

State of California
The Resources Agency
Department of Fish and Game
Habitat Conservation Planning Branch

1999/2000 Native Plant Salvage and Relocation
Second Status Report ^{1/}

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Prepared for
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ABSTRACT

This is the second annual monitoring report for the Nature Reserve of Orange County's 1999/2000 Native Plant Salvage and Relocation project. In the fall of 1999, NROC salvaged over 9,000 shrubs from The Irvine Company's Planning Area 22, which is located in the San Joaquin Hills within the Coastal Subregion of the Natural Community Conservation Planning area. Salvaged plants were relocated to Bommer Canyon, an adjacent area within the Coastal Subregion that has been degraded by historic grazing practices. In December 2000, the restoration plots were staked with identifying lath and surveyed. For each shrub and grass group, data were collected on the number of plants originally planted, the number of plants alive or dead, and the general condition of the plot. For cacti, planted groups were counted and documented. Restoration plots were surveyed again in 2002. As of spring 2002, the salvage efforts have been successful, achieving an approximate 75 percent survival of two of the most dominant shrub species. Benefits achieved through this effort include 1) preservation of native plant species pre-adapted to local site conditions, 2) preservation of a native seed bank, and 3) preservation of beneficial soil microorganisms. The restoration area was photo documented and all plots will be monitored in following years.

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INTRODUCTION AND BACKGROUND

This is the second annual monitoring report for the Nature Reserve of Orange County's (NROC) 1999-2000 California Department of Fish and Game (CDFG) Local Assistance grant for coastal sage scrub (CSS) and native grassland salvage in the inland San Joaquin Hills area of the Coastal Orange County Natural Community Conservation Planning (NCCP) Subregion. The salvage site was located in The Irvine Company's (TIC) Planning Area 22 (PA22), an area slated for golf course development (Figure 1).

In 1999, NROC received a NCCP grant from CDFG for \$26,529.00 to salvage approximately 4,000 native plants from approved development areas and to relocate to areas of degraded habitat elsewhere in the Coastal Subregion of the NCCP Reserve System. The Nature Conservancy (TNC) served as the project biologist to coordinate and monitor all salvage and relocation efforts. Special interest was taken in salvaging CSS dominants, native grasses, and bulbs. Benefits to this plant salvage effort include 1) the preservation of native plant species that are pre-adapted to local site conditions, 2) the preservation of beneficial soil microorganisms, 3) the preservation of a native seed bank, and 4) a cost-effective (compared to purchasing nursery stock) means to revegetate a site.

Plant species salvaged were California buckwheat (*Eriogonum fasciculatum*), coastal sagebrush (*Artemisia californica*), bush monkeyflower (*Mimulus aurantiacus*), bladderpod (*Isomeris arborea*), coastal cholla (*Opuntia prolifera*), prickly pear (*Opuntia littoralis*), purple needlegrass (*Nassella pulchra*), and wild hyacinth (*Dichelostemma pulchellum*). The majority of salvaged plants were relocated to adjacent Bommer Canyon, an open space area within the NCCP Coastal Subregion (Figure 1). Bladderpod and some of the larger cholla were replanted within degraded portions of the NCCP special linkage areas in Shady Canyon. The intent was to

