

Condition of Selected Populations of the Rare Plants *Sidalcea covillei* and *Calochortus excavatus* in 2011

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Abstract

The Inyo County Water Department monitors populations of *Sidalcea covillei* (Owens Valley checkerbloom) and *Calochortus excavatus* (Inyo County star tulip) each year in accordance with the provisions of the Long Term Water Agreement. These populations were censused in 2011 using a combination of hand counts and estimation via population sampling. In 2011 overall, two *Sidalcea* populations were in poor condition according to both low population numbers and poor site conditions; in a third site, no plants were found, however this is not unreasonable given results from previous years. Two other sites were below the long-term mean and range but were in good site condition. In four additional SICO populations, although estimates were not below the long-term range, site quality estimates were poor. Sixteen *Calochortus* population estimates were below the long-term average of all previous year's estimates but at only nine of these the overall site quality was evaluated as fair or fair to poor. A combination of lowered water table, grazing and competition may be causing population fluctuations. These factors were qualitatively recorded but were not directly measured by ICWD in 2011.

Introduction

The Green Book requires monitoring of rare plant populations in the Owens Valley. This report contains a brief update of the status of the populations sampled by the Inyo County Water Department in 2011. Two species of rare plants have been monitored between 1993 and 2011; the Owens Valley checkerbloom, *Sidalcea covillei* (SICO), and Inyo County star tulip, *Calochortus excavatus* (CAEX). Both species are endemic to the Owens Valley. SICO is listed as endangered by the state of California, and is a US Fish and Wildlife species of concern. Both species are listed under CNPS List 1B.1 (rare, threatened, or endangered in CA and elsewhere). The Water Department has monitored up to 24 *Sidalcea* occurrences and up to 26 *Calochortus* occurrences annually. It has been documented that both species respond to particular environmental factors including water availability, cattle grazing, and abundance of invasive species (Henderson, 2010).

Methods

ICWD sampled 17 SICO populations and 25 CAEX populations within the Owens Valley in 2011; one new CAEX site was added. Individual CAEX plants were counted using walking grids located within previously mapped population polygons. SICO populations were sampled by first mapping known population locations into polygons and then either sampling individuals via randomly located quadrats, or via hand counts of flagged individuals within mapped sub-populations. Polygon boundaries were marked with flags and mapped by walking perimeter with GPS unit. Quadrats (approximately 1m²) were randomly sampled within the polygon. Locations of quadrats were selected using a random bearing and number of paces (a random pace sheet of 20, 30, or 40 paces was used depending upon the size of the polygon). The number of quadrats sampled was appropriate to size of polygon with 10 being the smallest number of quadrats. In the 2011 season, ICWD sampled all SICO populations which have GPS data. However this did not result in sampling all populations during the same environmental conditions because seven populations did not have GPS data and could not be located. These populations will again be attempted to be located during 2012 population sampling.

Because it has been found that populations of both species respond to particular environmental factors which can be used to evaluate site quality (Henderson 2010), a qualitative assessment of the level of grazing, abundance of invasive species, apparent available soil moisture and rare plant vigor are recorded at each site. This allows an evaluation of the overall site quality for each population, and results in a rating of one of four categories: excellent (10-12), good (8-9), fair (6-7), or poor (2-5).

Results

Of the 17 *Sidalcea* populations sampled, nine maintained adequate population estimates compared to the mean and range of individuals estimated during the entire sampling period from 1993-2010, while five estimates were substantially lower than the average and range of the previous year's estimates (Table 1) with the exception of site 20 where no plants were found in 2009. In four additional populations, although population counts were not below the range, site quality estimates were poor. One of these populations (site 5) was severely grazed by horses or mules as noted in the field, and received a very low site quality rating of 3.5 out of 12; a 'poor' rating. In one population, only one plant was found, but this is not inconsistent with low numbers detected in previous years. Of the nine populations that maintained population estimates within the previously sampled range, one was in fair condition, one was in excellent condition, and the rest were in good condition.

Of the 26 *Calochortus* populations sampled in 2011, in 16 sites population estimates were lower than the average of all previous sampling years (Table 2). At nine of these low sites, the overall site quality was evaluated as fair or fair to poor. In one of these population occurrences (site 25) no plants were found and the overall site quality estimate of 5.5 indicates that this site was in fair condition in 2011. Of the 17 sites that maintained ample population estimates, eight were in good site condition, while seven were evaluated as fair to good.

