APPENDIX A
SURVEY DATES AND STAFF

Site	Date	Work done	Staff
Bob Baker	2/11/2003	mapping/fs	Keli Balo, Betsy Miller, Holly Cheong, Keith Greer
Del Mar Mesa	2/19/2003	mapping/fs	Keli Balo, Betsy Miller, Holly Cheong
Otay Lakes	2/20/2003	mapping/fs	Keli Balo, Holly Cheong, Melanie Johnson, Keith Greer
J 16-18	2/21/2003	mapping/fs	Keli Balo, Holly Cheong, Greg Mason
J13S	2/21/2003	mapping/fs	Keli Balo, Holly Cheong, Greg Mason
Nobel Drive	2/21/2003	mapping/fs	Betsy Miller, Keith Greer, Holly Cheong, Chad Kane
Nobel Research	2/21/2003	mapping/fs	Betsy Miller, Keith Greer, Holly Cheong, Chad Kane
Proctor Valley	2/21/2003	mapping/fs	Keli Balo, Holly Cheong
Sweetwater HS	2/21/2003	mapping/fs/cover estimates	Greg Mason
West Otay A+B	2/21/2003	mapping/fs/cover estimates	Greg Mason
Arjons	2/24/2003	mapping/fs	Melanie Johnson, Holly Cheong, Keli Balo
Lopez Ridge	2/24/2003	mapping/fs	Melanie Johnson, Holly Cheong, Keli Balo
Mira Mesa Marketcenter	2/24/2003	mapping/fs	Melanie Johnson, Holly Cheong, Keli Balo
J29-30	2/26/2003	mapping/fs	Betsy Miller, Keith Greer, Keli Balo
Cubic	2/27/2003	mapping/fs	Keli Balo, Betsy Miller
Magnatron	2/27/2003	mapping/fs	Keli Balo, Betsy Miller
Sander	2/27/2003	mapping/fs	Keli Balo, Betsy Miller
Serra Mesa Library	2/27/2003	mapping/fs	Keli Balo, Betsy Miller
Bowtie	2/28/2003	mapping/fs	Keli Balo, Betsy Miller, Holly Cheong
Del Mar Mesa	2/28/2003	mapping/fs	Keli Balo, Betsy Miller, Holly Cheong
Clayton	3/4/2003	mapping/fs	Keli Balo, Betsy Miller, Holly Cheong, Keith Greer
J13S	3/4/2003	cover estimates	Keli Balo, Betsy Miller, Holly Cheong, Keith Greer
Otay Mesa Road Pardee	3/4/2003	mapping/fs	Keli Balo, Betsy Miller, Holly Cheong, Keith Greer
Sander	3/4/2003	mapping/fs	Keli Balo, Betsy Miller, Holly Cheong, Keith Greer
St Jerome	3/4/2003	mapping/fs	Keli Balo, Betsy Miller, Holly Cheong, Keith Greer
Wahl Hudson	3/4/2003	mapping/fs	Keli Balo, Betsy Miller, Holly Cheong, Keith Greer
J11E	3/4/2003	mapping/fs	Keli Balo, Betsy Miller, Holly Cheong, Keith Greer
J11W	3/4/2003	mapping/fs/cover estimates	Keli Balo, Betsy Miller, Holly Cheong, Keith Greer
J12	3/4/2003	mapping/fs	Keli Balo, Betsy Miller, Holly Cheong, Keith Greer
RR Sesi Family	3/4/2003	mapping/fs	Keli Balo, Betsy Miller, Holly Cheong, Keith Greer
Wahl Hudson	3/4/2003	mapping/fs	Keli Balo, Betsy Miller, Holly Cheong, Keith Greer
Kelton	3/6/2003	mapping/fs	Holly Cheong, Keli Balo
Otay Lakes	3/6/2003	mapping/fs	Keli Balo, Holly Cheong
Marron Valley	3/7/2003	mapping/fs	Holly Cheong, Betsy Miller
Carmel Mountain	3/10/2003	mapping/fs	Holly Cheong, Keli Balo
Li Collins	3/10/2003	mapping/fs	Holly Cheong, Keli Balo

Site	Date	Work done	Staff
Mission Trails	3/11/2003	mapping/fs	Holly Cheong, Keith Greer
Carmel Mountain	3/12/2003	mapping/fs	Betsy Miller, Randy Rodriguez, Keli Balo
Shaw Texas	3/12/2003	mapping/fs	Betsy Miller, Randy Rodriguez, Keli Balo
Fieldstone	3/14/2003	mapping/fs/cover estimates	Holly Cheong, Betsy Miller
Maddox	3/14/2003	mapping/fs/cover estimates	Holly Cheong, Betsy Miller
Sunset Pointe	3/14/2003	mapping/fs	Holly Cheong, Betsy Miller
Del Mar Mesa	3/19/2003	cover estimates plants	Keli Balo, Betsy Miller
Bachman	3/20/2003	mapping/fs	Keli Balo, Greg Mason, Holly Cheong
J34	3/20/2003	mapping/fs	Keli Balo, Greg Mason, Holly Cheong
Lopez Ridge	3/20/2003	cover estimates	Melanie Johnson
Otay Mesa Road Pardee	3/20/2003	mapping/fs	Keli Balo, Greg Mason, Holly Cheong
Proctor Valley	3/20/2003	mapping/fs	Keli Balo, Holly Cheong
Arjons	3/21/2003	mapping/fs	Melanie Johnson, Holly Cheong, Keli Balo
Nobel Research	3/21/2003	mapping/fs	Melanie Johnson, Holly Cheong, Keli Balo
Sunset Pointe	3/21/2003	mapping/fs	Melanie Johnson, Holly Cheong, Keli Balo
Del Mar Mesa	3/25/2003	cover estimates plants	Keli Balo
Montgomery Field	3/26/2003	mapping/fs/cover estimates	Holly Cheong, Keli Balo, Betsy Miller, Melanie Johnson
J13E	3/27/2003	mapping/fs/cover estimates	Keli Balo, Melanie Johnson, Betsy Miller
J13N	3/27/2003	mapping/fs/cover estimates	Keli Balo, Melanie Johnson, Betsy Miller
Wruck	3/27/2003	mapping/fs	Keli Balo, Melanie Johnson, Betsy Miller
Carroll Canyon	3/28/2003	mapping/fs	Betsy Miller, Holly Cheong, Keli Balo
Bowtie	4/1/2003	cover estimates plants	Keli Balo, Betsy Miller
Mission Trails	4/2/2003	mapping/fs	Keli Balo, Betsy Miller
Montgomery Field	4/2/2003	mapping/fs/cover estimates	Keli Balo, Betsy Miller
Clayton	4/3/2003	cover estimates plants/fs	Keli Balo, Betsy Miller
J 16-18	4/3/2003	cover estimates	Keli Balo, Betsy Miller
J13S	4/3/2003	cover estimates	Keli Balo, Betsy Miller
Greystone Torrey Highlands	4/4/2003	mapping/fs/cover estimates	Keli Balo, Betsy Miller
Mesa Norte	4/4/2003	mapping/fs/cover estimates	Keli Balo, Betsy Miller
Mira Mesa Marketcenter	4/4/2003	cover estimates	Keli Balo, Betsy Miller
Nobel Drive	4/4/2003	cover estimates	Keli Balo, Betsy Miller
Marron Valley	4/7/2003	mapping/fs	Holly Cheong, Keli Balo
Clayton	4/10/2003	cover estimates plants/fs	Keli Balo, Betsy Miller
Greystone Torrey Highlands	4/10/2003	mapping/fs/cover estimates	Keli Balo, Betsy Miller
St Jerome	4/10/2003	cover estimates	Keli Balo, Betsy Miller
Wahl Hudson	4/10/2003	mapping/fs	Keli Balo, Betsy Miller

