



ENVIRONMENTAL CONSULTANTS

Sound Science. Creative Solutions.®

Lilli Pipeline Pollinator Garden Monitoring Report, Weld County, Colorado

Prepared for
Noble Energy, Inc.

Prepared by
SWCA Environmental Consultants

November 2015



**Lilli Pipeline Pollinator Garden Monitoring Report,
Weld County, Colorado**



Prepared for

Noble Energy, Inc.
1625 Broadway, Suite 2200
Denver, CO 80202
Phone: (303) 228-4000
www.nobleenergyinc.com

Prepared by

SWCA Environmental Consultants
295 Interlocken Boulevard, Suite 300
Broomfield, Colorado 80021
Phone: (303) 487-1183 | Fax: (303) 487-1245
www.swca.com

TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1
2.0 METHODS	1
3.0 RESULTS	3
4.0 DISCUSSION	5

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Noble Pollinator-Specific Seed Mix	1
2. Pollinator Plant Species Count.....	3
3. Relative Abundance of Pollinator Plant Species.....	4

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Overview Map of Pollinator Garden.....	2
2. Comparison of Pollinator Plant Species 2014-2015	5
3. Comparison Relative Abundance of Pollinator Plant Species 2014-2015.....	6

LIST OF APPENDICES

Appendix

- A Site Photographs

This page intentionally left blank.

1.0 INTRODUCTION

Noble Energy, Inc. (Noble), in collaboration with the U.S. Forest Service (USFS), established a pollinator garden along a portion of the Lilli Pipeline approximately 5.1 miles northwest of Raymer, Weld County, Colorado (Figure 1). This portion of Lilli Pipeline is located on the Pawnee National Grassland (PNG), managed by the USFS. The pollinator garden is approximately one mile long and 60 feet wide. During reclamation of Lilli Pipeline in 2013, a pollinator-specific seed mix (Table 1) was used to promote the establishment of pollinator plant species and provide habitat and food sources for pollinator species occurring on PNG. Initial monitoring of the pollinator garden was established in 2014 and the following report outlines results of the second year growth at this site.

Table 1. Noble Pollinator-Specific Seed Mix

Common Name	Scientific Name	USDA Code	Present 2014	Present 2015
Scarlet globemallow	<i>Sphaeralcea coccinea</i>	SPCO	✓	✓
Common yarrow	<i>Achillea lanulosa</i>	ACLAA		✓
Rocky Mountain beeplant	<i>Cleome serrulata</i>	CLSE	✓	
Lewis flax	<i>Linum lewisii</i>	LILE3	✓	✓
Dotted blazing star	<i>Liatris punctata</i>	LIPU	✓	
Upright prairie coneflower	<i>Ratibida columnifera</i>	RACO3	✓	✓
Broadbeard beardtongue	<i>Penstemon angustifolius</i>	PEAN4	✓	✓
Common sunflower	<i>Helianthus annuus</i>	HEAN3	✓	✓
Tanseyleaf tansyaster	<i>Machaeranthera tanacetifolia</i>	MATA2	✓	✓
Purple prairie clover	<i>Dale purpurea</i> var. <i>purpurea</i>	DAPUP	✓	✓
Winterfat	<i>Krascheninnikovia lanata</i>	KRLA2	✓	✓
Western wallflower	<i>Erysimum asperum</i>	ERAS2	✓	✓

2.0 METHODS

Monitoring was conducted on 05 October 2015 by USFS, Colorado Native Plant Society Volunteers, and SWCA Environmental Consultants (SWCA). Permanent survey plots established in 2014 were revisited to inventory the occurrence and abundance of pollinator plant species during the 2015 growing season (Figure 1). Seven transects including 21 2-meter diameter survey plots (three replicates per transect) were monitored during the inventory. From the centroid of the survey plot (all plots are permanently marked with re-bar at their center), a 1-meter tape was rotated 360-degrees and the number of all pollinator plant species (listed in Table 1) were counted.

