Lotus nuttallianus (Nuttall's Lotus)

Introduction

The MSCP Biological Monitoring Plan (1996) does not specify any Nuttall's Lotus (*Lotus nuttallianus)* monitoring locations within the City of San Diego. However, a large *L. nuttallianus* population was discovered in Mission Bay in 1998 by Gary Suttle, so the Mission Bay site is regularly monitored by the City as this is among the few known occurrences of this species.

In addition to normal monitoring activities, follow-up monitoring was performed in order to determine the effectiveness of invasives control at the 'No Mens'site (Site 1).

Results

Site	Lead Monitor/s	Dates	Method*	Result
Mission Bay	Johnson	May 26, 2005 May 27, 2005	Line Intercept (Sites 1 and 6); Census (Sites 2,3 and 5)	14,557 Plants

* Please see the *City of San Diego MSCP Rare Plant Monitoring: Field Monitoring Methods* manual for a full description of plant monitoring methods and locations.

The Mission Bay *L. nuttallianus* population count was much higher in 2005 than in any other year of monitoring to date. Some previous years' surveys included areas that are no longer quantitatively monitored (e.g., the Least Tern nesting site). Table 1 shows *L. nuttallianus* populations in Mission Bay from 2000-2005; however, sites that have not consistently been quantitatively monitored have been excluded from the total counts in order to compare populations from year to year.

Table 2. Mission Bay *L. nuttallianus* populations, 2000-2005.

	2000	**2001**	**2002**	**2003**	**2004**	**2005**
Estimated *L. nuttallianus* Population*	238	683	210	5,393	375	14,557

* Note that these numbers differ from previous summary reports as they exclude subpopulations which have not been consistently monitored quantitatively.

At the 'Hospitality Point' Rip-Rap site (Site 3), the population appears to extend beyond the previously mapped western boundary. Due to time constraints, this area could not be monitored; however, the population boundary should be mapped in future years, and an alternative monitoring method may need to be devised in high rainfall years due to high plant counts.

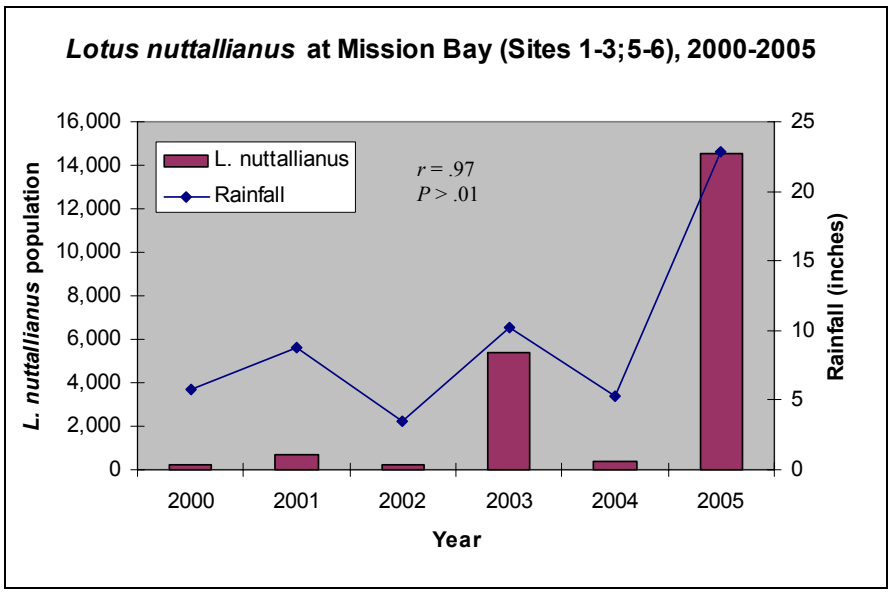
In December, 2004, 30 volunteers hand removed nearly 0.25 acre of *Carpobrotus edulis* (Highway Iceplant) weighing approximately 3.5 tons from the 'No Mens' site (Site 1). However, this was a very small portion of iceplant on-site, and approximately six acres of Iceplant remain. A six-month follow-up to the removal was performed in May, 2005. A 5%

regrowth of iceplant and 4% cover of Nuttall's Lotus was observed in cleared areas. There were also 175 small Iceplant sprouts (likely resprouts) in the cleared areas. Thus, hand removal at this site appears to be inadeqate to effectively control the Iceplant problem.

Analysis

Plant populations from sites that have been quantitatively monitored from 2000-2005 were examined and correlated with water year rainfall using Microsoft Excel. *L. nuttallianus* exhibits a very strong positive correlation with rainfall (Figure 1).

Figure 11. *Lotus nuttallianus* at Continuously Monitored Mission Bay Sites and Annual Rainfall, 2000-2005



Notes: 1) All rainfall data are from San Diego County Water Authority; data collected at Lindbergh Field (http://www.sdcwa.org/manage/rainfall-lindbergh.phtml). 2) Additional statistical analyses, such as confidence intervals, etc., are being performed by MSCP plant monitoring scientific advisors and will be used in revisions to the plant monitoring program.

Management Issues

Carpobrotus edulis continues to be a significant problem at both the 'No Mens' and 'South Shores' sites (Sites 1 and 6), as do *Chrysanthemum coronarium* (Garland Daisy), *Centaurea melitensis* (Tocolote), and *Melilotus alba* (White Sweetclover) which are also present throughout both sites. In some cases, up to 75% transects were covered by Highway Iceplant (South Shores, Transects #4-7).