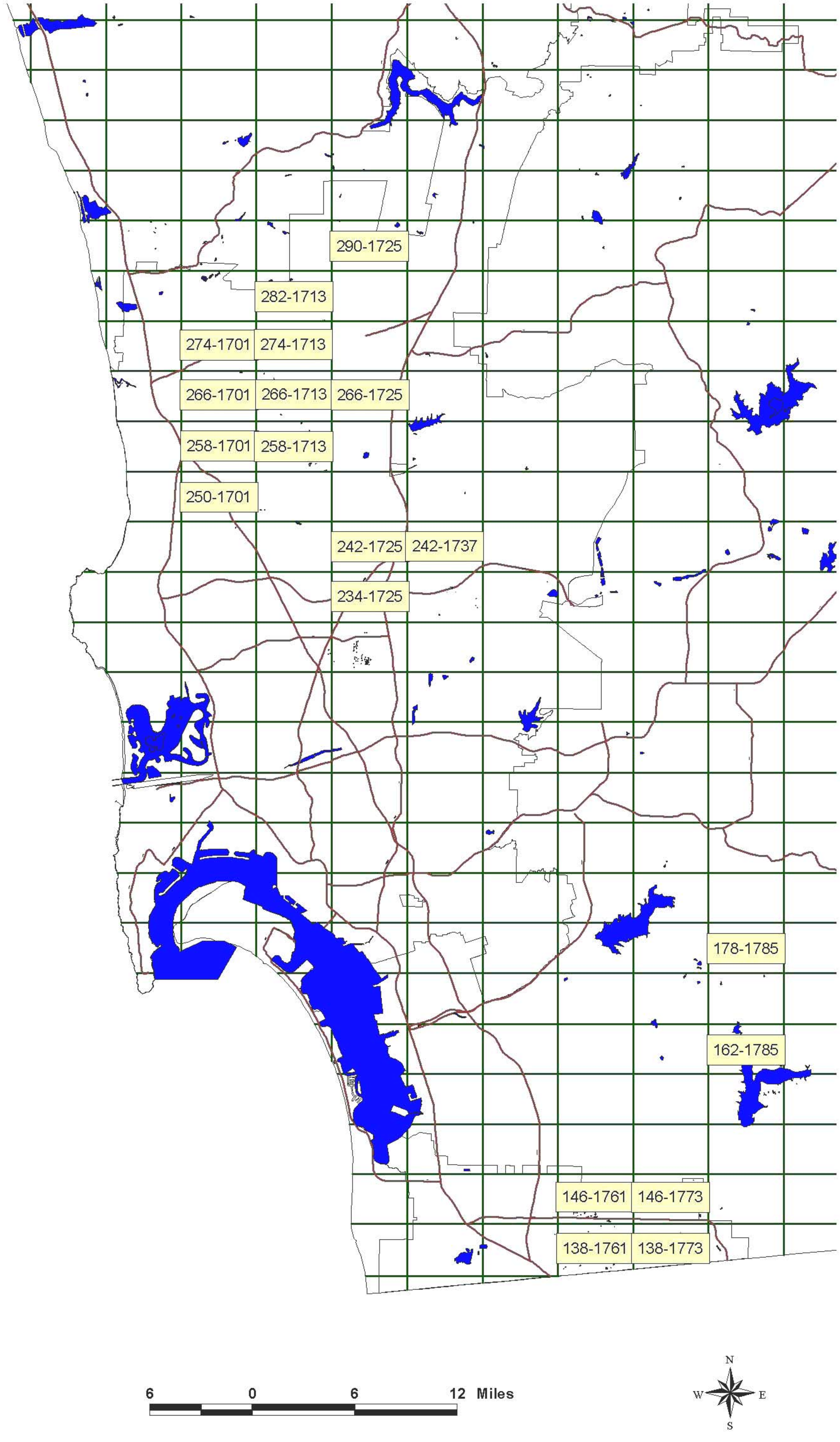
Site	Date	Work done	Staff
Bachman	4/11/2003	mapping/fs	Keli Balo, Betsy Miller
General Dynamics	4/11/2003	mapping/fs/cover estimates	Betsy Miller, Keith Greer, Keli Balo
J 16-18	4/11/2003	cover estimates	Keli Balo, Betsy Miller
J13N	4/14/2003	cover estimates	Keli Balo, Betsy Miller
Cubic	4/15/2003	cover estimates plants	Keli Balo
Sander	4/15/2003	mapping/fs/cover estimates	Keli Balo
Bob Baker	4/16/2003	cover estimates plants	Keli Balo, Betsy Miller
Lopez Ridge	4/16/2003	cover estimates	Keli Balo, Betsy Miller
Otay Mesa Recon Site	4/16/2003	mapping/fs/cover estimates	Robert MacAller
Otay Mesa Road Helix	4/16/2003	mapping/fs/cover estimates	Keli Balo, Betsy Miller
Recon Cal Terraces	4/16/2003	mapping/fs/cover estimates	Robert MacAller
Recon South	4/16/2003	mapping/fs/cover estimates	Robert MacAller
Bob Baker	4/18/2003	cover estimates plants	Keli Balo, Keith Greer
Winterwood	4/18/2003	mapping/fs/cover estimates	Keli Balo, Keith Greer
Arjons	4/23/2003	cover estimates plants	Melanie Johnson, Holly Cheong
Otay Lakes	4/24/2003	mapping/fs	Holly Cheong
Arnie's Point	4/25/2003	cover estimates plants	Melanie Johnson, Keith Greer
Carroll Canyon	4/28/2003	cover estimates plants	Betsy Miller, Holly Cheong, Randy Rodriguez
J29-30	4/30/2003	cover estimates	Holly Cheong, Melanie Johnson, Betsy Miller
Bowtie	5/19/2003	cover estimates plants	Keli Balo, Betsy Miller, Holly Cheong, Melanie Johnson
Otay Lakes	5/30/2003	cover estimates plants	Keli Balo
Del Mar Mesa	5/3/2004	mapping/cover estimates	Betsy Miller, Holly Cheong
Fieldstone	5/3/2004	cover estimates	Holly Cheong
Winterwood	5/3/2004	cover estimates	Holly Cheong
Del Mar Mesa	5/4/2004	mapping/cover estimates	Betsy Miller, Holly Cheong
Del Mar Mesa	5/6/2004	mapping/cover estimates	Betsy Miller, Holly Cheong
Arjons	5/6/2004	cover estimates	Melanie Johnson
Montgomery Field	5/6/2004	cover estimates	Melanie Johnson
General Dynamics	5/6/2004	cover estimates	Melanie Johnson
Del Mar Mesa	5/7/2004	mapping/cover estimates	Betsy Miller, Holly Cheong
J 27		mapping/fs/cover estimates	Keli Balo, Holly Cheong
J14		mapping/fs/cover estimates	Greg Mason
J21		mapping/fs	Keli Balo, Holly Cheong
J28		mapping/fs	Keli Balo, Holly Cheong
Rhodes		mapping/fs/cover estimates	Greg Mason
Robinhood Ridge		mapping/fs/cover estimates	Greg Mason

APPENDIX B
FAIRY SHRIMP PROTOCOL SURVEYS

PROTOCOL FAIRY SHRIMP SURVEYS CONDUCTED WITHIN CITY OF SAN DIEGO JURISDICTION

DATE	SITE	TYPE OF COLLECTION
9/17/2002	Winterwood	dry season
9/17/2002	Mira Mesa Marketcenter	dry season
9/20/2002	Otay Lakes	dry season
9/20/2002	J 16-18	dry season
9/20/2002	J 11E	dry season
9/20/2002	J 11W	dry season
9/20/2002	Otay Mesa Road Recon	dry season
9/23/2002	Mission Trails	dry season
9/25/2002	Montgomery Field	dry season
9/25/2002	Serra Mesa	dry season
9/25/2002	Sander	dry season
9/25/2002	General Dynamics	dry season
9/30/2002	Marron Valley	dry season
10/29/2002	Mira Mesa Marketcenter	dry season
12/12/2002	Del Mar Mesa	wet season
12/13/2002	Del Mar Mesa	wet season
12/29/2002	Mesa Norte	wet season
12/31/2003	Nobel Drive	wet season
12/31/2002	Maddox	wet season
1/3/2003	Carmel Mountain	wet season
2/21/2003	General Dynamics	wet season
2/24/2003	Lopez Ridge	wet season
2/27/2003	Sander	wet season

APPENDIX C
LAMBERT COORDINATE MAPS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282-1713
274-1701
274-1713
266-1701
266-1713
266-1725
258-1701
258-1713
250-1701
242-1725
242-1737
234-1725
178-1785
162-1785
146-1761
146-1773
138-1761
138-1773
6 0 6 12 Miles
N
W
E
S

J 33

J 32

J 34

J 14

J 13N

J 13S

J 13E

J 16-18

J 12

J 11E

J 11W

J 15

Vernal Pools
Bauder Complex

138-1761

0 800 Feet

	146-1761	
138-1749		138-1773


J 27
J 27
J 28W
J 28E
J 19
J 21
J 20
Vernal Pools
Bauder Complex
138-1773
0
800 Feet
146-1773
138-1761
138-1785