Table 1. Rare plant population estimates for sites sampled during the period 1993-2011 by the Inyo County Water Department for *Sidalcea covillei* (SICO). Columns indicate: population estimates between 1993 and 2010; the average estimate from the period 1993-2010, *Avg*; the 2011 population estimate, *2011*; and the overall site quality in 2011, *SiteQual*. Grey shading indicates populations that were below the average and range of most previous sampling years, and pink shading indicates the site quality evaluation measured conditions as fair or poor in 2011.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	<i>Avg</i>	2011	<i>SiteQual</i>
1		0																			
2		46457	78817	64299															63191	11101	8.5
3	2000	2400	72156	27901															26114	9716	9
4	826	17356	10126	9674															9496		
5	1800	2976	3657	10676															4777	62	3.5
6	66600	124714	169367	74003															108671	97343	8
7	64388	156288	84653	25149															82620	11285	8.5
8			181	221	350	520	625	586	754	918	921	872	834	808	715	503	350		611	400	8
9		1100	1496	1582	1476														1414	803	8
10		0																			
11	92155	68126	198418	141568													8000		101653	57590	10
12		0*	2000	500																	
13	3000		19396	8652													3000		10349	6633	9
14	22275	59999	77355	89502													80	4630	42307	3444	7
15		600	9731	5545														323	4050	378	6
16											5	5	5	2	2	2	0	0	3	1	9
17	5000	41239	51002	20196													1200	20655	23215	19568	9.5
18		35	200																		
19	150	115000	90974		69743		41275	42351	39938								5000		50554	18829	8.5
20	106	67	171	131	129	152	223	94	113	53	75	44	72	91	70	44	0	14	91.6	8	6.5
21	35000		28668	12868														28582	26280	24909	9
22			97452	43438																	
23	0	12	0	0																	
24		10		2	1														4	10	5.5

Table 2. Rare plant population estimates for sites sampled during the period 1993-2011 by the Inyo County Water Department for *Calochortus excavatus* (CAEX). Columns indicate: population estimates between 1993 and 2010; the average estimate from the period 1993-2010, *Avg*; the 2011 population estimate, *2011*; and the overall site quality in 2011, *SiteQual*. Grey shading indicates populations that were below the long-term average of previous sampling years.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	<i>Avg</i>	2011	<i>SiteQual</i>
1	26	152	91	80	220	116	208	177	699	337	388	392	128	181	234	64	15	51	198	62	8
2				2	1			0	0	0		0	0		0	0			0		
3	18	6	58	21	25	21	17	10	6	23	18	5	8	15	18	26	6	13	17	8	8
4	72	46	50	104	45	100	133	98	27	13	103	7	140	112	143	68	1		74	5	6.5
5	282	31	500	450	400	250		687	658	991	1124	85	837	203	927	1227	68	94	518	38	5
6	105	77	180	200	111	92	114	236	432	340	286	214	408	262	167	269	145		214	198	8
7							8	0											4	35	8
8																				17	8
9					7	16	2	0	4	1	6	0	8	8	1	8	1	7	5	3	7
10	15	0	0	57	45	2	19	6	88	65	173	7	77	95	51	37	1	14	42	6	7.5
11						50		44	84	96	296	82	290	457	76	183	23	276	163	265	8
12													852	662	399	780	174	626	582	516	8
13	12	33	42	31	6	3	7	14	10	0	19	16	34	42	6	30	10	39	20	21	8
14	0	0	69	9	3	10	0	0	14	0	51	0	39	19	0	49	7	14	16	6	6
15	78	0	315	19	100	200	41	54	124	21	348	30	186	40	54	213	62	183	115	62	8
16													166	296	18	567	34	350	239	135	7.5
17	0	2	5	1	2	4	4	0	4	0	2	0	0	1	0	1	0	0	1	2	7.5
18	120	26	450	32	14	23	0	0	1	0	2	0	260	99	0	355	2	380	98	151	7.5
19		200	400	92	90	90	100	318	627	527	1643	81	1502	506	263	1793	361	1220	577	814	7.5
20	13	0	118	17	1	47	17	3	19	0	6	0	10	14	0	43	2	28	19	26	7
21	0			33	30	74	67	82	43	53	36	0	28	34	5	6	0	2	31	11	7
22		97	400	200	18	100	150	167	592	4	673	6	681	575	177	1162	0	61	298	165	7.5
23										345	1081	255	661	191	170	1616	505	448	586	141	5.5
24	15	1	56	55	50	17	64	76	45	20	13	7	16	86	26	59	6	42	36	55	8
25			36	7	2	15	17	3	1	0	3	2	17	8	5	4	3	2	8	0	5.5
26	1	0	21	3	4	15	6	5	6	5	8	4	17	6	5	14	4	3	7	11	7.5
27	55	1	380	150	50	100	248	689	548	90	368	90	321	130	171	320	5	155	215	92	7

