle part of photo) before being moved to watering stations (foreground) for additional growing time. Pipes made of PVC serve as slide-through pots, allowing resource managers to transplant the seedlings to various restoration sites around the park with minimal disturbance to their long and delicate roots.*

long-term needs for native plant material for other projects. My function was soon viewed as serving the specific needs of the road project and the general needs of the park, and my position was converted to permanent. With additional park funding, we expanded the newly established nursery beyond what was needed for the road project and began propagating and maintaining plant material for other park purposes.

Quite frankly, building and operating a native plant propagation facility is a little tougher than it sounds. My education is in ornamental horticulture with dual emphasis on park and nursery management, and landscape design and construction. I learned greenhouse and irrigation systems engineering along with plant propagation and nursery facilities management. My practical experience included nursery operations and native desert plant propagation at a state facility, and landscape construction for private contractors. Even though I had the right education and some experience, building the nursery was an incredibly time consuming and expensive task. A productive, permanent operation requires considerable commitment not only from the nursery manager, but also from the nursery manager's supervisors and park management.

### Considerations

If you are contemplating building a nursery to serve park needs, here are a few things to consider. Where will it be located, and how much land will you need? If built within a park, must land be disturbed, or can land be rented for this purpose outside the park? Do you have a reliable cost estimate for the construction of the nursery? Does the park have the expertise to build it or will you have to hire contractors? Do you have access to electricity and large amounts of water suitable for irrigation, and how reliable are these supplies? Does your location have good sun exposure for at least 8-10 hours a day, with a suitable microclimate? Can the nursery be kept secure from theft, vandalism, and herbivory? Do you know how many, what size, and what species of plants will be needed and when? How much flexibility will you have or need? Do you have, or have access to, up-to-date technical knowledge of irrigation and greenhouse management methods? Where will you get supplies? Is knowledgeable assistance available during vacations or emergency situations? How fast can someone

respond to a facility maintenance emergency? Is management willing to commit long term to budgets and personnel?

These are important questions that must be answered. For example, at Lake Mead we had no suitable place to build our facility outside the park, so we built it internally. Fortunately, we were able to use the site of an old sewage lagoon, previously disturbed land, which was secure. Unfortunately, we had to run power and water to the site at a cost of approximately \$15,000. We considered using treated effluent for our water source, but found it too salty for use on container plants. (We do use it for flood irrigation, however.) We spent \$6,000 to surround 2 acres with chain-link fence and quarter-inch wire mesh to exclude animals and provide security, and another \$6,000 on irrigation materials. Our greenhouse (only 180 sq ft—fig. 3) was built with volunteer labor and about \$200 in materials, but we spent about \$3,000 on the office and secure storage building. The 16 ft x 32 ft barn was built by Boy Scouts as an Eagle Scout project, but we provided the foundation at a cost of \$2,500. Whenever we used a contractor, if we could get one to come out to the park, we were charged a premium for driving time.

### Size

You may not think you want a nursery as large as 2 acres, but consider your plant needs over the next few years. How many 1-, 5-, or 15-gallon plants are you going to need? Are you going to need space for salvaged plants, soil, and equipment storage? What happens to the plants when the project is delayed for a year (or three)? Consider access space, too, and keep in mind that a 15-gallon plant may take two years to grow to size. Or perhaps you will just grow plants in very small containers, to save space. You will need major greenhouse space for that, at a considerable cost over outdoor space. Also, plants in a greenhouse are extremely vulnerable to environmental disturbances. In the desert, a greenhouse without power will soar to over 130°F in a few minutes in the summer, and will drop

*Building a nursery to meet the native plant needs of various resource management projects at the park required careful consideration of human and fiscal resources*

*See "Lake Mead" on page 16*

to well below freezing in a few hours in the winter. Higher humidity can allow devastating fungal or insect infestations, but tiny containers and seedbeds need to stay very moist. The longer a plant is in the house, the greater the cost.

You may have the space, the water, the power, the money, the construction capability, the time, and the ambition. But so far we have only discussed the easy stuff, the onetime headaches. Doing your homework, indeed, will prevent some real migraines down the road, but you are still bound to have some problems.

### Staffing

Since Lake Mead has such a wide array of plant communities, we often grow plants with variable requirements for water, sunlight, and nutrients. We have containers of different shapes and sizes, different soil mixes, nutrient mixes, and hormone concentrations. There are several stations for irrigation, capable of using one of four different watering schedules, and each using a bewildering array of parts (fig. 4). Even though our nursery is not particularly big or complex, nobody just walks in and understands exactly how we operate. An experienced nursery worker will catch on pretty fast, but everyone else will need a lot of training.

Keep in mind, too, that absences must be covered. As the nursery manager, you are responsible for the care of your plants 24 hours a day, seven days a week. I strongly urge anyone thinking about building and operating a nursery to consider splitting the responsibilities between two people. This does not necessarily mean two full-time staff, but the nursery manager should always have trained staff to fall back on during vacations, other projects, illness, and other emergencies. Someone who knows how to repair a valve or major line break, program the clock, and is familiar with the watering needs of individual plants is invaluable to any nursery. This is most

easily accomplished when the backup person is a part of the daily operations and knows the routine.



*Figure 4. Raised in a harsh desert environment, plants at the nursery require constant care while the bewildering array of plastic watering lines demands continual vigilance. A power outage, leak, or break in a line could spell disaster for these fragile propagules in a relatively short period of time.*

### Weighing alternatives

By now you may be reevaluating your notion to start a production nursery. What are the alternatives? Perhaps you could share expenses with a nursery already established in your cluster in exchange for plant material. Among the desert parks of the Pacific-Great Basin Cluster two have production nurseries, one at Lake Mead and the other at Joshua Tree National Park. The Joshua Tree operation is geared toward arid plants such as creosotebush (*Larrea tridentata*) and bursage (*Ambrosia dumosa*), while the Lake Mead operation can accommodate several thousand riparian plants such as Goodings willow (*Salix gooddingii*)

and cottonwood (*Populus fremontii*). The remaining desert parks in this cluster may take advantage of these facilities when needed. Perhaps you have an agricultural or horticultural college, a Natural Resource

Conservation Service facility, or a private production nursery within a reasonable driving distance of your park that would grow materials for you under contract. Be aware, however, that contract growing has certain disadvantages that include inflexibility and lack of knowledge of native plant propagation and maintenance. Many native plants have no established methods for reproduction in a nursery, and trial and error propagation by a contract grower may prove to be very costly. Additionally, many contract nurseries are not oriented toward genetic diversity, preferring to clone plants like factories. But if you require material for one project only, a good contract grower may be just what you need.

Eight years ago, Lake Mead National Recreation Area had no means of addressing its growing need for native plant material. In contrast, during 1999, the park will devote a full-time position to rearing almost 10,000 plants of 30 species for use in five major park projects. Additionally, we will be able to provide material for many smaller landscaping and restoration projects. What began as a way to meet the needs of a road restoration project has lead to an ongoing nursery operation to

meet the needs of the park for the long-term supply of genetically diverse, native plant materials. Filling this niche for the park is personally satisfying, as is getting out in the nursery early in the morning, sharing space with birds and the occasional rattlesnake, and caring for the living beings I helped to create. The journey has been a real challenge, but over all, well worth it. **P**

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*Alice Newton is a Resource Management Specialist at Lake Mead National Recreation Area, 601 Nevada Highway, Boulder City, Nevada 89005. She can be reached at 702-293-8977; [alice\\_c\\_newton@nps.gov](mailto:alice_c_newton@nps.gov).*