Roads
Vernal Pools
Bauder Complex

146-1761

0 800 Feet

	154-1761	
146-1749		146-1773
	138-1761	

J 5

M 4

J 31

J 4

J 2N

J 1

M 4

M 4

J 2S

J 2W

J 14

J 14

J 3

OTAY MESA RD

J29-30

J29-30

J30

J30

J29

J31N

J29

J31N

J29

J29

J31S

J31S

J31S

J35

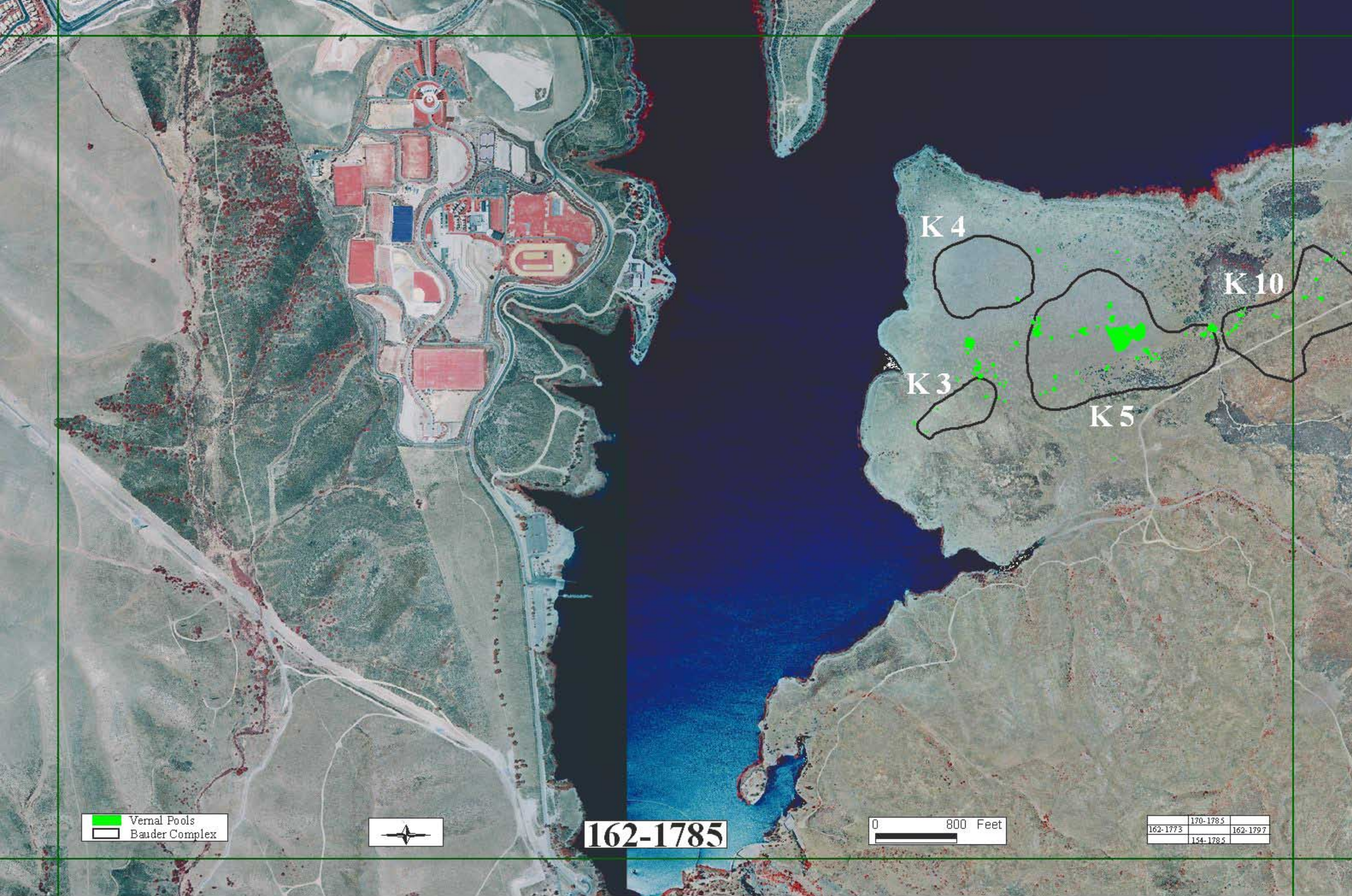
OTAY MESA

Roads
Vernal Pools
Bauder Complex

146-1773

0 800 Feet

	154-1773	
146-1761		146-1785
	138-1773	


K 4
K 10
K 3
K 5
Vernal Pools
Bauder Complex
162-1785
0 800 Feet
170-1785
162-1773
162-1797
154-1785

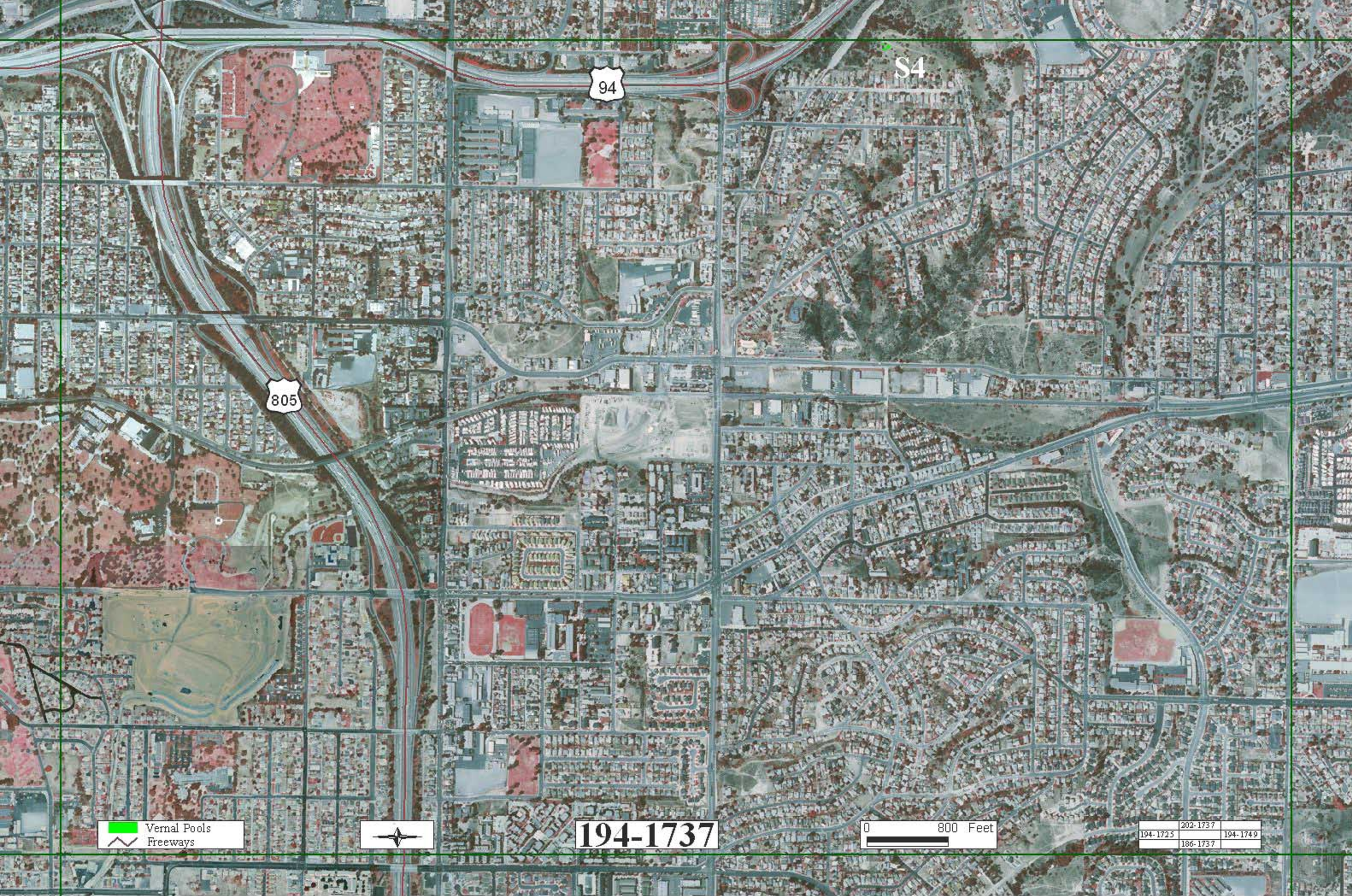
R1

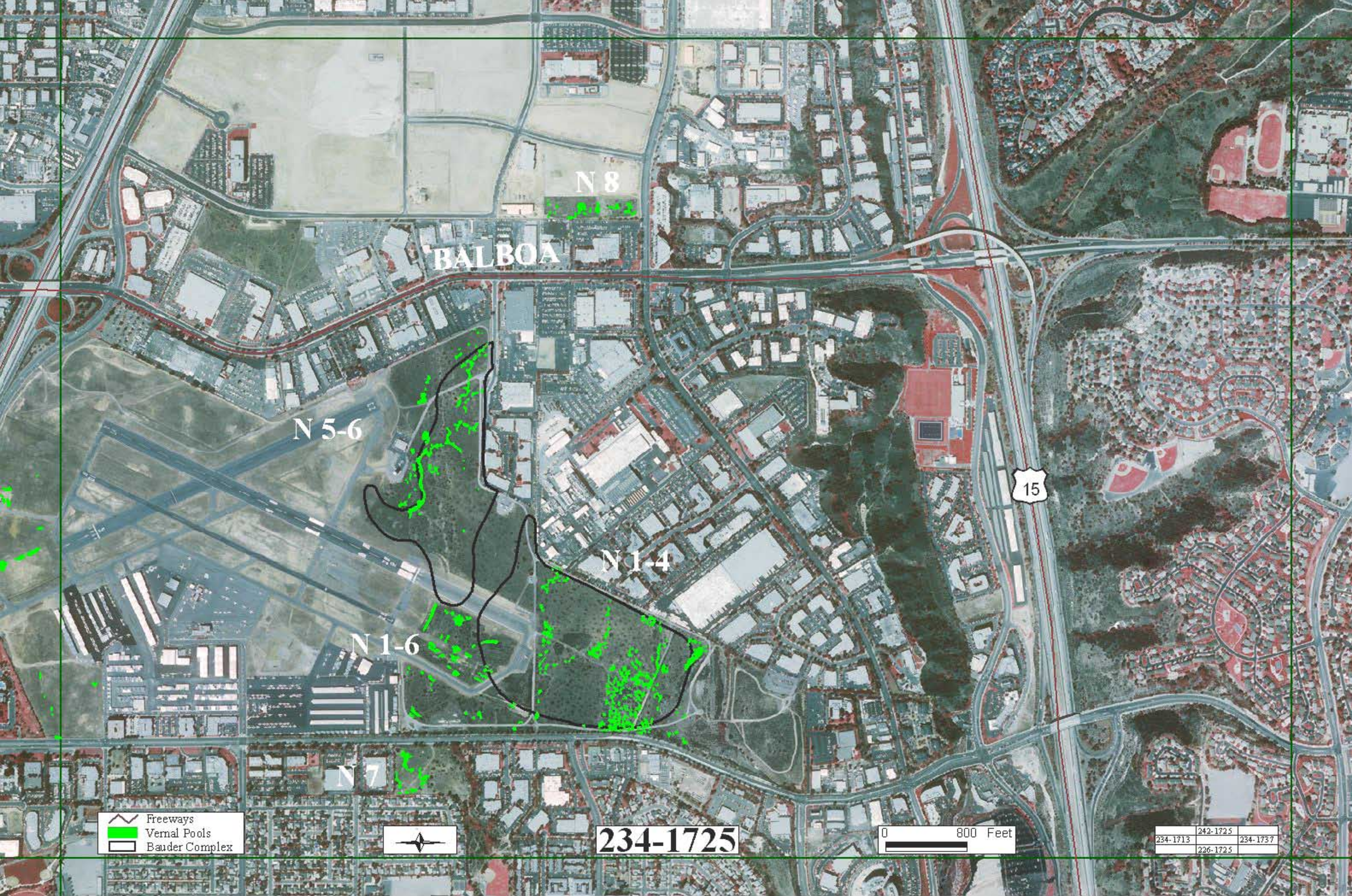
Roads
Vernal Pools
Bauder Complex

178-1785

0 800 Feet

170-1785


94
805
S4
Vernal Pools
Freeways
194-1737
0
800 Feet
202-1737
194-1725
194-1749
186-1737


N 8
BALBOA
N 5-6
N 1-4
N 1-6
N 7
15
Freeways
Vernal Pools
Bauder Complex
234-1725
0
800 Feet
242-1725
234-1713
234-1737
226-1725