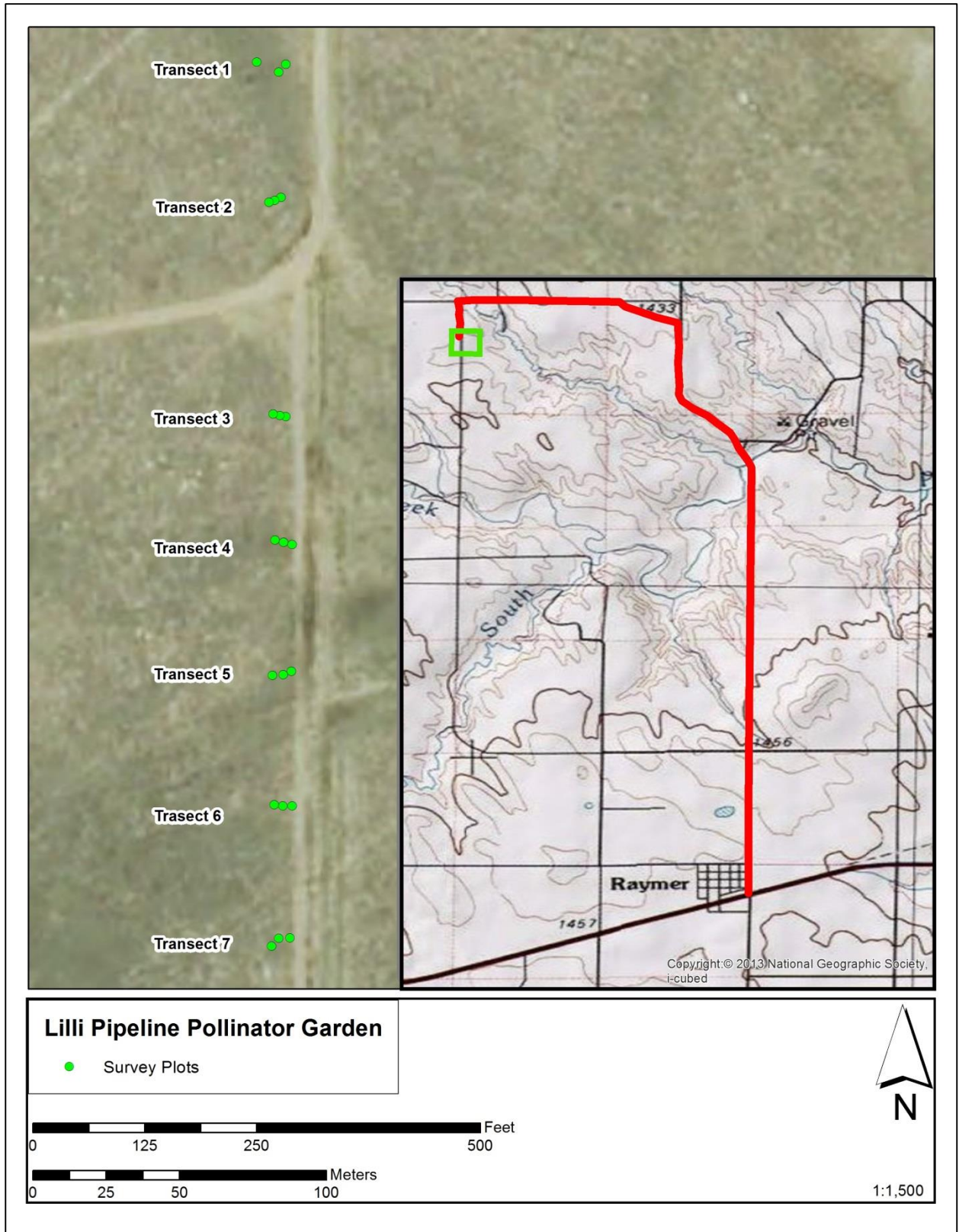


Figure 1. Overview Map of Pollinator Garden.