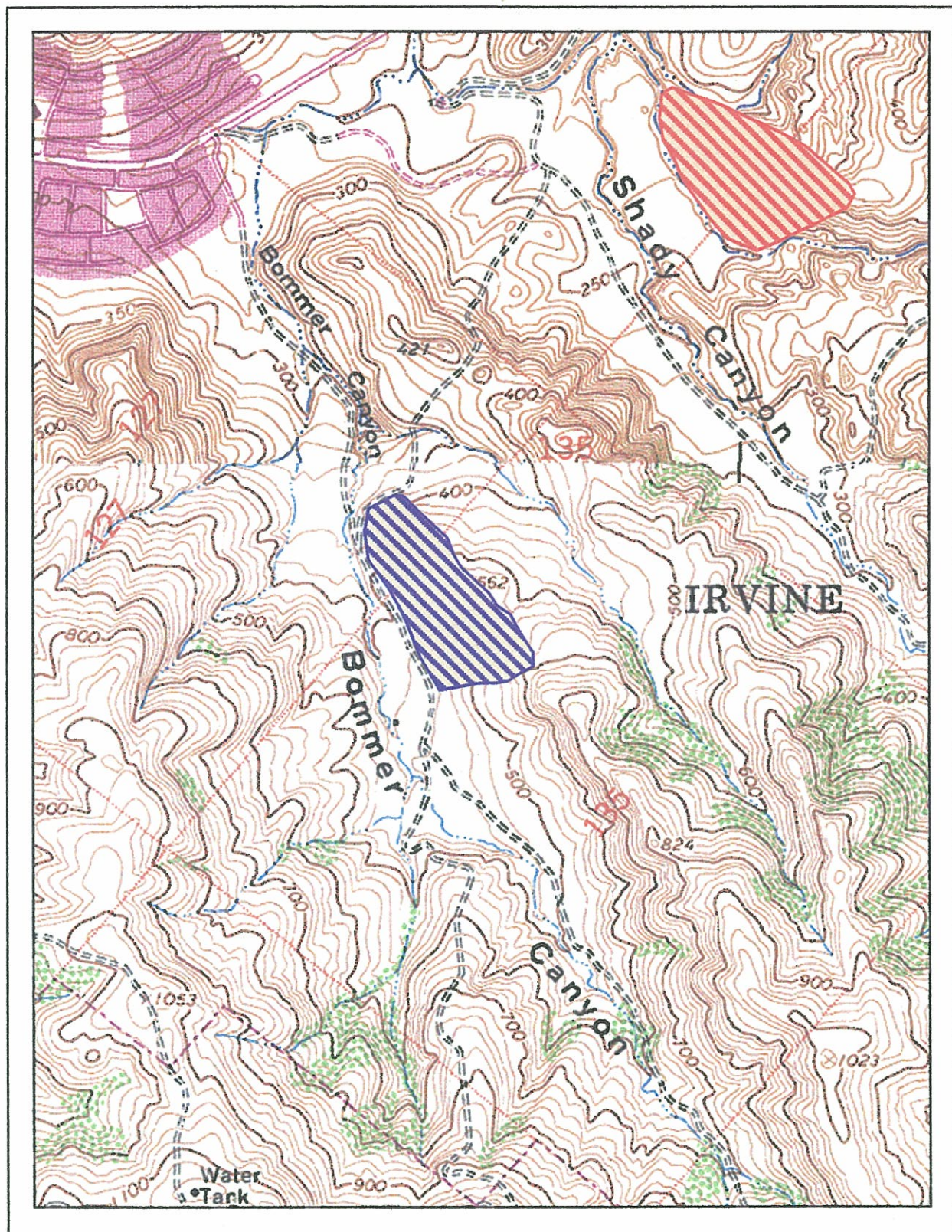


Figure 1. Coastal NCCP Subregion - 1999 / 2000 Salvage and Relocation Areas

■ Salvage site ■ Relocation site

enhance these linkage areas with bladderpod and the larger, older cholla that would otherwise be difficult to move to Bommer Canyon.

NROC is required to record the progress and success of this salvage effort by documenting the number and species of plants salvaged and relocated, the survival and growth of these transplants, and by establishing photographic stations to document this process over time. Annual reports documenting the progress of this restoration effort will be prepared by NROC for three years following initial planting and will be submitted to CDFG. This is the second of three annual reports.

METHODS

In December 2000, all restoration plots in Bommer Canyon were staked with painted lath and numbered. Color codes were used to distinguish between species in case of complete die-out within plots (Table 1).

The plots have been monitored twice since transplantation – once in late 2000 and again in spring 2002. For each shrub group, the number of plants originally planted and the number of dead shrubs were documented, as was the general condition of the plot. In 2000, this was not possible to do for the grass plots as most bunchgrasses had lost a significant amount of biomass during the transplantation process and ensuing winter. However, in 2002, native grass plots were monitored for survival.

It was not feasible to quantify the number of cactus plants that were transplanted, since 1) groups of cactus were often planted near pre-existing patches and 2) prickly pear and cholla reproduce asexually and transplanted segments are difficult to distinguish from naturally

dispersing segments. Thus, planted groups of cactus were simply marked and counted in both 2000 and 2002.

Photographs were taken of the restoration areas to document the progress of the sites. Photos of the same sites will be taken in future years for visual comparison.

RESULTS AND DISCUSSION

The numbers of plants planted for each CSS species are outlined in Table 2. Many more California buckwheat plants were transplanted than any other species (2563 plants). California buckwheat had a survival rate of 88 percent one year after transplantation; 79 percent two years after transplantation. Approximately 700 coastal sagebrush plants were relocated to Bommer Canyon, 85 percent survived transplantation and the first growing season; 77 percent survived two years post-planting. Of the 684 monkeyflower shrubs that were relocated, only 111 survived (84 percent mortality) the first year. Fifteen additional monkeyflower plants died during the second season following transplantation (86 percent mortality over two-year period). The shrub salvage and transplantation effort was overall very successful, with a combined survival rate of approximately 79 percent for two of the most dominant CSS species, California buckwheat and coastal sagebrush (Photos 1 and 2). Bush monkeyflower did not transplant so successfully, however, and may require wetter conditions such as increased rainfall, irrigation, or coastal fog for more successful transplantation. Spring of 2000 was relatively dry which may have increased mortality rates for the some of the transplanted species for the first year after planting.