F 1-27
MCAS Miramar
Not Accessible
AA 13
MCAS Miramar
Not Accessible
U 1-13
MCAS Miramar
Not Accessible
15
AA 4-7
MCAS Miramar
Not Accessible
52
MCAS Miramar
Not Accessible
F 16-17
AA 4-7
MCAS Miramar
Not Accessible
U 15
U 19
U 15
163
AA 4-7
MCAS Miramar
Not Accessible
Freeways
Vernal Pools
Bauder Complex
242-1725
0
800 Feet
250-1725
242-1713
242-1737
234-1725

AA 8
MCAS Miramar
Not Accessible

A 4
MCAS Miramar
Not Accessible

52

Q 2

Q 2

A 1

A 3

Q 2

Freeways
Vernal Pools
Bauder Complex

242-1737

0 800 Feet

	250-1737	
242-1725		242-1749
	234-1737	

X 6

X 7

X 5

NC

NC

805

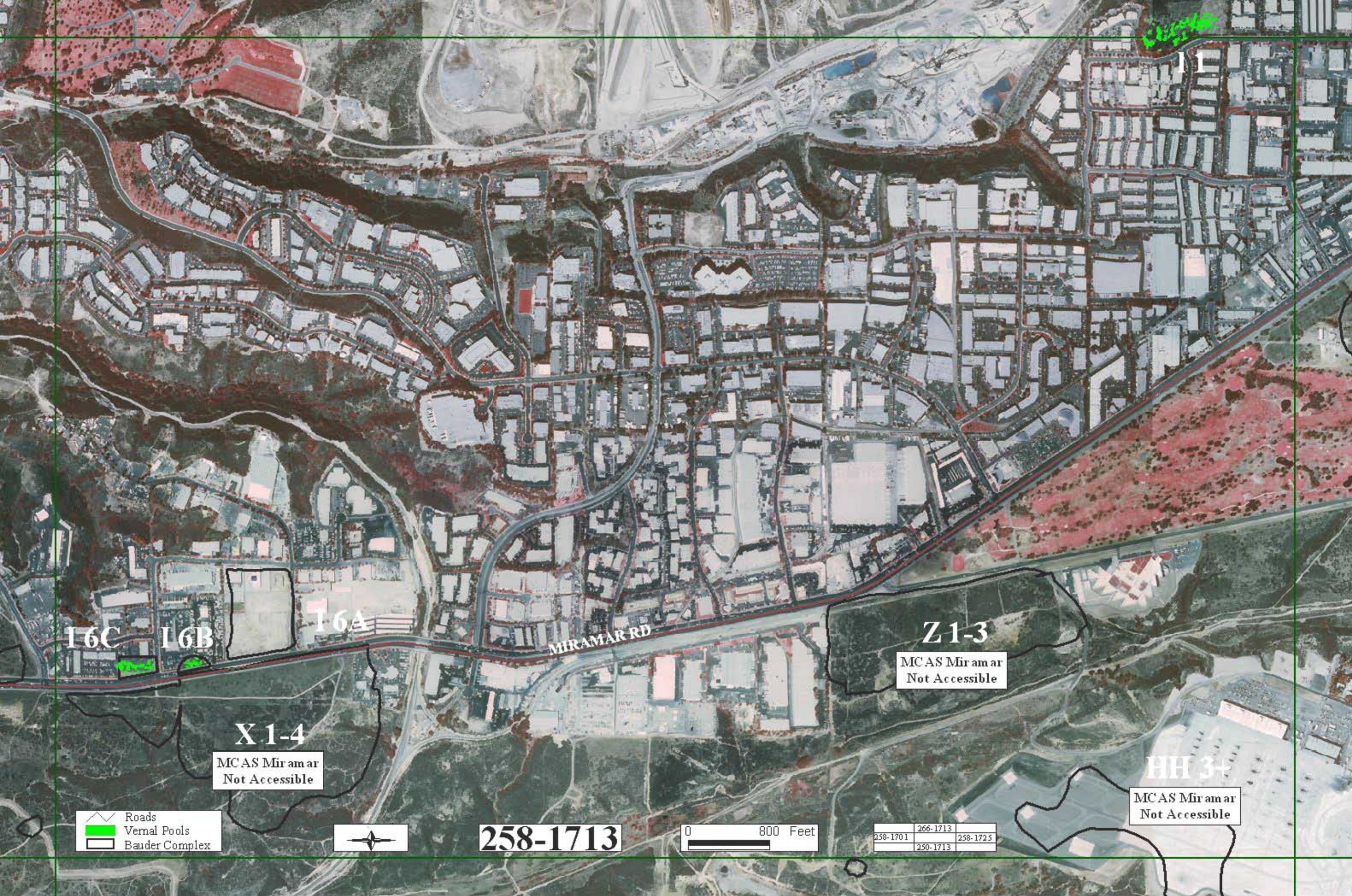
Freeways
Vernal Pools
Bauder Complex

250-1701

0 800 Feet

	258-1701	
250-1689		250-1713
	242-1701	


805
I 12
I 7
Navy
Not Accessible
Freeways
Vernal Pools
Bauder Complex
258-1701
0
800 Feet
266-1701
258-1689
258-1713
250-1701


I 1
I 6C
I 6B
I 6A
MIRAMAR RD
Z 1-3
MCAS Miramar
Not Accessible
X 1-4
MCAS Miramar
Not Accessible
HH 3+
MCAS Miramar
Not Accessible
Roads
Vernal Pools
Bauder Complex
258-1713
0 800 Feet
266-1713
258-1701
258-1725
250-1713


H 31-32
5
805
Freeways
Vernal Pools
Bauder Complex
266-1701
0 800 Feet
274-1701
266-1689
266-1713
258-1701


C 17-18
C10-16
C 28
C 24
D 1
D 5-8
Vernal Pools
Bauder Complex
266-1713
0 800 Feet
274-1713
266-1701
266-1725
258-1713

C27

15

Freeways
Vernal Pools
Bauder Complex

266-1725

0 800 Feet

	274-1725	
266-1713		266-1737
	258-1725	


H 38
H 38
H 17
H 33
Vernal Pools
Bauder Complex
274-1701
0
800 Feet
282-1701
274-1689
274-1713
266-1701


H 17
H 17
B 13
B 13
B 11
B 5-6
B 7-8
Vernal Pools
Bauder Complex
274-1713
0
800 Feet
282-1713
274-1701
274-1725
266-1713

H 39

H

H

H 1-15

Vernal Pools
Bauder Complex

282-1713

0 800 Feet

	290-1713	
282-1701		282-1725
	274-1713	

H40

Vernal Pools
Bauder Complex

290-1725

0 800 Feet

	298-1725	
290-1713		290-1737
	282-1725	

MM1

Vernal Pools
Bauder Complex

Marron Valley

0 800 Feet

APPENDIX D
VERNAL POOL INDICATORS BY SITE

Appendix D

Vernal Pool Indicators

	Bauder Complex		VP INDICATORS	*Callitriche marginata*	*Crassula aquatica*	*Deschampsia danthoniodes*	*Downingia cuspidata*	*Elatine californica*	*Epilobium pygmaeum*	***Eryngium aristulatum***	*Isoetes howellii*	*Isoetes orcuttii*	*Isoetes* spp.	*Lilaea scilloides*	*Marsilea vestita*	*Malvella leprosa*	*Myosurus minimus*	***Navarretia fossalis***	***Orcuttii californica***	*Phalaris lemmmonii*	*Phalaris* spp.	*Pilularia americana*	*Pilularia* spp.	*Plagiobothrys acanthocarpus*	*Plantago elongata*	*Plantago* spp.	***Pogogyne abramsii***	***Pogogyne nudiuscula***	*Psilocarphus brevissimus*	*Branchinecta* spp.	***B. sandiegonensis***	*B. lindahli*	***S. woottoni***
Del Mar Mesa																																
	H 1-15	Del Mar Mesa		•	•	•	•	•		•	•	•		•								•			•		•		•	•	•		
	H 17	Shaw Texas		•	•																				•					•			
	H 18-23	Rhodes		•	•	•		•		•		•		•								•		•	•		•		•	•			
	H 39	Greystone Torrey Highlands		•	•			•		•	•	•										•		•			•		•				
	H 40	Li Collins																												•				
Carmel Mountain																																
	H 38	Carmel Mountain		•	•						•			•											•				•	•	•		
Mira Mesa																																
	B 5-8	Lopez Ridge		•	•	•	•			•	•	•		•								•		•	•		•		•		•		
	B 5-8	Crescent Heights		•	•	•					•	•		•								•		•	•				•				
	B 11	Mesa Norte		•	•	•	•	•		•				•							•		•		•	•		•		•		•	
	C 10-16	Winterwood		•	•	•	•			•			•	•							•		•		•	•		•		•		•	
	C 17-18	Fieldstone		•	•	•	•				•												•		•	•		•		•			
	C 27	Mira Mesa Market Center			•		•	•			•												•					•		•		•		
	C 28	Maddox		•	•	•							•	•												•		•		•	•	•		
	D 5-8	Parkdale Carroll Canyon																												•				
	D 5-8	Carroll Canyon Preserve		•	•	•	•			•	•	•	•	•				•				•	•		•		•		•	•			
	I 1	Arjons		•	•	•	•	•		•	•	•		•							•		•		•	•		•		•	•	•	
Nobel Drive																																

