FINAL PROJECT REPORT

LEAD AGENCY

Lake Mead National Recreation Area, National Park Service

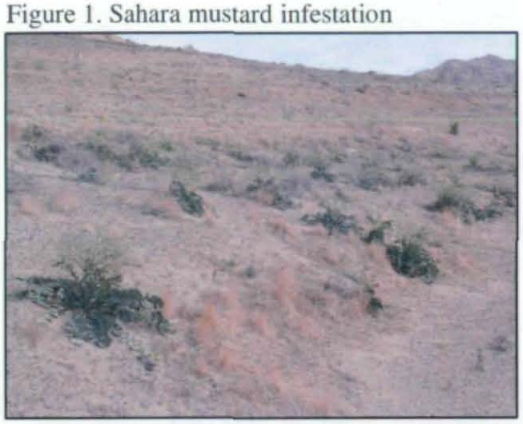
Featured Project

Control of Sahara Mustard In Rare Plant Habitats
Project Number: 2005-NPS-533-P-2005-07

Project Description

The goal of this project was to control Sahara mustard infestations in high priority rare plant habitats within Clark County. The objective was to protect the current rare plant populations in sandy areas. Success was measured by number of plants removed from rare plant, sandy habitats over a two year period.

Figure 1. Sahara mustard infestation



Project Status

This two year emergency control effort for Sahara mustard has been completed. This document represents the final report for work performed by the National Park Service, Lake Mead National Recreation Area, with funding primarily received from the Clark County Multiple Species Habitat Conservation Plan during the 2006 and 2007 field seasons.

Figure 2. Removal efforts for Sahara mustard

Project Contact

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Funding Awarded

$150,566

Funding Spent

$150,566

Completion Date or Status

Project completed July 1, 2007

Products Produced from Project

Over the two year period of this project, 1,942,086 Sahara mustard plants were removed or destroyed within, or adjacent to, targeted sandy habitats in Clark County, Nevada.

CONTROL OF SAHARA MUSTARD IN RARE PLANT HABITATS
Project Number: 2005-NPS-533-P-2005-07

FINAL REPORT

Work performed by the National Park Service, Lake Mead National Recreation Area during the 2006 and 2007 field seasons with emergency funding primarily received from the Clark County Multiple Species Habitat Conservation Plan.

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INTRODUCTION

Sahara mustard was recently added to the Nevada Noxious Weed List in 2006. Initial infestations have the potential to grow exponentially making it difficult to manage. Sahara mustard is spread through seed production and is transported to uninfested areas by wind, water, and vehicles. It is often one of the first winter annuals to germinate and bolt, taking advantage of resources before most native annuals can germinate. A single plant can reach three feet wide by three feet tall thereby altering the native annual canopy. Subsequent wet winters may produce significant numbers of Sahara mustard plants.

GOALS AND DELIVERABLES

The proposal listed several known rare plant populations and their habitats throughout Clark County where Sahara mustard control should be focused. The six priority locations and the species of concern are:

- Sandy Cove, Lake Mead NRA, site of largest known population of Three-corner milkvetch
- Virgin River dunes, Lake Mead NRA and BLM, Site of large populations of Threecorner milkvetch, Sticky buckwheat, and Beaver Dam breadroot, as well, as the site of a number of other rare sand-loving species that are not known from elsewhere in Lake Mead NRA
- Jean Dry Lake, Hidden Valley, and Ivanpah Valley- BLM, important White-margined penstemon habitat
- Sandy areas in the Muddy River Drainage- BLM, important Threecorner milkvetch and Beaver Dam breadroot habitat
- Sandy areas in Logandale Management Area- BLM, important Threecorner milkvetch and Beaver Dam breadroot habitat
- Sandy/Saline areas in Pahrump Valley and Sandy Valley- BLM, important Pahrump Valley buckwheat habitat

Five specific deliverables were defined:

1. Quarterly Reports will be submitted to the Clark county MSHCP database.
2. Final project reports will be submitted to the Clark county MSHCP Database.
3. Written and oral reports will be submitted to the Clark County and/or Implementation and Monitoring Committee upon request.
4. Treatment of incipient Sahara mustard populations on high priority rare plant habitats.
5. Four year treatment and monitoring of high priority sites.