3.0 RESULTS

All 21 survey plots had at least 3 of the 12 (minimum of 25% establishment) pollinator plant species, but no survey transect contained all of the pollinator plant species (Table 2). The largest number of pollinator plant species recorded at a survey plot was seven in Survey Plots 4-2, 6-1, and 6-2. The average across all survey plots was 5.0 pollinator plant species per survey plot. Survey Plot 2-2 had the highest number of individual target species present (200); with plot 5-2 having the smallest number of individual target species (14). The number of individual pollinator plants detected ranged from 14-200 with an average of 99.4 pollinator plants per survey plot.

Table 2. 2015 Pollinator Plant Species Count.

Plot	Species Observed	Plant Species (count)*												Total
		SPCO	ACLAA	CLSE	LILE3	LIPU	RACO3	PEAN4	HEAN3	MATA2	DAPUP	KRLA2	ERAS2	
1-1	5	96	0	0	1	0	0	0	19	20	1	0	0	137
1-2	5	72	0	0	1	0	5	0	20	0	0	1	0	99
1-3	4	55	0	0	11	0	6	0	48	0	0	0	0	120
2-1	5	3	0	0	39	0	18	0	102	14	0	0	0	176
2-2	5	7	0	0	17	0	12	0	96	68	0	0	0	200
2-3	5	37	0	0	11	0	17	0	65	1	0	0	0	131
3-1	6	5	0	0	26	0	14	0	52	7	2	0	0	106
3-2	6	15	0	0	20	0	4	0	60	4	3	0	0	106
3-3	4	2	0	0	0	0	7	0	22	1	0	0	0	32
4-1	6	20	0	0	16	0	2	0	83	6	1	0	0	128
4-2	7	12	0	0	19	0	10	1	53	11	2	0	0	108
4-3	6	6	3	0	13	0	20	0	11	1	0	0	0	54
5-1	3	0	0	0	24	0	13	0	4	0	0	0	0	41
5-2	3	0	0	0	2	0	9	0	3	0	0	0	0	14
5-3	3	9	0	0	0	0	6	0	1	0	0	0	0	16
6-1	7	23	0	0	21	0	6	0	86	15	0	1	1	153
6-2	7	25	0	0	9	0	5	0	58	2	2	1	0	102
6-3	5	35	0	0	8	0	5	0	33	0	0	0	3	84
7-1	6	1	0	0	29	0	2	0	60	24	0	0	1	117
7-2	4	40	0	0	11	0	7	0	45	0	0	0	0	103
7-3	4	28	0	0	4	0	5	0	23	0	0	0	0	60
Total	-	491	3	0	282	0	173	1	944	174	11	3	5	2087

*SPCO = scarlet globemallow; ACLAA = common yarrow; CLSE = Rocky Mountain beeplant; LILE3 = Lewis flax; LIPU = dotted blazing star; RACO3 = upright prairie coneflower; PEAN4 = broadbeard beardtongue; HEAN3 = common sunflower; MATA2 = tanseyleaf tansyaster; DAPUP = purple prairie clover; KRLA2 = winterfat; and, ERAS2 = western wallflower

Common sunflower (*Helianthus annuus*) was the only pollinator plant species detected in all survey plots during the 2015 surveys (Table 2). This species had the highest count of individual plants (944 individuals), accounting for 45% of the total number of individuals detected across all survey plots (Table 3). Scarlet globemallow (*Sphaeralcea coccinea*), Lewis flax (*Linum lewisii*), upright prairie coneflower (*Ratibida columnifera*), and tanseyleaf

tansyaster (*Machaeranthera tanacetifolia*), were detected in 17 (81%), 19 (90%), 20 (95%), and 13 (62%) survey plots, respectively. Scarlet globemallow and Lewis flax accounted for 24% and 14% of all individuals detected across all survey plots, respectively. Conversely, upright prairie coneflower and tanseyleaf tansyaster accounted for only 8% and 8%, respectively.

Individuals of Purple prairie clover (*Dalea purpurea* var. *purpurea*), common yarrow (*Achillea lanulosa*), broadbeard beardtongue (*Penstemon angustifolius*), winterfat (*Krascheninnikovia lanata*), and western wallflower (*Erysimum asperum*) were detected. Each accounted for 1% or less of the total number of pollinator plant species found across all survey plots during 2015.