Appendix D

Vernal Pool Indicators

	Bauder Complex		VP INDICATORS	*Callitriche marginata*	*Crassula aquatica*	*Deschampsia danthoniodes*	*Downingia cuspidata*	*Elatine californica*	*Epilobium pygmaeum*	***Eryngium aristulatum***	*Isoetes howellii*	*Isoetes orcuttii*	*Isoetes* spp.	*Lilaea scilloides*	*Marsilea vestita*	*Malvella leprosa*	*Myosurus minimus*	***Navarretia fossalis***	***Orcuttii californica***	*Phalaris lemmmonii*	*Phalaris* spp.	*Pilularia americana*	*Pilularia* spp.	*Plagiobothrys acanthocarpus*	*Plantago elongata*	*Plantago* spp.	***Pogogyne abramsii***	***Pogogyne nudiuscula***	*Psilocarphus brevissimus*	*Branchinecta* spp.	***B. sandiegonensis***	*B. lindahli*	***S. woottoni***
	I 6	Bob Baker/ Bob Baker 2		•	•	•	•			•		•		•							•	•		•	•		•		•	•			
	I 12	Pueblo Lands		•	•	•																			•				•		•		
	X 5	Nobel Drive		•	•	•	•							•				•		•		•		•	•				•		•		
	X 7	Nobel Research Park		•	•	•	•							•								•		•	•				•		•		
Kearny Mesa																																	
	N 1-6	Montgomery Field		•	•	•	•	•			•	•		•						•		•	•	•	•		•		•	•	•		
	N 7	Serra Mesa Library			•																			•	•				•				
	N 8	General Dynamics		•	•	•	•	•		•	•	•		•						•		•		•	•		•		•		•		
	U 15	Magnatron		•	•	•	•	•		•				•															•				
	U 15	Sander		•	•	•	•					•										•			•		•		•		•		
	U 19	Cubic		•	•	•	•	•		•				•															•	•			
Mission Trails Regional Park																																	
	Q 2	Mission Trails Regional Park		•	•									•										•	•				•		•		
Urban San Diego																																	
	S 4	Kelton		•	•							•												•	•				•				
Otay Lakes																																	
	13	Otay Lakes		•	•	•				•											•			•					•	•			
	R 1	Proctor Valley		•	•	•					•											•							•	•			
Otay Mesa																																	

Appendix D

Vernal Pool Indicators

Bauder Complex		VP INDICATORS	*Callitriche marginata*	*Crassula aquatica*	*Deschampsia danthoniodes*	*Downingia cuspidata*	*Elatine californica*	*Epilobium pygmaeum*	***Eryngium aristulatum***	*Isoetes howellii*	*Isoetes orcuttii*	*Isoetes* spp.	*Lilaea scilloides*	*Marsilea vestita*	*Malvella leprosa*	*Myosurus minimus*	***Navarretia fossalis***	***Orcuttii californica***	*Phalaris lemmmonii*	*Phalaris* spp.	*Pilularia americana*	*Pilularia* spp.	*Plagiobothrys acanthocarpus*	*Plantago elongata*	*Plantago* spp.	***Pogogyne abramsii***	***Pogogyne nudiuscula***	*Psilocarphus brevissimus*	*Branchinecta* spp.	***B. sandiegonensis***	*B. lindahli*	***S. woottoni***
J 2 S	Otay Mesa Road Helix		•	•	•		•	•	•				•			•		•			•						•	•		•		•
J 2 S	Otay Mesa Road Recon		•	•	•		•	•	•								•	•			•						•	•		•		•
J 2 W	J 2 W		•	•					•				•								•		•					•	•	•		•
J 2 S/W	Otay Mesa Road Pardee		•	•									•															•	•	•		
J 2 W/N/S	Recon Cal Terraces		•	•	•			•	•				•	•			•	•					•				•	•	•	•	•	•
J W 2; J 31	Hidden Trails																						•	•				•	•			
J 3	J 3																											•		•		•
J 4	J 4																											•	•			
J 4-5	Robinhood Ridge		•	•	•		•	•	•				•			•	•	•			•	•		•			•	•		•		•
J 11 E	J 11 E			•											•	•			•				•	•				•				
J 11 W	J 11 W		•	•	•								•	•					•				•	•				•	•	•		
J 12	J 12			•									•						•				•	•				•				
J 13 E	J 13 E																						•					•				
J 13 N	J 13 N							•	•									•	•				•	•				•		•		
J 13 S	J 13 S			•			•	•	•				•		•		•	•	•		•			•				•	•			
J 14	J 14			•	•			•					•			•	•		•								•	•		•		•
J 14	905																							•					•		•		
J 14	Recon South		•	•	•			•	•				•	•			•	•					•				•	•		•	•	•
J 15	Arnie's Point			•					•																			•				

Appendix D

Vernal Pool Indicators

	Bauder Complex		VP INDICATORS	*Callitriche marginata*	*Crassula aquatica*	*Deschampsia danthoniodes*	*Downingia cuspidata*	*Elatine californica*	*Epilobium pygmaeum*	***Eryngium aristulatum***	*Isoetes howellii*	*Isoetes orcuttii*	*Isoetes* spp.	*Lilaea scilloides*	*Marsilea vestita*	*Malvella leprosa*	*Myosurus minimus*	***Navarretia fossalis***	***Orcuttii californica***	*Phalaris lemmmonii*	*Phalaris* spp.	*Pilularia americana*	*Pilularia* spp.	*Plagiobothrys acanthocarpus*	*Plantago elongata*	*Plantago* spp.	***Pogogyne abramsii***	***Pogogyne nudiuscula***	*Psilocarphus brevissimus*	*Branchinecta* spp.	***B. sandiegonensis***	*B. lindahli*	***S. woottoni***
	J 16-18	J 16-18/ Wruck Canyon			•			•	•	•										•				•					•				
	J 21	J 21		•	•					•									•							•							
	J 27	J 27			•					•						•				•					•	•				•				
	J 28 E	J 28 E																									•						
	J 29-30	J 29-30		•	•					•				•											•					•	•			
	J 31	J 31			•					•						•									•					•				
	J 32	West Otay A + B		•	•	•		•									•	•				•			•	•			•	•	•	•		•
	J 33	Sweetwater High School		•	•	•		•		•				•			•	•		•		•			•	•			•	•		•		•
	J 34	J 34		•										•											•					•				
	J 35	Brown Field																												•				
Marron Valley																																		
	MM 1	Marron Valley		•	•	•					•													•	•					•	•			

APPENDIX E
FACULTATIVE WETLAND SPECIES BY SITE

Appendix E

Facultative Wetland Species

	Bauder Complex		WETLAND SPECIES	*Agrostis avenacea*	*Agrostis microphylla*	*Agrostis tandilensis*	*Ambrosia psilostachya*	*Anagallis arvensis*	*Arundo donax*	*Atriplex semibaccata*	*Baccharis salicifolia*	*Briza* spp.	*Brodiaea jolonensis*	*Brodiaea orcuttii*	*Brodiaea* spp.	*Calandrinia ciliata*	*Calandrinia maritima*	*Calandrinia* spp.	*Camissonia* spp.	*Centunculus minimus*	*Centunculus* spp.	*Chenopodium ambrosioides*	*Claytonia perfoliata*	*Cotula australis*	*Cotula coronopifolia*	*Crassula erecta --> Cyperus erythrohizos*	*Cressa truxillensis*	*Cyperus* spp.	*Distichlis spicata*	*Eleocharis acicularis*	*Eleocharis macrostachya*
Del Mar Mesa																															
	H 1-15	Del Mar Mesa												•							•	•			•	•	•					•
	H 17	Shaw Texas																							•						
	H 39	Greystone Torrey Highlands											•												•						•
	H 40	Li Collins																													
Carmel Mountain																															
	H 38	Carmel Mountain													•										•	•			•		•
Mira Mesa																															
	B 5-8	Lopez Ridge		•	•	•								•										•	•						•
	B 5-8	Crescent Heights		•	•	•								•										•	•						•
	B 5-8	Tierra Alta																								•					
	B 11	Mesa Norte		•				•						•											•			•			•
	C 10-16	Winterwood						•						•										•	•						•
	C 17-18	Fieldstone												•																	
	C 27	Mira Mesa Market Center												•											•						•
	C 28	Maddox		•																					•						
	D 5-8	Carroll Canyon							•					•	•						•										•
	D 5-8	Parkdale Carroll Canyon							•					•	•						•										•
	I 1	Arjons												•						•											•
Nobel Drive																															

Appendix E

Facultative Wetland Species

	Bauder Complex		WETLAND SPECIES	*Agrostis avenacea*	*Agrostis microphylla*	*Agrostis tandilensis*	*Ambrosia psilostachya*	*Anagallis arvensis*	*Arundo donax*	*Atriplex semibaccata*	*Baccharis salicifolia*	*Briza* spp.	*Brodiaea jolonensis*	*Brodiaea orcuttii*	*Brodiaea* spp.	*Calandrinia ciliata*	*Calandrinia maritima*	*Calandrinia* spp.	*Camissonia* spp.	*Centunculus minimus*	*Centunculus* spp.	*Chenopodium ambrosioides*	*Claytonia perfoliata*	*Cotula australis*	*Cotula coronopifolia*	*Crassula erecta --> Cyperus erythrohizos*	*Cressa truxillensis*	*Cyperus* spp.	*Distichlis spicata*	*Eleocharis acicularis*	*Eleocharis macrostachya*
	I 6	Bob Baker/ Bob Baker 2																							•						•
	I 12	Pueblo Lands																			•										•
	X 5	Nobel Drive												•							•				•						•
	X 7	Nobel Research Park																													•
Kearny Mesa																															
	N 1-6	Montgomery Field						•									•														•
	N 7	Serra Mesa Library																													
	N 8	General Dynamics		•										•						•											•
	U 15	Magnatron																													•
	U 15	Sander												•							•										•
	U 19	Cubic												•																	•
Mission Trails Regional Park																															
	Q 2	Mission Trails Regional Park					•																									•
Urban San Diego																															
	S 4	Kelton						•													•										
Otay Lakes																															
	K 3, 5, 10, 13	Otay Lakes						•					•		•			•								•		•				•