The proposal called for quarterly reports to be submitted to the Clark County MSHCP database. All the quarterly reports were submitted to the county database. Treatment of incipient Sahara mustard infestations on high priority rare plant habitats was performed by NCC (Nevada Conservation Corp.) and ACE (American Conservation Experience) personnel. They were trained by UNLV employees working with Lake Mead resource management staff. The fieldwork consisted of mechanically removing the plants either with hoes or by hand. All plants were bagged and disposed of properly.

ACHIEVEMENTS AND LEVELS OF PERFORMANCE

The total number of Sahara mustard removed within rare plant habitat for field season 2006 was 203,520 and 296,971 plants for field season 2007. A grand total of 500,491 plants removed from rare plant habitat in a two year period. The chart in figure 3 shows the total number of Sahara mustard plants removed over a four year period.

Sandy Cove-NPS

The sand dunes at Sandy Cove were visited numerous times throughout the season (December to April, see map 1). A total of 113,950 plants were removed in field season 2006 from the dunes and the surrounding beaches. In 2007, the amount of plants removed was 183,120. The dunes had fewer Sahara mustard plants than the surrounding beaches. Control efforts on the beaches in the past four seasons have shown a significant decline in the numbers of Sahara mustard (observation made by Carrie Nazarchyk). Beaches where no Sahara mustard was previously controlled resulted in more plants germinating.

Virgin River dunes-NPS/BLM

No Sahara mustard removal was done this biennium. This area was still closed at the time of the survey both years. As stated in the last biennium report to the county, an un-cooperative private land owner whose 40 acre parcel of land blocked access to NPS approved road 112a (Hoines, J. and D. Bangle, 2005). Negotiations are underway, and the weed sentry may be granted access the Virgin River drainage this next season.

Jean Dry Lake, Hidden Valley, and Ivanpah Valley-BLM

The weed sentry program surveyed this area in both field seasons 2006 and 2007. The surveys documented no germination of Sahara mustard, possibly due to lack of precipitation. Therefore, there was no need for control.

Sandy areas in the Muddy River Drainage-BLM

These areas include Toquop Wash, Weiser Wash, and Carp/Elgin sites (see map 3). All three sites were surveyed by the weed sentry numerous times throughout the season. In 2006, Carp/Elgin and Toquop Wash were the two sites that had Sahara mustard controlled; 33,048 and 56,522, respectively. Weiser Wash did not have any germinating in the designated rare plant site. In 2007, Weiser Wash was the only site where Sahara mustard was removed, a total of 94,586 plants. The other two sites did not show any significant germination in the designated rare plant habitat. The areas surrounding these three specific sites are grossly infested with Sahara mustard and our efforts were to provide a buffer around the rare plant sites designated by the BLM.

Lime Cove-NPS

Lime Cove was not on the list to control Sahara mustard, but previous rare plant surveys have shown a significant population of *Eriogonum viscidulum*, sticky buckwheat. There was total of 19,265 Sahara plants removed from the site in 2007 (see map 2).

Pahrump Valley and Sandy Valley-BLM

This area was surveyed in field season 2006 and no Sahara mustard was documented. The Sandy and Pahrump Valleys have populations of *Eriogonum bifurcatum*, Pahrump valley buckwheat. Field season 2005, a wet year, should have produced some germination if there were any seeds in the seed bank, but none were observed. Three consecutive years where no Sahara mustard is present allows for the zero tolerance strategy for future control efforts.

