Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Survey of Threecorner Milkvetch (*Astragalus geyeri* var. *triquetrus*) and Sticky Buckwheat (*Eriogonum viscidulum*) in Fiscal Year 2011 in Lake Mead National Recreation Area

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

August 2012

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Multi-Species Conservation Program
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ACRONYMS AND ABBREVIATIONS

GPS	Global Positioning System
Lake Mead NRA	Lake Mead National Recreation Area
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
m	meter(s)

Symbols

%	percent

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INTRODUCTION

The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) is a coordinated, comprehensive, long-term multi-agency effort to conserve and recover endangered species and to protect and maintain wildlife habitat on the lower Colorado River. The LCR MSCP's purposes are to (1) protect the Lower Colorado River environment while ensuring the certainty of existing river water and power operations, (2) address the needs of threatened and endangered wildlife under the Endangered Species Act, and (3) prevent the listing of additional species on the lower Colorado River (Bureau of Reclamation 2004). Two rare plant species occur within the covered areas designated in the LCR MSCP, threecorner milkvetch (*Astragalus geyeri* var. *triquetrus*) and sticky buckwheat (*Eriogonum viscidulum*). Both species occur within the Lake Mead National Recreation Area (Lake Mead NRA), which is administered by the National Park Service.

Conservation measure goals of the LCR MSCP are to provide funding for threecorner milkvetch and sticky buckwheat conservation programs. The LCR MSCP will provide a total of $10,000 per year, for each of the two rare plants, until 2030 to an ongoing conservation program or other entity approved by the U.S. Fish and Wildlife Service to implement conservation activities for the threecorner milkvetch and sticky buckwheat.

This summary report was prepared to update the status, monitoring results, and conservation actions for these rare plant species at Lake Mead NRA for fiscal year 2011.

METHODS

Threecorner Milkvetch

In March, April, and May 2011, formal monitoring was conducted at Sandy Cove and Ebony Cove.

A randomly stratified grid (36 x 36 meters [m]) was used to monitor threecorner milkvetch. Eighteen quadrats (6 x 12 m) were delineated within each grid. The number of grids varied by location based on the extent of habitat and populations of threecorner milkvetch. The corners of each permanent grid were previously recorded using a highly accurate Global Positioning System (GPS) unit (Trimble GeoXH). GPS coordinates were recorded at all grid corners, including easting, northing, elevation, and level of accuracy. A GPS unit with equivalent accuracy to the unit used originally was used to relocate the grid corners. Measuring tapes delineated grids, and pin flags marked individual threecorner milkvetch plants, recording the number of plants per quadrat (Bangle 2010).

Approximately 3 acres of Sahara mustard (*Brassica tournefortii*) were hand-pulled from the dunes at Sandy Cove and surrounding beaches.

Sticky Buckwheat

Lime Cove and Glory Hole were not surveyed during 2011 for sticky buckwheat populations. There was no Sahara mustard control at these locations during 2011.

RESULTS

Threecorner Milkvetch

No data were collected in 2010 for threecorner milkvetch at Ebony Cove or Sandy Cove. Sandy Cove data were collected in 2008, but no data were collected at Ebony Cove in 2008. Weather stations at Sandy Cove and Ebony Cove were installed in February 2009 and August 2009, respectively. The Ebony Cove location has two grids, and Sandy Cove has eight grids. Within each grid are 18 quadrats. Table 1 shows the total number of plants per location within all the grids at that location. Tables 2 and 3 show a more detailed version of these totals, with the number of plants within each of the 18 quadrats at each grid.

Table 1.—Total plants documented for Sandy Cove and Ebony Cove within each location

Threecorner milkvetch				
	2008	**2009**	**2010**	**2011**
Sandy Cove	3,968	2,027	n/a	146
Ebony Cove	n/a	424	n/a	0

DISCUSSION

The environmental factors that affect threecorner milkvetch and sticky buckwheat recruitment and germination within each population are currently unknown. Winter annuals typically respond to increased seasonal rainfall by germinating at higher densities. Our observations in recent years support this, but more data from this long-term monitoring project are necessary to effectively interpret relationships between environmental factors such as rainfall and temperature and germination rates of these plants (Bangle 2010).