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Facultative Wetland Species

	Bauder Complex		WETLAND SPECIES	*Agrostis avenacea*	*Agrostis microphylla*	*Agrostis tandilensis*	*Ambrosia psilostachya*	*Anagallis arvensis*	*Arundo donax*	*Atriplex semibaccata*	*Baccharis salicifolia*	*Briza* spp.	*Brodiaea jolonensis*	*Brodiaea orcuttii*	*Brodiaea* spp.	*Calandrinia ciliata*	*Calandrinia maritima*	*Calandrinia* spp.	*Camissonia* spp.	*Centunculus minimus*	*Centunculus* spp.	*Chenopodium ambrosioides*	*Claytonia perfoliata*	*Cotula australis*	*Cotula coronopifolia*	*Crassula erecta --> Cyperus erythrohizos*	*Cressa truxillensis*	*Cyperus* spp.	*Distichlis spicata*	*Eleocharis acicularis*	*Eleocharis macrostachya*
	R 1	Proctor Valley						•					•	•																	•
Otay Mesa																															
	J 2 S	Otay Mesa Road Helix						•																				•			•
	J 2 W	J 2 W																													•
	J 2 W/N/S	Recon Cal Terraces																		•											•
	J W 2; J 31	Hidden Trails																													•
	J 3	J 3						•																							
	J 4	J 4																													
	J 4-5	Robinhood Ridge						•		•																					•
	J 11 E	J 11 E									•					•										•					
	J 11 W	J 11 W									•											•		•	•						•
	J 12	J 12					•																	•	•	•					•
	J 13 E	J 13 E																						•							
	J 13 N	J 13 N																													•
	J 13 S	J 13 S											•																		•
	J 14	J 14																													•
	J 14	905						•																							
	J 14	Recon South																		•											•
	J 15	Arnie's Point																													•
	J 16-18	J 16-18		•				•																						•	•

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Facultative Wetland Species

	Bauder Complex		WETLAND SPECIES	*Agrostis avenacea*	*Agrostis microphylla*	*Agrostis tandilensis*	*Ambrosia psilostachya*	*Anagallis arvensis*	*Arundo donax*	*Atriplex semibaccata*	*Baccharis salicifolia*	*Briza* spp.	*Brodiaea jolonensis*	*Brodiaea orcuttii*	*Brodiaea* spp.	*Calandrinia ciliata*	*Calandrinia maritima*	*Calandrinia* spp.	*Camissonia* spp.	*Centunculus minimus*	*Centunculus* spp.	*Chenopodium ambrosioides*	*Claytonia perfoliata*	*Cotula australis*	*Cotula coronopifolia*	*Crassula erecta --> Cyperus erythrohizos*	*Cressa truxillensis*	*Cyperus* spp.	*Distichlis spicata*	*Eleocharis acicularis*	*Eleocharis macrostachya*
	J 21	J 21						•								•								•	•					•
	J 27	J 27								•	•																	•	•	•
	J 28 E	J 28 E								•																		•		•
	J 29-30	J 29-30								•						•											•				•
	J 31	J 31																•									•				•
	J 32	West Otay A + B		•				•																							•
	J 33	Sweetwater High School		•				•																							•
	J 34	J 34																													•
Marron Valley																															
	MM 1										•		•						•						•				•		•

Appendix E

Facultative Wetland Species

	Bauder Complex		WETLAND SPECIES	*Eleocharis* spp.	*Foeniculum vulgare*	*Galium aparine*	*Gastridium ventricosum*	*Grindelia camporum*	*Helianthemum scoparium*	*Heliotropium curassavicum*	*Juncus bufonius*	*Juncus dubius*	*Juncus mexicanus*	*Leptochloa uninervia*	*Lolium multiflorium*	*Lythrum hyssopifolium*	*Marrubium vulgare*	*Melilotus indica*	*Muhlenbergia rigens*	*Nicotiana glauca*	*Ophioglossum californicum*	*Phalaris minor*	*Picris echioides*	*Pityrogramma triangularis* --> *Rubus parviflorus*	*Polypogon monspeliensis*	*Psilocarphus tenellus*	*Rumex crispus*	*Rumex pulcher*	*Salix gooddingii*	*Sambucus mexicana*	*Scirpus* spp.
Del Mar Mesa																														
	H 1-15	Del Mar Mesa									•				•	•					•				•	•	•			•	
	H 17	Shaw Texas									•		•			•									•	•	•				
	H 39	Greystone Torrey Highlands									•				•	•									•		•				
	H 40	Li Collins									•				•	•											•				
Carmel Mountain																														
	H 38	Carmel Mountain							•		•					•								•						•	
Mira Mesa																														
	B 5-8	Lopez Ridge					•				•					•					•				•	•				•	
	B 5-8	Crescent Heights					•				•					•					•				•	•				•	
	B 5-8	Tierra Alta					•						•													•					
	B 11	Mesa Norte					•				•				•	•									•		•				
	C 10-16	Winterwood									•					•										•	•				
	C 17-18	Fieldstone							•		•					•									•		•				
	C 27	Mira Mesa Market Center									•														•						
	C 28	Maddox									•				•	•											•			•	
	D 5-8	Carroll Canyon									•	•				•							•		•		•			•	
	D 5-8	Parkdale Carroll Canyon									•	•				•							•		•		•			•	
	I 1	Arjons									•					•									•						
Nobel Drive																														

Appendix E

Facultative Wetland Species

	Bauder Complex		WETLAND SPECIES	*Eleocharis* spp.	*Foeniculum vulgare*	*Galium aparine*	*Gastridium ventricosum*	*Grindelia camporum*	*Helianthemum scoparium*	*Heliotropium curassavicum*	*Juncus bufonius*	*Juncus dubius*	*Juncus mexicanus*	*Leptochloa uninervia*	*Lolium multiflorium*	*Lythrum hyssopifolium*	*Marrubium vulgare*	*Melilotus indica*	*Muhlenbergia rigens*	*Nicotiana glauca*	*Ophioglossum californicum*	*Phalaris minor*	*Picris echioides*	*Pityrogramma triangularis* --> *Rubus parviflorus*	*Polypogon monspeliensis*	*Psilocarphus tenellus*	*Rumex crispus*	*Rumex pulcher*	*Salix gooddingii*	*Sambucus mexicana*	*Scirpus* spp.
	I 6	Bob Baker/ Bob Baker 2									•					•								•	•						
	I 12	Pueblo Lands									•				•	•									•		•				
	X 5	Nobel Drive					•				•					•									•	•					
	X 7	Nobel Research Park					•				•				•										•	•					
Kearny Mesa																														
	N 1-6	Montgomery Field									•					•									•	•	•				
	N 7	Serra Mesa Library									•					•											•				
	N 8	General Dynamics									•					•				•					•		•				
	U 15	Magnatron										•				•									•						
	U 15	Sander									•					•									•						
	U 19	Cubic										•				•									•						
Mission Trails Regional Park																														
	Q 2	Mission Trails Regional Park			•						•					•									•		•				
Urban San Diego																														
	S 4	Kelton							•		•					•	•						•			•					
Otay Lakes																														
	K 3, 5, 10, 13	Otay Lakes									•					•										•					

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Facultative Wetland Species

	Bauder Complex		WETLAND SPECIES	*Eleocharis* spp.	*Foeniculum vulgare*	*Galium aparine*	*Gastridium ventricosum*	*Grindelia camporum*	*Helianthemum scoparium*	*Heliotropium curassavicum*	*Juncus bufonius*	*Juncus dubius*	*Juncus mexicanus*	*Leptochloa uninervia*	*Lolium multiflorium*	*Lythrum hyssopifolium*	*Marrubium vulgare*	*Melilotus indica*	*Muhlenbergia rigens*	*Nicotiana glauca*	*Ophioglossum californicum*	*Phalaris minor*	*Picris echioides*	*Pityrogramma triangularis* --> *Rubus parviflorus*	*Polypogon monspeliensis*	*Psilocarphus tenellus*	*Rumex crispus*	*Rumex pulcher*	*Salix gooddingii*	*Sambucus mexicana*	*Scirpus* spp.
	R 1	Proctor Valley					•				•				•	•									•		•			
Otay Mesa																														
	J 2 S	Otay Mesa Road Helix									•				•	•						•			•						
	J 2 W	J 2 W									•				•	•											•				
	J 2 W/N/S	Recon Cal Terraces									•					•															
	J W 2; J 31	Hidden Trails									•																				
	J 3	J 3														•									•						
	J 4	J 4									•					•									•	•					
	J 4-5	Robinhood Ridge					•				•				•	•						•			•						
	J 11 E	J 11 E								•	•		•		•	•	•			•							•		•		
	J 11 W	J 11 W								•	•				•				•								•		•		
	J 12	J 12				•					•				•		•								•		•				
	J 13 E	J 13 E									•				•												•				
	J 13 N	J 13 N													•	•															
	J 13 S	J 13 S													•	•									•		•	•			
	J 14	J 14									•				•							•			•		•				
	J 14	905														•															
	J 14	Recon South									•					•															
	J 15	Arnie's Point									•					•															
	J 16-18	J 16-18													•	•									•						

Appendix E

Facultative Wetland Species

	Bauder Complex		**WETLAND SPECIES**	*Eleocharis* spp.	*Foeniculum vulgare*	*Galium aparine*	*Gastridium ventricosum*	*Grindelia camporum*	*Helianthemum scoparium*	*Heliotropium curassavicum*	*Juncus bufonius*	*Juncus dubius*	*Juncus mexicanus*	*Leptochloa uninervia*	*Lolium multiflorium*	*Lythrum hyssopifolium*	*Marrubium vulgare*	*Melilotus indica*	*Muhlenbergia rigens*	*Nicotiana glauca*	*Ophioglossum californicum*	*Phalaris minor*	*Picris echioides*	*Pityrogramma triangularis --> Rubus parviflorus*	*Polypogon monspeliensis*	*Psilocarphus tenellus*	*Rumex crispus*	*Rumex pulcher*	*Salix gooddingii*	*Sambucus mexicana*	*Scirpus* spp.
	J 21	J 21		•						•	•					•									•		•				
	J 27	J 27			•						•			•	•	•							•		•		•				•
	J 28 E	J 28 E													•										•		•				
	J 29-30	J 29-30						•			•				•												•				
	J 31	J 31													•																
	J 32	West Otay A + B									•					•									•						
	J 33	Sweetwater High School					•				•				•	•									•						
	J 34	J 34														•											•				
Marron Valley																															
	MM 1							•			•				•	•		•										•				