Additional Areas

Several additional areas were surveyed and treated during field seasons 2006 and 2007, but were not listed as deliverables. These sites included:

1. The Overton Arm area of Lake Mead, which supports populations of *Eriogonum viscidulum*. Within this area, 25,295 and 111,780 Sahara mustard plants were destroyed in field season 2006 and 2007 respectively.
2. Several high priority vector areas were identified around Lake Mead such as; Northshore Road, viewpoints off of Lakeshore Drive, Las Vegas Bay, Gypsum wash, Boulder Beach, Kingman wash, and Gregg's Hideout. In total, 122,038 (field season 2006) and 217,651 (field season 2007) Sahara mustard plants were removed.
3. Several high priority vector areas were identified around Lake Mohave such as; Willow Beach, Jumbo wash, Katherine Landing, Nevada Telephone Cove, Cottonwood Cove, Arizona hotsprings, and Arizona police checkpoint. In 2006 there were 276,999 Sahara mustard plants removed and 466,501 in season 2007.

CHALLENGES AND LESSONS

Sahara mustard germination in the last two years was sparse throughout Clark County, probably owing to lack of fall and winter precipitation. There were a handful of areas in Clark County that had previous Sahara mustard infestations, but within the last two years nothing was recorded at these sites. Low numbers of Sahara mustard in a dry winter could be attributed to previous control efforts or lack of precipitation. One lesson learned after removing Sahara mustard for four years is that infestation size is related to rainfall amounts in the fall and winter

months of the year. In dry seasons it is a challenge to schedule work crews for specific, high priority areas. Work crews are typically scheduled the summer before, resulting in conflicts between crew availability and management needs. We learned to focus our control efforts early in the growing season when the plants are small rather than waiting for the plants to reach mature fruit stage, therefore requiring the plants to be bagged. We bag and remove the mature fruits to reduce the amount of seeds in the seed bank.

IMPACT

Our impacts on removing thousands of Sahara mustard plants will not truly be known until Clark County has another wet year. An example of this is Jean Dry Lake, a high priority rare plant (*Penstemon albomarginatus*) area on BLM land. We removed 3,077 from this site in 2005, but surveying efforts done by the weed sentry in 2006 and 2007 revealed no germination of Sahara mustard. We can not know if germination reduction across the 2005, 2006, and 2007 seasons are due to our eradication efforts or merely a response to environmental factors.