Table 2.—Documented threecorner milkvetch numbers within each grid at Ebony Cove

Threecorner milkvetch at Ebony Cove																				
		Quadrat																		
Year	**Grid**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**Total**
2009	1	39	17	4	4	23	39	13	37	11	19	21	4	17	12	2	6	45	24	337
2010	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2011	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	2	2	5	9	4	0	1	11	0	4	1	6	18	11	1	0	1	2	11	87
2010	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2011	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Threecorner milkvetch populations decreased 100 percent (%) from 2009 to 2011 at Ebony Cove and 92% at Sandy Cove. While this decrease is alarming, the Sandy Cove population numbers have demonstrated fluctuations in previous years, from zero in 2002 to over 8,000 plants in 2005 (The Nature Conservancy 2007). Since anthropogenic threats such as livestock grazing, exotic plant invasions, and off-road vehicle use are managed on these sites, this decrease may be due to lack of or change in seasonality of precipitation or change in temperatures triggering seed germination. Ebony Cove showed almost 5 inches of precipitation between September 2010 and April 2011, but still no plants were recorded. This might suggest there may be other factors besides precipitation affecting seed germination. Weather stations measuring temperature and precipitation were installed in February 2009 at Sandy Cove and August 2009 at Ebony Cove. Figures 2 and 3 show average temperature and total precipitation at each location since installation.

If drought continues in the Lake Mead region, we may see a long-term decrease in threecorner milkvetch numbers. How long threecorner milkvetch seeds remain viable in the soil seed bank is unknown and should be explored (Bangle 2005, 2010). It is also important to keep the threecorner milkvetch sites free of weeds that may be stabilizing the sand dunes (Bangle 2005, 2010). The three sites shown on figure 1 are given top priority for annual weed management actions by Lake Mead NRA staff.

It is recommended that a long-term monitoring program continue in order to develop a better understanding of what environmental stressors are affecting rare plant populations over time (Bangle 2010). Effective management decisions are impossible without knowledge of a population's status and trend and

Table 3.——Documented threecorner milkvetch numbers within each grid at Sandy Cove

Threecorner milkvetch at Sandy Cove																				
		Quadrat																		
Year	Grid	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
2008	1	21	23	5	6	8	3	8	1	1	0	3	5	2	1	0	0	0	0	87
2009	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2011	1	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4
2008	2	10	6	8	1	5	13	10	8	4	7	21	11	15	8	17	10	32	39	225
2009	2	10	26	18	9	2	8	16	5	12	11	20	27	29	40	8	15	29	26	311
2010	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2011	2	3	0	3	2	0	0	1	0	0	2	0	0	0	0	0	0	0	0	11
2008	3	35	16	11	28	38	76	72	40	14	12	31	85	3	12	6	5	6	1	491
2009	3	24	16	7	22	27	54	33	22	28	14	26	37	5	21	3	8	0	0	347
2010	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2011	3	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
2008	4	56	62	42	33	36	60	27	16	14	4	19	43	18	12	2	9	22	8	483
2009	4	1	16	6	34	14	1	5	22	11	16	8	3	2	3	10	2	0	4	158
2010	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2011	4	0	2	2	4	2	0	–	–	0	0	0	0	0	0	0	0	0	0	10
2008	5	8	18	24	14	19	29	20	15	36	9	33	35	13	25	7	9	17	28	359
2009	5	16	15	26	28	23	19	27	13	10	23	24	41	23	24	14	1	24	24	375
2010	5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2011	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2008	6	86	16	1	15	39	77	137	43	0	4	75	85	65	87	19	40	56	79	924
2009	6	17	1	31	92	2	9	2	3	24	0	1	13	0	0	0	65	0	13	273
2010	6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2011	6	0	0	12	20	1	0	0	9	7	0	0	7	3	0	0	0	0	0	59
2008	7	4	21	51	46	12	1	0	11	50	33	14	0	0	17	41	62	29	7	399
2009	7	3	4	12	14	4	3	2	7	18	18	5	8	3	7	24	16	21	6	175
2010	7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2011	7	0	0	2	15	4	2	3	0	5	1	4	2	0	4	3	4	0	0	49
2008	8	15	33	75	111	54	11	33	32	69	65	70	61	88	99	18	1	85	80	1,000
2009	8	49	14	15	12	11	32	47	23	6	18	26	43	29	23	3	4	9	24	388
2010	8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2011	8	1	0	1	1	0	0	2	1	0	0	0	1	0	0	0	0	0	0	7