Appendix E

Facultative Wetland Species

	Bauder Complex		**WETLAND SPECIES**	*Sisyrinchium bellum*	*Solanum* spp.	*Tamarix* spp.	*Trifolium* spp.	*Typha* spp.	*Veronica peregrina*
Del Mar Mesa									
	H 1-15	Del Mar Mesa		•	•		•		
	H 17	Shaw Texas							
	H 39	Greystone Torrey Highlands						•	
	H 40	Li Collins						•	
Carmel Mountain									
	H 38	Carmel Mountain							
Mira Mesa									
	B 5-8	Lopez Ridge							
	B 5-8	Crescent Heights							
	B 5-8	Tierra Alta							
	B 11	Mesa Norte							
	C 10-16	Winterwood							
	C 17-18	Fieldstone							
	C 27	Mira Mesa Market Center							
	C 28	Maddox							
	D 5-8	Carroll Canyon		•					•
	D 5-8	Parkdale Carroll Canyon		•					•
	I 1	Arjons							
Nobel Drive									

Appendix E

Facultative Wetland Species

	Bauder Complex		**WETLAND SPECIES**	*Sisyrinchium bellum*	*Solanum* spp.	*Tamarix* spp.	*Trifolium* spp.	*Typha* spp.	*Veronica peregrina*
	I 6	Bob Baker/ Bob Baker 2							
	I 12	Pueblo Lands							
	X 5	Nobel Drive							
	X 7	Nobel Research Park							
Kearny Mesa									
	N 1-6	Montgomery Field							
	N 7	Serra Mesa Library							
	N 8	General Dynamics					•		
	U 15	Magnatron							
	U 15	Sander							
	U 19	Cubic							
Mission Trails Regional Park									
	Q 2	Mission Trails Regional Park							
Urban San Diego									
	S 4	Kelton		•					
Otay Lakes									
	K 3, 5, 10, 13	Otay Lakes			•		•		

Appendix E

Facultative Wetland Species

	Bauder Complex		**WETLAND SPECIES**	*Sisyrinchium bellum*	*Solanum* spp.	*Tamarix* spp.	*Trifolium* spp.	*Typha* spp.	*Veronica peregrina*
	R 1	Proctor Valley							•
Otay Mesa									
	J 2 S	Otay Mesa Road Helix							
	J 2 W	J 2 W							
	J 2 W/N/S	Recon Cal Terraces							
	J W 2; J 31	Hidden Trails							
	J 3	J 3							
	J 4	J 4							
	J 4-5	Robinhood Ridge							
	J 11 E	J 11 E				•			
	J 11 W	J 11 W				•			
	J 12	J 12							
	J 13 E	J 13 E							
	J 13 N	J 13 N							
	J 13 S	J 13 S							
	J 14	J 14							
	J 14	905							
	J 14	Recon South							
	J 15	Arnie's Point							
	J 16-18	J 16-18							

Appendix E

Facultative Wetland Species

	Bauder Complex		**WETLAND SPECIES**	*Sisyrinchium bellum*	*Solanum* spp.	*Tamarix* spp.	*Trifolium* spp.	*Typha* spp.	*Veronica peregrina*
	J 21	J 21							
	J 27	J 27					•		
	J 28 E	J 28 E					•		
	J 29-30	J 29-30							
	J 31	J 31							
	J 32	West Otay A + B							
	J 33	Sweetwater High School							
	J 34	J 34							
Marron Valley									
	MM 1								

APPENDIX F
UPLAND SPECIES BY SITE

Appendix F
Upland Species

Bauder Complex		UPLAND SPECIES	*Acacia* spp.	*Adenostoma fasciculatum*	*Adolphia californica*	*Allium praecox*	*Allium* spp.	*Ambrosia chenopodifolia*	*Amsinckia menziesii* var. *intermedia*	*Antirrhinum nuttallianum*	*Apiastrum angustifolium*	*Artemisia californica*	*Astragalus trichopodus*	*Avena barbata*	*Avena fatua*	*Baccharis pilularis*	*Baccharis sarothroides*	*Bloomeria crocea*	*Brassica nigra*	*Brassica* spp.	*Bromus diandrus*	*Bromus hordeaceus*	*Bromus madritensis* ssp. *rubens*	*Bromus mollis*	*Bromus* spp.	*Calochortus splendens*	*Calystegia macrostegia*	*Castilleja exserta*	*Ceanothus tomentosus*	*Centaurea melitensis*	*Centaurium venustum*	*Cerastium glomeratum*	*Chaenactis* spp.	*Chamaesyce* spp.
Del Mar Mesa																																		
	H 1-15	Del Mar Mesa		•					•			•		•	•				•		•		•		•			•		•				
	H 17	Shaw Texas																				•												
	H 18-23	Rhodes		•	•				•						•								•		•			•		•				
	H 39	Greystone Torrey Highlands																																
	H 40	Li Collins																																
Carmel Mountain																																		
	H 38	Carmel Mountain		•					•			•											•							•				
Mira Mesa																																		
	B 5-8	Lopez Ridge		•			•					•			•							•	•				•	•		•				
	B 5-8	Crescent Heights		•			•					•			•							•	•				•	•		•				
	B 5-8	Tierra Alta		•		•				•				•	•								•	•					•	•		•		
	B 11	Mesa Norte												•	•						•	•	•	•	•					•	•			
	C 10-16	Winterwood		•								•							•															
	C 17-18	Fieldstone		•								•			•								•		•				•	•				
	C 27	Mira Mesa Market Center																																
	C 28	Maddox													•		•					•	•		•		•						
	D 5-8	Carroll Canyon		•			•				•						•		•								•	•		•	•			•
	D 5-8	Parkdale Carroll Canyon		•			•				•						•		•								•	•		•	•			•
	I 1	Arjons		•																														

Appendix F

Upland Species

	Bauder Complex		UPLAND SPECIES	*Acacia* spp.	*Adenostoma fasciculatum*	*Adolphia californica*	*Allium praecox*	*Allium* spp.	*Ambrosia chenopodifolia*	*Amsinckia menziesii* var. *intermedia*	*Antirrhinum nuttallianum*	*Apiastrum angustifolium*	*Artemisia californica*	*Astragalus trichopodus*	*Avena barbata*	*Avena fatua*	*Baccharis pilularis*	*Baccharis sarothroides*	*Bloomeria crocea*	*Brassica nigra*	*Brassica* spp.	*Bromus diandrus*	*Bromus hordeaceus*	*Bromus madritensis* ssp. *rubens*	*Bromus mollis*	*Bromus* spp.	*Calochortus splendens*	*Calystegia macrostegia*	*Castilleja exserta*	*Ceanothus tomentosus*	*Centaurea melitensis*	*Centaurium venustum*	*Cerastium glomeratum*	*Chaenactis* spp.	*Chamaesyce* spp.
Nobel Drive																																			
	I 6	Bob Baker/ Bob Baker 2			•		•																												
	I 12	Pueblo Lands								•			•			•				•				•											
	X 5	Nobel Drive			•								•									•	•	•											
	X 7	Nobel Research Park			•						•												•				•				•				
Kearny Mesa																																			
	N 1-6	Montgomery Field			•		•				•	•	•		•	•		•		•								•	•		•				
	N 7	Serra Mesa Library																																		
	N 8	General Dynamics																																		
	U 15	Magnatron																																		
	U 15	Sander			•													•										•			•				
	U 19	Cubic																																		
Mission Trails Regional Park																																			
	Q 2	Mission Trails Regional Park											•		•	•						•		•				•			•				
Urban San Diego																																			
	S 4	Kelton										•	•	•				•										•			•				
Otay Lakes																																			

Appendix F

Upland Species

	Bauder Complex		UPLAND SPECIES	*Acacia* spp.	*Adenostoma fasciculatum*	*Adolphia californica*	*Allium praecox*	*Allium* spp.	*Ambrosia chenopodifolia*	*Amsinckia menziesii* var. *intermedia*	*Antirrhinum nuttallianum*	*Apiastrum angustifolium*	*Artemisia californica*	*Astragalus trichopodus*	*Avena barbata*	*Avena fatua*	*Baccharis pilularis*	*Baccharis sarothroides*	*Bloomeria crocea*	*Brassica nigra*	*Brassica* spp.	*Bromus diandrus*	*Bromus hordeaceus*	*Bromus madritensis* ssp. *rubens*	*Bromus mollis*	*Bromus* spp.	*Calochortus splendens*	*Calystegia macrostegia*	*Castilleja exserta*	*Ceanothus tomentosus*	*Centaurea melitensis*	*Centaurium venustum*	*Cerastium glomeratum*	*Chaenactis* spp.	*Chamaesyce* spp.
	K 3, 5, 10, 13	Otay Lakes			•		•							•						•				•	•	•			•		•				
	R 1	Proctor Valley														•								•	•				•		•				
Otay Mesa																																		
	J 2 S	Otay Mesa Road Helix														•												•			•				
	J 2 W	J 2 W												•		•	•																		
	J 2 W; J 31	Hidden Trails														•	•				•							•							
	J 3	J 3																													•			
	J 4	J 4																																
	J 4-5	Robinhood Ridge												•		•				•								•			•	•			
	J 11 E	J 11 E							•	•				•	•	•	•			•	•	•	•							•					
	J 11 W	J 11 W					•			•				•				•		•	•							•					•		
	J 12	J 12												•			•			•										•					
	J 13 E	J 13 E						•		•				•		•	•			•	•					•									
	J 13 N	J 13 N																						•											
	J 13 S	J 13 S																																	
	J 14	J 14																																	
	J 16-18	J 16-18			•				•			•	•							•				•							•				
	J 21	J 21																•		•															
	J 27	J 27													•	•				•		•		•											
	J 28 E	J 28 E													•	•																			