Two target species, Rocky Mountain beeplant (*Cleome serrulata*) and Dotted blazing star (*Liatris punctata*) did not occur on any plots during 2015.

Table 3. 2015 Relative Abundance of Pollinator Plant Species.

Transect	Species Count	% Relative Abundance*											
		SPCO	ACLAA	CLSE	LILE3	LIPU	RACO3	PEAN4	HEAN3	MATA2	DAPUP	KRLA2	ERAS2
1-1	5	70	0	0	1	0	0	0	14	15	1	0	0
1-2	5	73	0	0	1	0	5	0	20	0	0	1	0
1-3	4	46	0	0	9	0	5	0	40	0	0	0	0
2-1	5	2	0	0	22	0	10	0	58	8	0	0	0
2-2	5	4	0	0	9	0	6	0	48	34	0	0	0
2-3	5	28	0	0	8	0	13	0	50	1	0	0	0
3-1	6	5	0	0	25	0	13	0	49	7	2	0	0
3-2	6	14	0	0	19	0	4	0	57	4	3	0	0
3-3	4	6	0	0	0	0	22	0	69	3	0	0	0
4-1	6	16	0	0	13	0	2	0	65	5	1	0	0
4-2	7	11	0	0	18	0	9	1	49	10	2	0	0
4-3	6	11	6	0	24	0	37	0	20	2	0	0	0
5-1	3	0	0	0	59	0	32	0	10	0	0	0	0
5-2	3	0	0	0	14	0	64	0	21	0	0	0	0
5-3	3	56	0	0	0	0	38	0	6	0	0	0	0
6-1	7	15	0	0	14	0	4	0	56	10	0	1	1
6-2	7	25	0	0	9	0	5	0	57	2	2	1	0
6-3	5	42	0	0	10	0	6	0	39	0	0	0	4
7-1	6	1	0	0	25	0	2	0	51	21	0	0	1
7-2	4	39	0	0	11	0	7	0	44	0	0	0	0
7-3	4	47	0	0	7	0	8	0	38	0	0	0	0
RA (%)	-	24	0	0	14	0	8	0	45	8	1	0	0

*SPCO = scarlet globemallow; ACLAA = common yarrow; CLSE = Rocky Mountain beeplant; LILE3 = Lewis flax; LIPU = dotted blazing star; RACO3 = upright prairie coneflower; PEAN4 = broadbeard beardtongue; HEAN3 = common sunflower; MATA2 = tanseyleaf tansyaster; DAPUP = purple prairie clover; KRLA2 = winterfat; and, ERAS2 = western wallflower