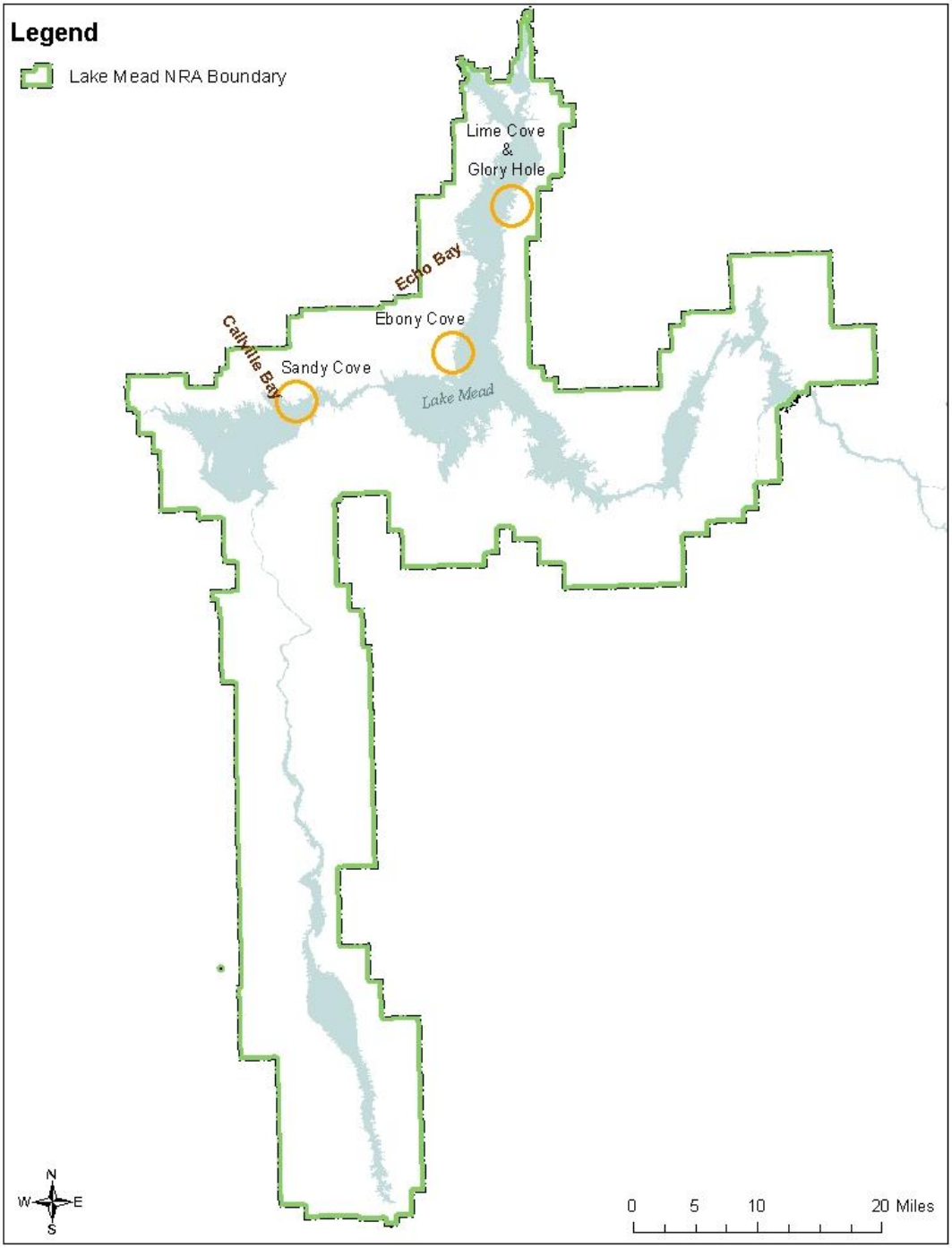

Figure 1.—Site locations for threecorner milkvetch and sticky buckwheat surveys.