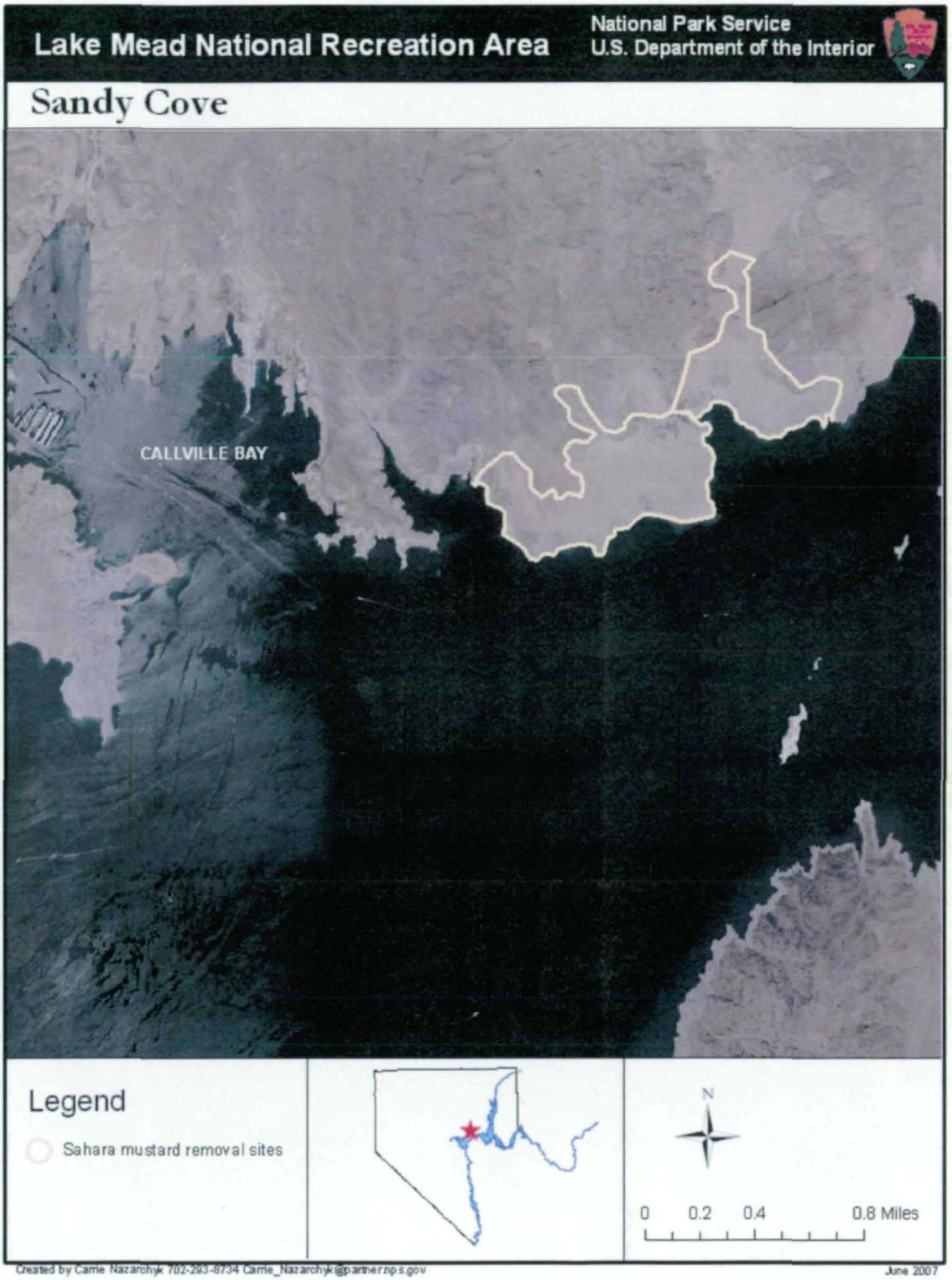
RECOMMENDATIONS

More research into Sahara mustard physiology and germination requirements is needed. In a separate research project, Lake Mead National Recreation Area will be conducting seed bank studies on non treated areas to help determine seed bank longevity and viability. This will help determine whether Sahara mustard is a refugium strategist, and will affect future management plans.