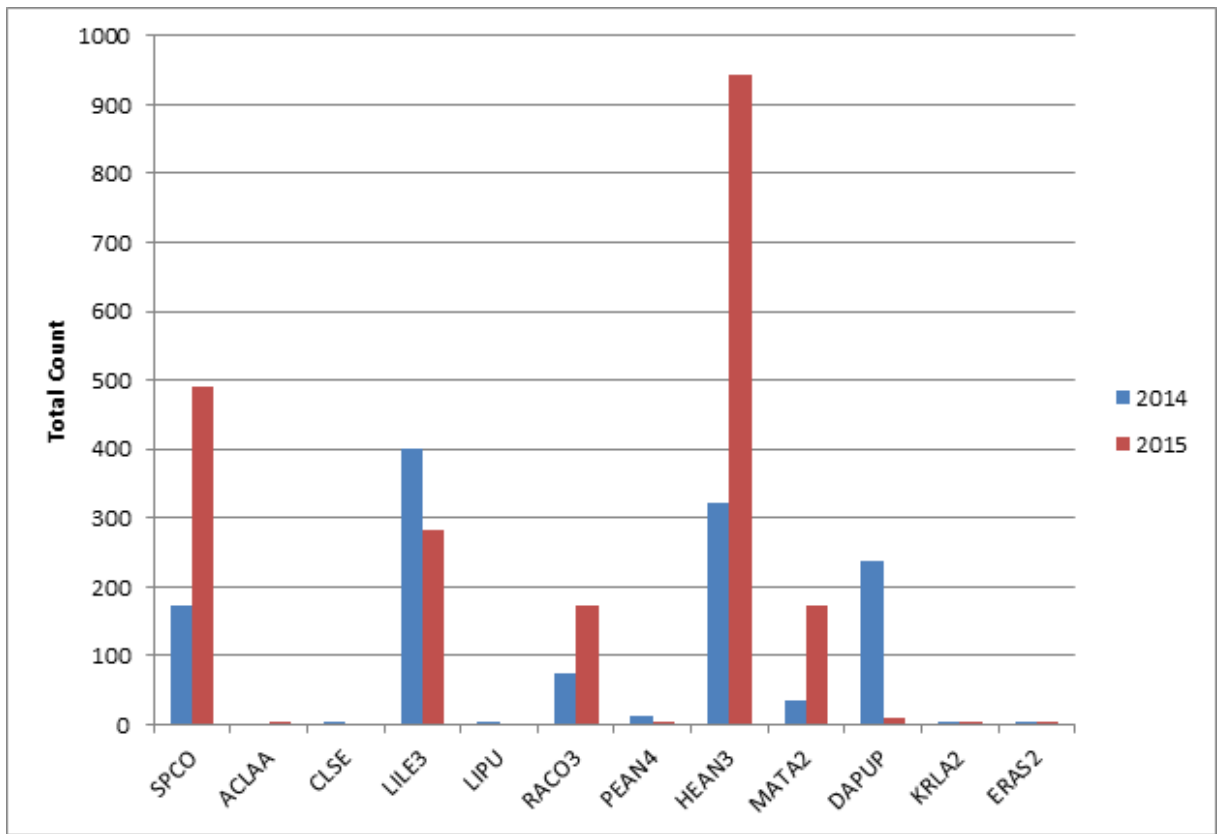


Figure 2. Pollinator Plant Species Total Counts 2014-2015

4.0 DISCUSSION

Comparisons between 2014 and 2015 show that the number of recorded pollinator plant species dropped from eleven to ten (Table 1), but that total counts of individual pollinator plants increased from 1,267 in 2014, to 2,087 in 2015. This is an overall increase of approximately 40 percent (%) in the number of pollinator plants. Figure 2 shows significant increases were seen in the number of scarlet globemallow, upright prairie coneflower, common sunflower, and tanseyleaf tansyaster.

The relative abundance of species also changed significantly between 2014 and 2014 (Figure 3). Increases were seen in scarlet globemallow, upright prairie coneflower, common sunflower, and tanseyleaf tansyaster of 10%, 2%, 20%, and 5%, respectively.

Two species, Lewis' flax and purple prairie clover, did decrease significantly in relative abundance between 2014 and 2015. The respective drops in relative abundance were both 18% (Figure 3).

Photographs of all sample plots can be found in Appendix A.