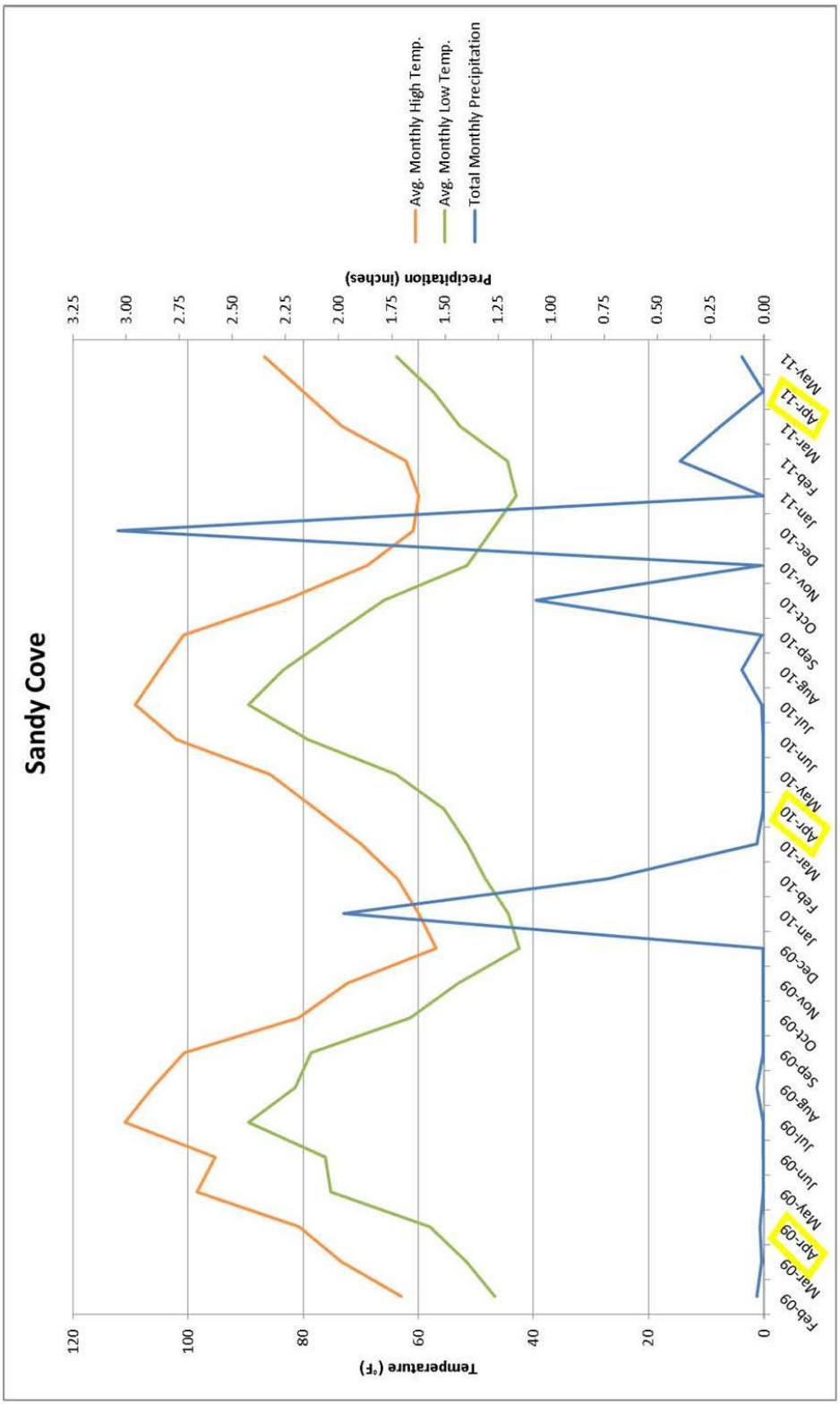

Figure 2.—Weather data from Sandy Cove, February 2009 to May 2011. The yellow box around the date designates the survey period for threecorner milkvetch.