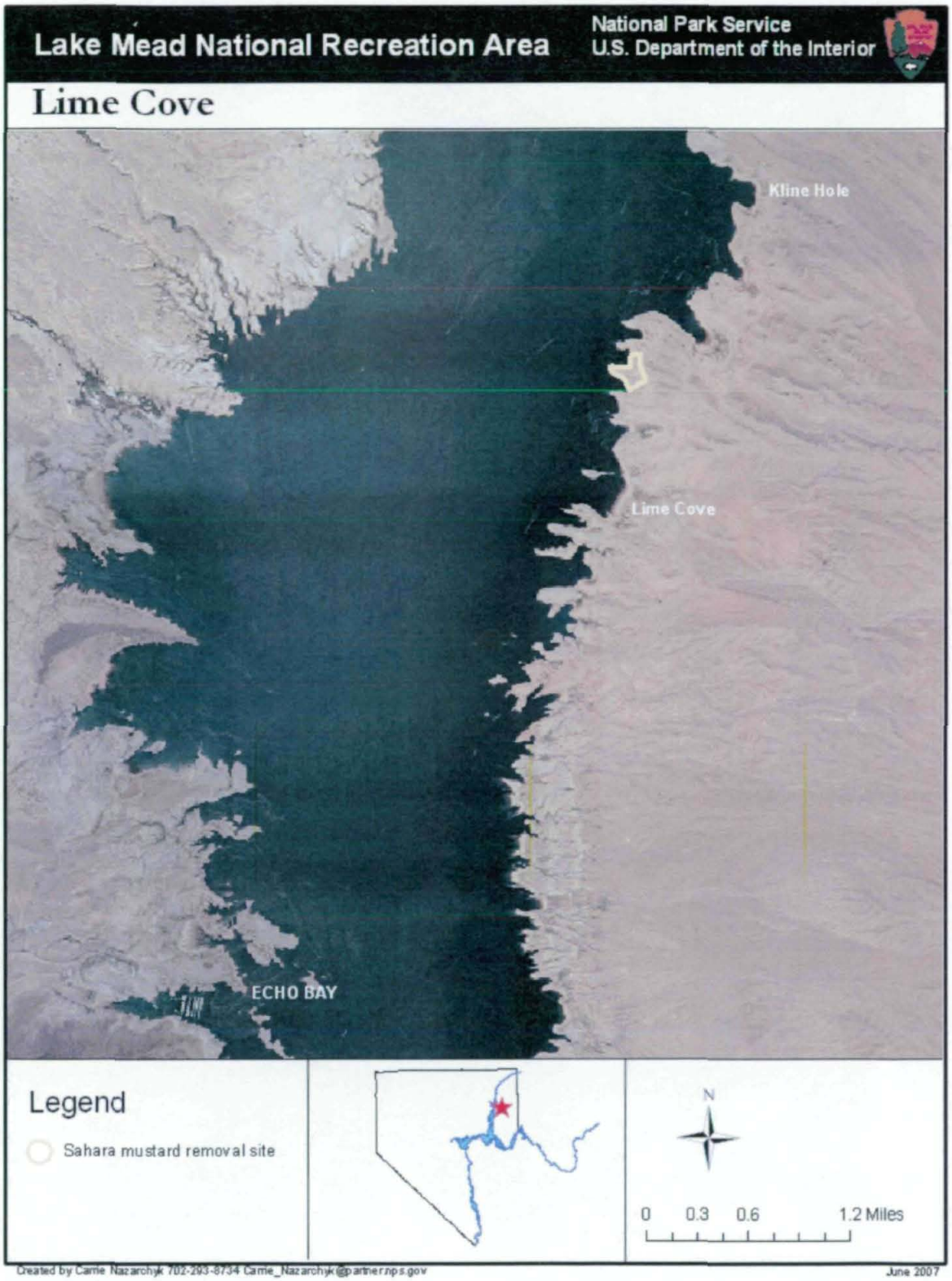
LITERATURE CITED

Hoines, J. and D. Bangle, 2005. Control of Sahara Mustard, Brassica tournefortii, in Rare Plant Habitats. Unpublished final report, contract reference: CBE NO. 5529-04.