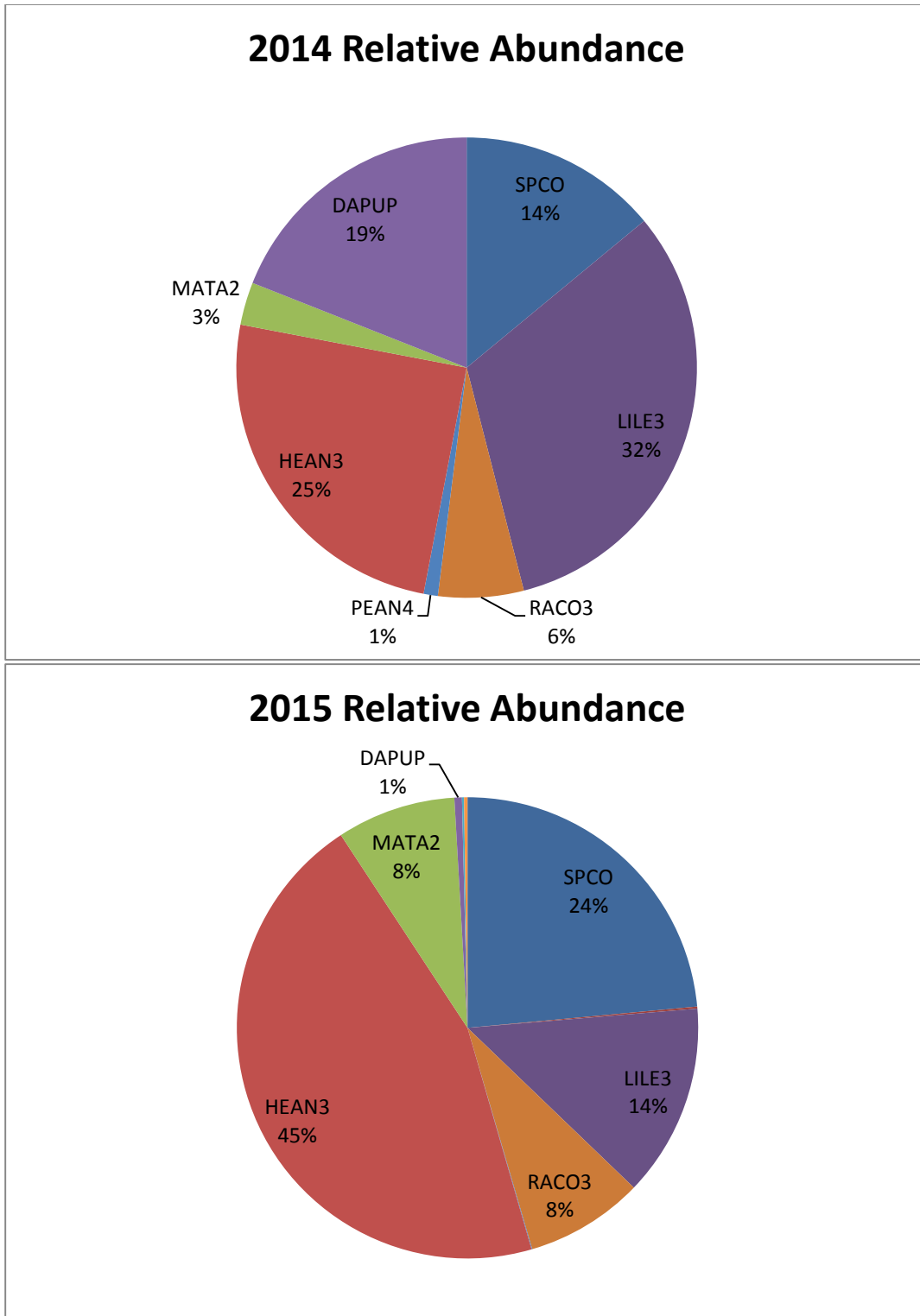


Figure 3. Relative Abundance of Pollinator Plant Species 2014-2015

This page intentionally left blank.

APPENDIX A
Site Photographs



Photograph 1. Vegetation within plot 1-1



Photograph 2. Vegetation within plot 1-2



Photograph 3. Vegetation within plot 1-3



Photograph 4. Vegetation within plot 2-1



Photograph 5. Vegetation within plot 2-2



Photograph 6. Vegetation within plot 2-3



Photograph 7. Vegetation within plot 3-1



Photograph 8. Vegetation within plot 3-2



Photograph 9. Vegetation within plot 3-3



Photograph 10. Vegetation within plot 4-1



Photograph 11. Vegetation within plot 4-2



Photograph 12. Vegetation within plot 4-3



Photograph 13. Vegetation within plot 5-1



Photograph 14. Vegetation within plot 5-2



Photograph 15. Vegetation within plot 5-3



Photograph 16. Vegetation within plot 6-1



Photograph 17. Vegetation within plot 6-2



Photograph 18. Vegetation within plot 6-3



Photograph 19. Vegetation within plot 7-1



Photograph 20. Vegetation within plot 7-2



Photograph 21. Vegetation within plot 7-3