Discussion

Population estimates are sampled differently for the two rare species monitored. Because the population dynamics and life history of *Sidalcea* allows for larger population sizes, these populations are often determined using representative samples and estimation. Therefore, greater variance between years may be expected in SICO population estimates when compared with smaller population numbers present in the *Calochortus* populations which allow for individual counts. Because of this difference, *Sidalcea* populations were considered using both the long-term average and the range, while the *Calochortus* populations were examined using only the long-term average.

Following the 2011 sampling season, five *Sidalcea covillei* populations were below the mean and range of conditions sampled in past census efforts, however only one of these populations (site 5) measured 'poor' with respect to site quality, another was assessed as 'fair', and the last three were in 'good' condition (see Table 1). Low estimates at site 5 were primarily due to heavy grazing; the 2011 census at this site was 71 times lower than the long term average so grazing can have a strong influence on persistence in a given sampling year. Another of these below average populations, site 20, has been well below the long-term average for the last four years, since 2008 likely due to dry soils, or grazing although grazed plants were not observed at the site. This population (20) has reduced to 8.6% of its long-term average and 7.5% of the site's 1991 population count. The three other sites below long-term range and average were rated in 'good' site condition and site status will be monitored in 2012 to further evaluate conditions.

Of the SICO population estimates within the long-term range, in two sites, conditions indicate 'fair' conditions but population estimates in 2011 are consistent with 2010 estimates. In one additional population, conditions were measured as 'poor', however, estimates are above the long-term average. In site 16, only one plant was found, however population estimates over the past five years were not inconsistent with this result (Table 1), and since site conditions in 2011 were rated as 'good', this population is most likely simply erratic in its population size.

It is planned that all previously sampled SICO populations with referenced geospatial (GIS) information will be sampled during the 2012 monitoring season and site quality will be assessed. An additional 7 sites without referenced GIS information will be attempted to be re-located in 2012 and it will be determined if annual monitoring is necessary for these sites.

Of the 26 *Calochortus excavatus* populations sampled in 2011, 16 were below the long term average of all previous year's estimates, however, none were below the range (Table 2). The other 10 maintained population estimates consistent with or above the long-term average. At nine of the below-average sites, the overall site quality was evaluated as poor or fair. In one population, site 25, no plants were found in 2011; this is not unreasonable based on past sampling as no plants were found in 2002 as well and, on average, eight plants have been found annually. This site was found to have poor to fair site quality and site status will be monitored in 2012 to further evaluate conditions. Of the 10 sites that maintained ample population estimates, eight were in good site condition, while seven were evaluated as fair to good.

It is expected that all previously sampled CAEX populations with referenced geospatial (GIS) information will be sampled and site-level assessments will be re-evaluated during the 2012 monitoring season.

Environmental site factors including water availability, cattle and/or horse grazing and abundance of invasive species appears to be related in some way to population abundance. Qualitative assessments of these factors were assessed in 2011 and in previous years, however quantitative assessments of most of these factors were not collected or analyzed in 2011.

Literature Cited

Henderson, A. 2010. Rare Plant Monitoring Report and analysis. Technical Report prepared for:
Inyo County Water Department.

California Natural Diversity Database (CNDDDB) [online]. Website
<http://www.dfg.ca.gov/biogeodata/cnddb/>