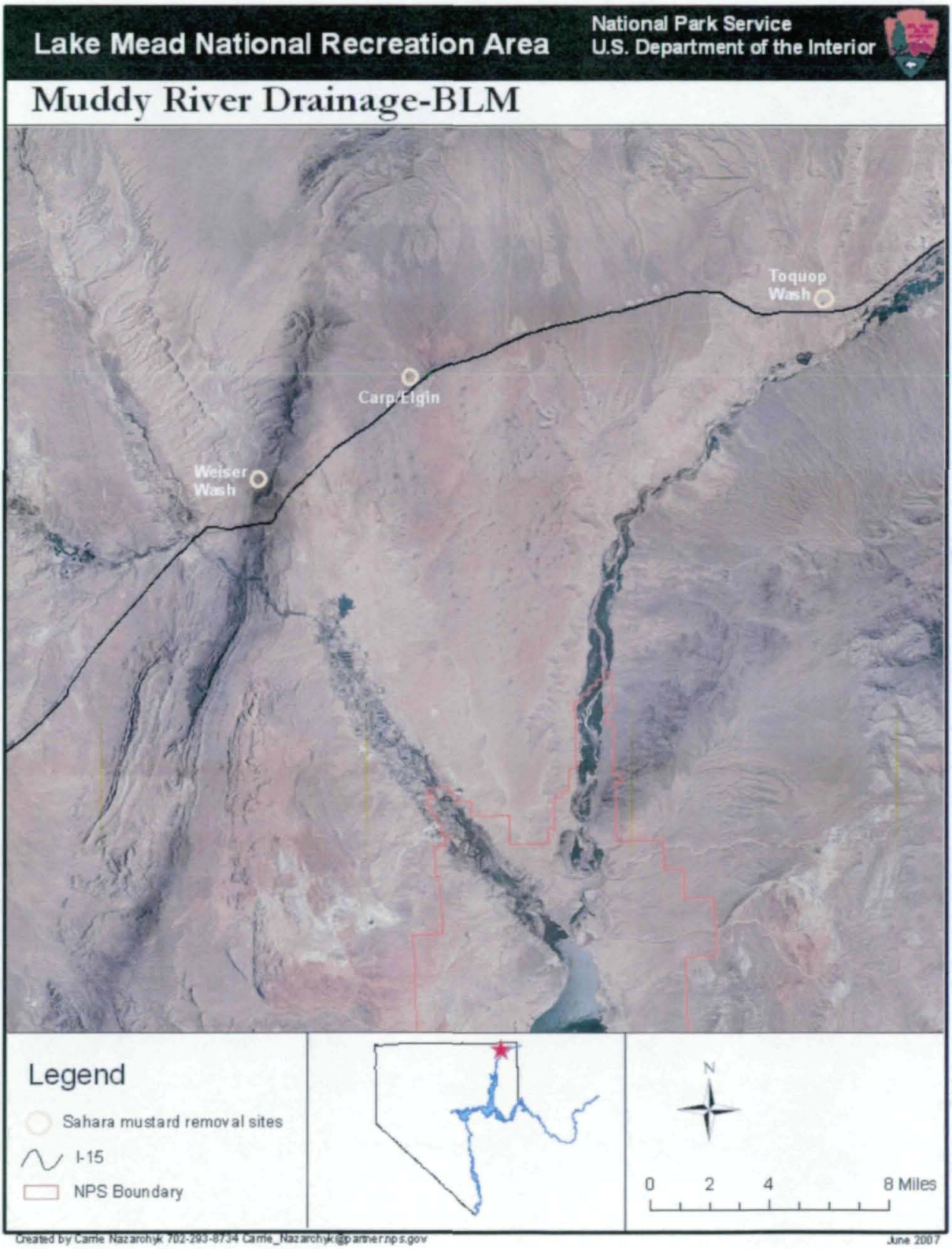
RESULTS



Map 1. Sahara mustard removal sites at Sandy Cove during field seasons 2006 and 2007.



Map 2. Sahara mustard removal site near Lime Cove rare plant habitat during field season 2007.



Map 3. Sahara mustard removal sites (Weiser Wash, Carp/Elgin, and Toquop Wash) in the Muddy River drainage on BLM.

