

**Condition of Selected Populations of the Rare Plants *Sidalcea covillei* and
Calochortus excavatus in 2010**

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July 14, 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 2010 using a combination of hand counts and estimation via quadrat sampling. According to results of this year's sampling, three *Sidalcea* population estimates are very low, and in another site, no plants were found, however this is not unreasonable given results from previous years. Seven *Calochortus* population estimates were below the average of all previous year's estimates. A combination of lowered water table, grazing and competition can affect 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 2010. Two species of rare plants have been monitored between 1993 and 2010; 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 23 *Sidalcea* occurrences and up to 25 *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 five SICO populations and 22 CAEX populations within the Owens Valley in 2010. Individual CAEX plants were counted using walking grids located within previously mapped population polygons. SICO populations were sampled either by mapping known population locations and sampling individuals via randomly located polygons, 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 intends to sample all SICO populations with GPS data to assess conditions of all populations during the same environmental conditions.

Because it has been found that populations of both species respond to particular environmental site 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 also recorded. 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 six *Sidalcea* populations sampled, two maintained adequate population estimates while in three sites, estimates were substantially lower than the average (and range with the exception of one 2009 estimate) of the previous years sampled for that population (Table 1). One of these populations 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 total possible; a poor rating. In one population, no plants were found, but this is not entirely inconsistent with the low numbers found in previous years. Of the two populations that maintained their population values, one was in fair condition, and one was in good condition.

Of the 22 *Calochortus* populations sampled in 2010, 15 maintained ample population estimates, while in seven, population estimates were lower than the average of all previous sampling years (Table 2). At four of these low sites, the overall site quality was poor, one was evaluated as fair, one was fair to good and one was in good condition. In one population occurrence, no plants were found, and the overall site quality estimate of 6 indicates that this site was in fair condition in 2011. Of the 15 sites that maintained ample population estimates, eight were in good site condition, while seven were evaluated as fair.

Table 1. Rare plant population estimates for sites sampled during the period 1993-2010 by the Inyo County Water Department for *Sidalcea covillei* (SICO). Additional columns indicate average population estimates between 1993 and 2009, *Avg*; and overall site quality, *SiteQual*. Grey shading indicates populations that were below the average of all and range of most previous sampling years.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	<i>Avg</i>	2010	<i>SiteQual</i>
1		0																		
2		46457	78817	64299																
3	2000	2400	72156	27901																
4	826	17356	10126	9674																
5	1800	2976	3657	10676																
6	66600	124714	169367	74003																
7	64388	156288	84653	25149																
8			181	221	350	520	625	586	754	918	921	872	834	808	715	503	350			
9		1100	1496	1582	1476															
10		0																		
11	92155	68126	198418	141568													8000			
12		0	2000	500																
13	3000		19396	8652													3000			
14	22275	59999	77355	89502													80	49842	4630	8.5
15		600	9731	5545														5292	323	7.5
16											5	5	5	2	2	2	0	3	0	3.5
17	5000	41239	51002	20196													1200	23727	20655	6.5
18		35	200																	
19	150	115000	90974		69743		41275	42351	39938								5000			
20	106	67	171	131	129	152	223	94	113	53	75	44	72	91	70	44	0	96	14	7.5
21	35000		28668	12868														25512	28582	8.5
22			97452	43438																
23	0	12	0	0																
24		10		2	1															

Table 2. Rare plant population estimates for sites sampled during the period 1993-2010 by the Inyo County Water Department for *Calochortus excavatus* (CAEX). Additional columns indicate average population estimates between 1993 and 2009, *Avg*; and overall site quality, *SiteQual*. Grey shading indicates populations were below the average of all previous sampling years.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	<i>Avg</i>	2010	<i>SiteQual</i>
1	26	152	91	80	220	116	208	177	699	337	388	392	128	181	234	64	15	206	51	5
2				2	1			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	18	13	*8
4	72	46	50	104	45	100	133	98	27	13	103	7	140	112	143	68	1			
5	282	31	500	450	400	250		687	658	991	1124	85	837	203	927	1227	68	545	94	*8
6	105	77	180	200	111	92	114	236	432	340	286	214	408	262	167	269	145			
7							8	0												
8					7	16	2	0	4	1	6	0	8	8	1	8	1	5	7	7
9	15	0	0	57	45	2	19	6	88	65	173	7	77	95	51	37	1	43	14	6
10						50		44	84	96	296	82	290	457	76	183	23	153	276	9.5
11													852	662	399	780	174	573	626	8
12	12	33	42	31	6	3	7	14	10	0	19	16	34	42	6	30	10	19	39	8
13	0	0	69	9	3	10	0	0	14	0	51	0	39	19	0	49	7	16	14	6.5
14	78	0	315	19	100	200	41	54	124	21	348	30	186	40	54	213	62	111	183	6.5
15													166	296	18	567	34	216	350	8
16	0	2	5	1	2	4	4	0	4	0	2	0	0	1	0	1	0	2	0	6
17	120	26	450	32	14	23	0	0	1	0	2	0	260	99	0	355	2	81	380	7
18		200	400	92	90	90	100	318	627	527	1643	81	1502	506	263	1793	361	537	1220	8.5
19	13	0	118	17	1	47	17	3	19	0	6	0	10	14	0	43	2	18	28	8.5
20	0			33	30	74	67	82	43	53	36	0	28	34	5	6	0	33	2	4.5
21		97	400	200	18	100	150	167	592	4	673	6	681	575	177	1162	0	313	61	7.5
22										345	1081	255	661	191	170	1616	505	603	448	6.5
23	15	1	56	55	50	17	64	76	45	20	13	7	16	86	26	59	6	36	42	8
24			36	7	2	15	17	3	1	0	3	2	17	8	5	4	3	8	2	5
25	1	0	21	3	4	15	6	5	6	5	8	4	17	6	5	14	4	7	3	4.5
26	55	1	380	150	50	100	248	689	548	90	368	90	321	130	171	320	5	219	155	6

*Indicates overall site quality is an average of all years recorded

Discussion

Following the 2010 sampling season, three *Sidalcea covillei* populations were below and two populations were consistent with the average of previous sampling years. In another site, no plants were found, however population estimates over the past five years were so low that this value may not be unreasonable (Table 1). In the site where no plants were found, the qualitative evaluation of overall 'site quality' indicated poor conditions. Of the three populations below the average of previous years, one population is in fair condition and two were in good condition. Because it is planned that all previously sampled SICO populations with referenced geospatial (GIS) information will be sampled during the 2011 monitoring season, all of these populations will be re-censused next year. Site-level assessments will also be re-evaluated during the 2011 sampling season.

Of the 22 *Calochortus excavatus* populations sampled in 2010, seven *Calochortus* populations were below the average of all previous year's estimates, however, none were below the range of previous year's estimates (Table 2). The other 15 maintained population estimates consistent with the average of previous sampling years. At four of the low-estimate sites, the overall site quality was poor and one was evaluated as fair. In one population occurrence, no plants were found, however this is not unreasonable because plants were not found in seven of 17 previous sampling years. The overall site quality estimate at this population of six indicated that it was in fair condition in 2011. Of the 15 sites that maintained ample population estimates, eight were in good site condition, while seven were evaluated as fair. 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 2011 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, however quantitative assessments of most of these factors were not collected or analyzed in 2010.

Literature Cited

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

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