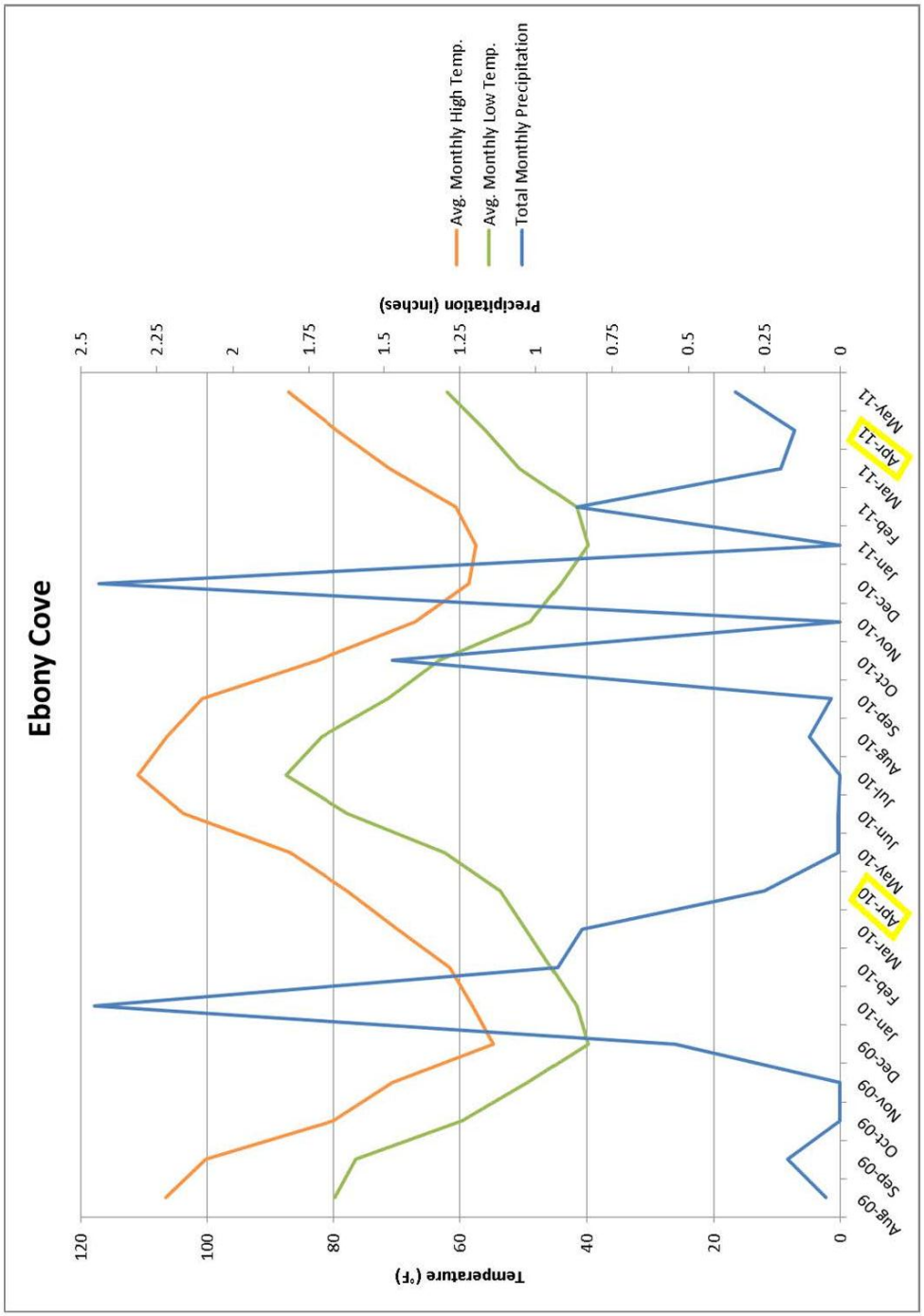

Figure 3.—Weather data from Ebony Cove, August 2009 to May 2011.
The yellow box around the date designates the survey period for threecorner milkvetch.

knowing whether increasing, decreasing, or stable (Philippi et al. 2001). Knowledge of environmental requirements and stressors may help predict future population survival under changing climate conditions (Niles et al. 1995; Bangle 2010).

OTHER CONSERVATION ACTIONS

In fiscal year 2011, approximately 3 acres of Sahara mustard were removed from the dunes at Sandy Cove and surrounding beaches. These areas have been treated for over 10 years, and the amount of Sahara mustard appears to be declining (C. Norman, personal observation). The amount of Sahara mustard on top of the dunes where the threecorner milkvetch is located was minimal compared to previous years. Without paired Sahara mustard monitoring plots, it cannot be determined whether this decline is a result of management efforts or other environmental factors. Also, fluctuating water levels greatly influence Sahara mustard recruitment on the shoreline, making it difficult to determine the actual effects of management control efforts on those populations.

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