One hundred and eight groups of prickly pear (approximately 2700 total plants and/or pads) and 40 groups of cholla (approximately 800 total plants and/or segments) were planted in 1999/2000 in Bommer Canyon. Cactus relocation was successful (qualitatively); the majority of



PHOTO 1. Bommer Canyon 2003: California buckwheat plot #8 - three years post-planting



PHOTO 2. Bommer Canyon 2003: Coastal sagebrush plot #28 - three years post-planting

transplanted cacti were vigorous, growing and in good condition in both 2000 and 2002 – most had rooted and produced new pads; many others also flowered (Photos 3 and 4). Very few (<50) dead or dying cactus were observed in 2002. Prickly pear, in particular, seemed to proliferate easily with very little site preparation. Cactus piled, rather than planted, also survived, rooted and produced new pads. Future attempts to revegetate with cactus may be less labor intensive than this initial effort because of the ease with which prickly pear reestablishes.

Seventy-nine groups of purple needlegrass were planted, with and without native bulbs (blue dicks). At the time monitoring surveys were conducted in 2000, the condition of the transplanted native grasses was impossible to determine. These plots were monitored in 2002 and approximately 24 percent of the purple needlegrass survived two years after transplantation. Purple needlegrass, like the monkeyflower, may require additional moisture at time of transplantation. Other explanations for the low survival rate include poor soil conditions at the restoration site or not enough of the rootball excavated during the salvage process.

Salvaged bulbs were planted randomly among the native grass plots. As with the cactus, it was impossible to determine which bulbs were pre-existing and which were transplanted. Scattered bulbs were observed at this site before revegetation efforts. Qualitative observations were made in 2002 and approximately 75 percent of the native grass plots had at least 25 to 50 bulbs growing within them.

In 2001, Bommer Canyon received an additional 1800 salvaged plants as well as topsoil material from another TIC proposed development area (Planning Area 27) through a separate CDFG Local Assistance Grant (Contract No. P0050004) to NROC. Further progress of the site will be documented in the next monitoring report.



PHOTO 3. Bommer Canyon 2003: Coastal prickly pear plot #38 - three years post-planting



PHOTO 4. Bommer Canyon 2003: Coastal cholla plot #11 - three years post-planting

TABLE 1. Color codes used for marking restoration plots in Bommer Canyon.

Species	Color code
California buckwheat (<i>Eriogonum fasciculatum</i>)	Blue
Coastal sagebrush (<i>Artemisia californica</i>)	Orange
Bush monkeyflower (<i>Mimulus aurantiacus</i>)	Purple
Purple needlegrass (<i>Nassella pulchra</i>)	Red
Coastal prickly pear (<i>Opuntia littoralis</i>)	Pink
Coastal cholla (<i>Opuntia prolifera</i>)	Pink with yellow tape

TABLE 2. Summary of monitoring data for Bommer Canyon restoration sites planted in 1999-2000. Monitoring took place in December 2000 and spring 2002. Numbers planted per group and percent survival rates were not recorded for native grasses or cactus plots in 2000 because it was not feasible to count the number of individuals planted for these species (see methods).

Species	Total # plants	Total # surviving 2000	Total # surviving 2002	Percent Change
California buckwheat (<i>Eriogonum fasciculatum</i>)	2563	2247 (87.6%)	2030 (79.2%)	-8.4%
Coastal sagebrush (<i>Artemisia californica</i>)	701	595 (84.9%)	536 (76.5%)	-8.4%
Bush monkeyflower (<i>Mimulus aurantiacus</i>)	684	111 (16.1%)	96 (14.0%)	-2.1%
Purple needlegrass (<i>Nassella pulchra</i>)	N/A	N/A	389 (24.3%)	N/A
Blue dicks (<i>Dichelostemma pulchellum</i>)	N/A	N/A	N/A	N/A
Coastal prickly pear (<i>Opuntia littoralis</i>)	~2700	N/A	N/A	N/A
Coastal cholla (<i>Opuntia prolifera</i>)	~800	N/A	N/A	N/A

RECOMMENDATIONS

The following recommendations are provided for future salvage and restoration efforts:

1. Certain species (i.e. bush monkeyflower) are easily stressed during salvage and appear to require more moisture with transplantation than other species. To reduce mortality rates and ensure successful establishment at the new location, future efforts should focus on planting these species in locations where more moisture (rain, coastal fog, etc.) is available or in a location that is easily accessible for irrigation.
2. Prickly pear is hardy and proliferates easily with very little site preparation or maintenance. Less time and effort should be directed towards digging individual holes to plant prickly pear pads. The cactus can survive with only a limited effort to scrape the soil before placing a small pile of cactus on the bare ground. While some of the pads will die, many others will produce new pads and establish a root system. Rather than planting individual pads, which will take years to gain the height a cactus wren may find acceptable for nesting (typically three feet), the cactus pile is already transplanted at that height.
3. Areas selected for restoration would benefit from receiving soil and plant material from the salvage site. Areas selected for topsoil salvage should have little to no exotic plant species and high native plant diversity. This salvaged soil material can be spread between groupings to enhance diversity within the restoration area. Focus species for salvage are often large shrubs and grasses. However, many small annuals are often found within these CSS and native grassland habitats. These species are as important to establishing a balanced, restored habitat as the larger species and as development increases, neglecting to salvage them may result in their ultimate loss.

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