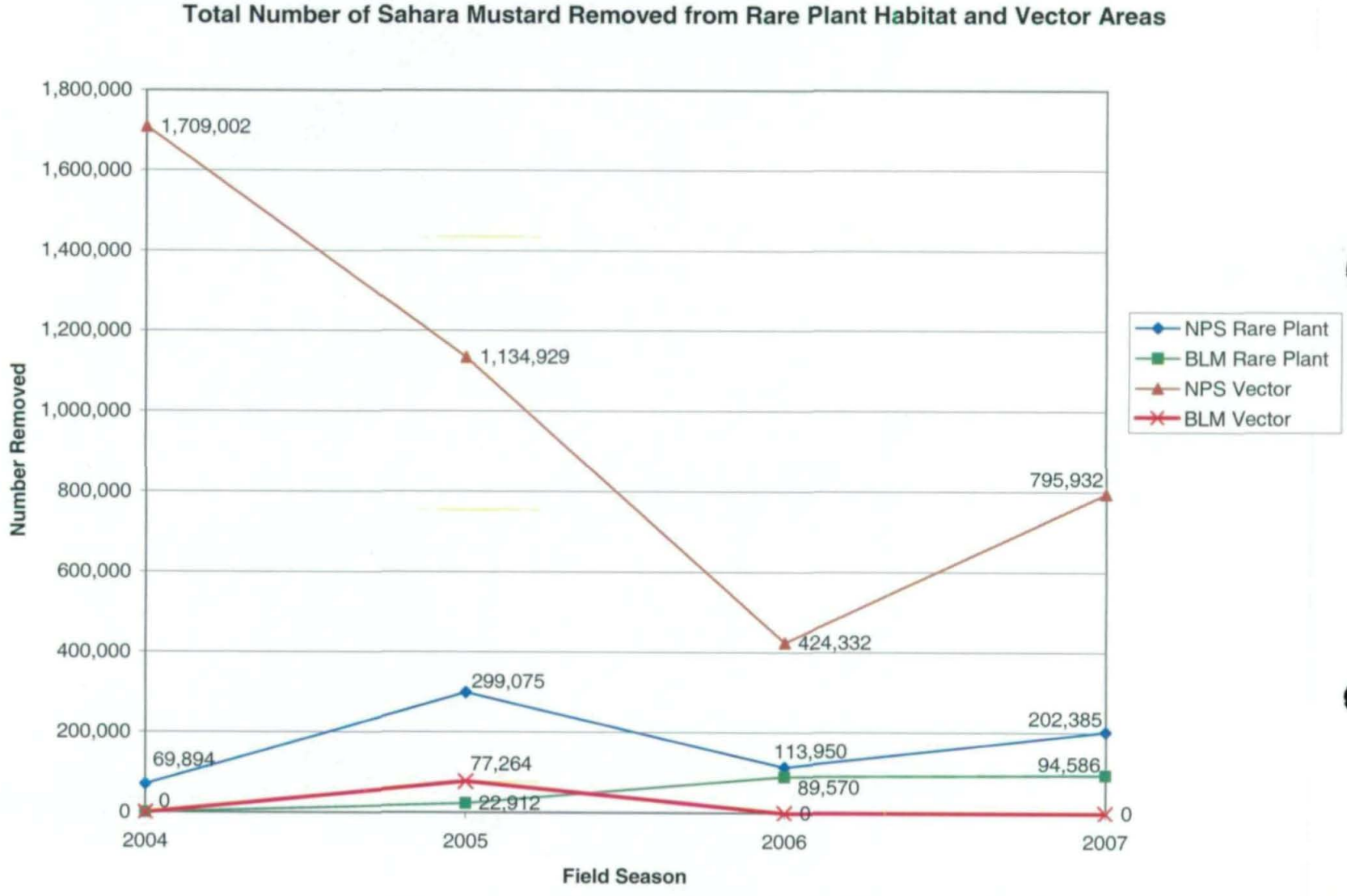


Figure 3. Total number of Sahara mustard plants removed in both rare plant and vector areas for each field season.

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MSHCP Contingency Fund

Milestones:

1. Summer, Fall, 2005, Follow-up monitoring and treatments for Spring 2005 surveys
2. Winter, 2005, Begin training Brassica crew leader.
3. Spring, 2006, treatment of high priority areas.
4. Summer, Fall 2006, Follow-up monitoring, data management, and reporting.
5. Winter, 2007, Begin training Brassica crew leader
6. Spring, Summer 2007, treatments in high priority areas.
7. Summer, Fall 2007, Data Management, and Final report preparation.

Deliverables:

1. Quarterly Reports will be submitted to the Clark county MSHCP database.
2. Final project reports will be submitted to the Clark county MSHCP Database.
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Indices of success:

1. Treatment of incipient Sahara mustard invasions on high priority habitats in Clark County for the conservation of sand-loving rare species.
2. Declining numbers or extent of populations of Sahara mustard on priority sandy rare plant habitats.