At the 'No Mens' site, *Hirschfeldia incana* (Short-Pod Mustard), *Acacia* sp., *Cortaderia* sp. (Pampas Grass) and *Nicotiana glauca* (Tree Tobacco) are also problem species. At the 'South Shores' site., *Mesembryanthemum crystallinum* (Crystalline Iceplant) and *Limonium perezii* (Perez's Marsh-Rosemary; Seafoam Statice) are abundant in many areas.

At the 'Hospitality Point' site (Site 2), weed cover is relatively low as a result of volunteer control efforts at this site; however, there is some *Melilotus alba* (White Sweetclover),

Chrysanthemum coronarium (Garland Daisy) and non-native grasses (primarily *Bromus* sp.) present at the site, though in very low densities/cover.

At the 'Hospitality Point Rip-Rap' site (Site 3), there is considerable cover of *Penisetum* sp. (possibly both *P. setaceum* and *P. villosum*) , especially at the eastern end (approximately 60-70%). Additionally, Sisymbrium sp., *Chrysanthemum coronarium* (Garland Daisy), and *Avena barbata* (Slender Wild Oat) are present at this site in lower densities (approximately 25, 15, and two percent cover, respectively). Additionally, considerable amounts of dog feces were noted in the *L. nuttallianus* habitat, likely from the pathway and parking lots located at the top of the rip-rap population area.

Management Recommendations

No Mens (Site 1)

Carpobrotus edulis (Highway Iceplant), *Chrysanthemum coronarium* (Garland Daisy), *Centaurea melitensis* (Tocolote), and *Melilotus alba* (White Sweetclover) and *Acacia* sp., *Hirschfeldia incana* (Short-Pod Mustard), *Cortaderia* sp. (Pampas Grass) and *Nicotiana glauca* (Tree Tobacco) should be controlled at the site.

South Shores (Site 6)

Carpobrotus edulis (Highway Iceplant), *Chrysanthemum coronarium* (Garland Daisy), *Centaurea melitensis* (Tocolote), and *Melilotus alba* (White Sweetclover), *Mesembryanthemum crystallinum* (Crystalline Iceplant) and *Limonium perezii* (Perez's Marsh-Rosemary; Seafoam Statice) should be controlled at the site.

Hospitality Point (Site 2)

Invasives at this site should continue to be controlled.

Hospitality Point Rip-Rap (Site 3)

Pennisetum sp., *Sisymbrium* sp., *Chrysanthemum coronarium* (Garland Daisy), and *Avena barbata* (Slender Wild Oat) should be controlled. Additionally, the City's policies regarding dog-leashing should be enforced in this area, and installation of dog waste bags/cans should be pursued.

No Mens (Site 1), May 26, 2005

Transect 2, facing south

Transect 3, facing south

Transect 4, facing south

Transect 5, facing south

Transect 6, facing south

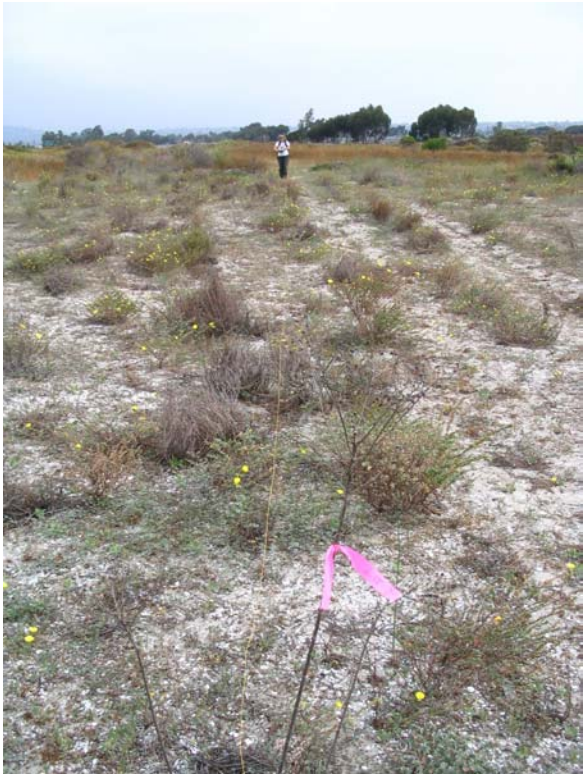
Transect 7, facing north

Transect 8, facing south

Transect 9, facing south

Transect 10, facing south

Transect 11, facing south



Transect 11, facing north

Hospitality Point (Site 2), May 27, 2005

Panorama of monitoring site from southeast corner, facing west, northwest, and north (photos merged using Canon PhotoStitch, v.3.1).

Panorama of monitoring site, from southwest corner, facing north, northeast, east (photos merged using Canon PhotoStitch, v.3.1).

Hospitality Point Rip-Rap (Site 3), May 27, 2005

Rip-rap site from east end, with invasive *Penisetum* sp. in forefront

View of site, facing west, from approximately the midle of the site

South Shores (Site 6), May 26, 2005

Transect 2, facing north

Transect 4, facing north

Transect 5, facing south

Transect 6, facing north

Transect 7, facing north

Transect 8, facing south

Transect 10, facing south