Appendix F

Upland Species

	Bauder Complex		UPLAND SPECIES	*Acacia* spp.	*Adenostoma fasciculatum*	*Adolphia californica*	*Allium praecox*	*Allium* spp.	*Ambrosia chenopodifolia*	*Amsinckia menziesii* var. *intermedia*	*Antirrhinum nuttallianum*	*Apiastrum angustifolium*	*Artemisia californica*	*Astragalus trichopodus*	*Avena barbata*	*Avena fatua*	*Baccharis pilularis*	*Baccharis sarothroides*	*Bloomeria crocea*	*Brassica nigra*	*Brassica* spp.	*Bromus diandrus*	*Bromus hordeaceus*	*Bromus madritensis* ssp. *rubens*	*Bromus mollis*	*Bromus* spp.	*Calochortus splendens*	*Calystegia macrostegia*	*Castilleja exserta*	*Ceanothus tomentosus*	*Centaurea melitensis*	*Centaurium venustum*	*Cerastium glomeratum*	*Chaenactis* spp.	*Chamaesyce* spp.
	J 29-30	J 29-30		•			•	•					•		•	•				•								•						
	J 31	J 31											•		•	•																		
	J 33	Sweetwater High School													•					•						•								
	J 34	J 34																																
Marron Valley																																		
	MM 1	Marron Valley								•			•									•	•	•			•	•	•			•			

Revised Bauder identification numbers are shown in bold.

Appendix F

Upland Species

	Bauder Complex		UPLAND SPECIES	*Chamomilla suaveolens*	*Chenopodium murale*	*Chlorogalum parviflorum*	*Chlorogalum pomeridianum*	*Chlorogalum* spp.	*Chrysanthemum coronarium*	*Cistus* spp.	*Cirsium vulgare*	*Clematis pauciflora*	*Comarostaphylis diversifolia*	*Cneoridium dumosum*	*Crassula comata*	*Crassula* spp.	*Croton californicus*	*Cryptantha intermedia*	*Cryptantha* spp.	*Cuscuta californica*	*Cuscuta* spp.	*Cynara cardunculus*	*Cynodon dactylon*	*Daucus carota*	*Daucus pusillus*	*Deinandra conjugens*	*Deinandra fasciculata*	*Descurainia pinnata*	*Dichelostemma capitata*	*Dichondra occidentalis*	*Dodecatheon clevelandii*	*Dudleya variegata*	*Encelia californica*	*Ephedra californica*	*Eremocarpus setigerus*
Del Mar Mesa																																		
	H 1-15	Del Mar Mesa				•							•	•	•				•							•		•						
	H 17	Shaw Texas																																
	H 18-23	Rhodes				•							•		•											•		•	•					
	H 39	Greystone Torrey Highlands																																
	H 40	Li Collins																								•								
Carmel Mountain																																		
	H 38	Carmel Mountain				•				•					•					•					•		•		•				•		
Mira Mesa																																		
	B 5-8	Lopez Ridge				•									•					•	•	•				•		•		•					
	B 5-8	Crescent Heights				•									•					•	•	•				•		•		•					
	B 5-8	Tierra Alta			•	•			•				•	•		•		•											•						
	B 11	Mesa Norte		•																							•								•
	C 10-16	Winterwood													•					•			•				•		•				•		
	C 17-18	Fieldstone				•									•												•		•				•		
	C 27	Mira Mesa Market Center																									•								
	C 28	Maddox															•										•								
	D 5-8	Carroll Canyon				•								•	•					•	•						•								
	D 5-8	Parkdale Carroll Canyon				•								•	•					•	•						•								
	I 1	Arjons																									•								

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Upland Species

Bauder Complex		UPLAND SPECIES	*Chamomilla suaveolens*	*Chenopodium murale*	*Chlorogalum parviflorum*	*Chlorogalum pomeridianum*	*Chlorogalum* spp.	*Chrysanthemum coronarium*	*Cistus* spp.	*Cirsium vulgare*	*Clematis pauciflora*	*Comarostaphylis diversifolia*	*Cneoridium dumosum*	*Crassula comata*	*Crassula* spp.	*Croton californicus*	*Cryptantha intermedia*	*Cryptantha* spp.	*Cuscuta californica*	*Cuscuta* spp.	*Cynara cardunculus*	*Cynodon dactylon*	*Daucus carota*	*Daucus pusillus*	*Deinandra conjugens*	*Deinandra fasciculata*	*Descurainia pinnata*	*Dichelostemma capitata*	*Dichondra occidentalis*	*Dodecatheon clevelandii*	*Dudleya variegata*	*Encelia californica*	*Ephedra californica*	*Eremocarpus setigerus*
Nobel Drive																																	
I 6	Bob Baker/ Bob Baker 2				•									•												•		•					
I 12	Pueblo Lands		•											•												•							•
X 5	Nobel Drive												•	•												•		•					•
X 7	Nobel Research Park													•												•			•				•
Kearny Mesa																																	
N 1-6	Montgomery Field																						•				•						
N 7	Serra Mesa Library																									•							
N 8	General Dynamics																									•							
U 15	Magnatron																									•							
U 15	Sander													•				•								•							
U 19	Cubic																									•							
Mission Trails Regional Park																																	
Q 2	Mission Trails Regional Park		•		•									•				•								•		•					
Urban San Diego																																	
S 4	Kelton			•				•						•				•								•		•					•
Otay Lakes																																	

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Upland Species

	Bauder Complex		UPLAND SPECIES	*Chamomilla suaveolens*	*Chenopodium murale*	*Chlorogalum parviflorum*	*Chlorogalum pomeridianum*	*Chlorogalum* spp.	*Chrysanthemum coronarium*	*Cistus* spp.	*Cirsium vulgare*	*Clematis pauciflora*	*Comarostaphylis diversifolia*	*Cneoridium dumosum*	*Crassula comata*	*Crassula* spp.	*Croton californicus*	*Cryptantha intermedia*	*Cryptantha* spp.	*Cuscuta californica*	*Cuscuta* spp.	*Cynara cardunculus*	*Cynodon dactylon*	*Daucus carota*	*Daucus pusillus*	*Deinandra conjugens*	*Deinandra fasciculata*	*Descurainia pinnata*	*Dichelostemma capitata*	*Dichondra occidentalis*	*Dodecatheon clevelandii*	*Dudleya variegata*	*Encelia californica*	*Ephedra californica*	*Eremocarpus setigerus*
	K 3, 5, 10, 13	Otay Lakes				•	•								•				•	•							•				•			•
	R 1	Proctor Valley													•												•							•
Otay Mesa																																		
	J 2 S	Otay Mesa Road Helix																									•	•							
	J 2 W	J 2 W		•					•						•												•	•							•
	J 2 W; J 31	Hidden Trails																																	
	J 3	J 3																																	
	J 4	J 4																																	
	J 4-5	Robinhood Ridge		•					•		•																•	•					•		•
	J 11 E	J 11 E		•	•			•							•					•							•	•	•	•			•		
	J 11 W	J 11 W		•					•						•													•		•			•		
	J 12	J 12		•					•																			•		•			•		
	J 13 E	J 13 E		•		•									•					•								•		•					
	J 13 N	J 13 N																										•							
	J 13 S	J 13 S																																	•
	J 14	J 14																										•							
	J 16-18	J 16-18				•									•						•				•			•		•			•		
	J 21	J 21		•	•				•							•				•								•	•	•					
	J 27	J 27				•									•					•	•							•					•		
	J 28 E	J 28 E													•					•								•							

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Upland Species

	Bauder Complex		UPLAND SPECIES	*Chamomilla suaveolens*	*Chenopodium murale*	*Chlorogalum parviflorum*	*Chlorogalum pomeridianum*	*Chlorogalum* spp.	*Chrysanthemum coronarium*	*Cistus* spp.	*Cirsium vulgare*	*Clematis pauciflora*	*Comarostaphylis diversifolia*	*Cneoridium dumosum*	*Crassula comata*	*Crassula* spp.	*Croton californicus*	*Cryptantha intermedia*	*Cryptantha* spp.	*Cuscuta californica*	*Cuscuta* spp.	*Cynara cardunculus*	*Cynodon dactylon*	*Daucus carota*	*Daucus pusillus*	*Deinandra conjugens*	*Deinandra fasciculata*	*Descurainia pinnata*	*Dichelostemma capitata*	*Dichondra occidentalis*	*Dodecatheon clevelandii*	*Dudleya variegata*	*Encelia californica*	*Ephedra californica*	*Eremocarpus setigerus*
	J 29-30	J 29-30				•						•			•			•								•		•		•	•			
	J 31	J 31				•									•																			
	J 33	Sweetwater High School		•											•											•	•							
	J 34	J 34																																
Marron Valley																																		
	MM 1	Marron Valley													•		•	•								•	•	•					•	•

Appendix F
Upland Species

	Bauder Complex		UPLAND SPECIES	*Eriogonum fasciculatum*	*Eriophyllum confertiflorum*	*Erodium botrys*	*Erodium cicutarium*	*Erodium moschatum*	*Erodium* spp.	*Eschscholzia californica*	*Euphorbia misera*	*Eucalyptus* spp.	*Ferocactus viridescens*	*Filago californica*	*Filago* spp.	*Geranium carolinianum*	*Gnaphalium californicum*	*Gutierrezia californica*	*Hedypnois cretica*	*Herniaria hirsuta* ssp. *cinerea*	*Hirschfeldia incana*	*Holocarpha virgata*	*Hordeum* spp.	*Hordeum jubatum*	*Hypochoeris glabra*	*Isocoma arborea*	*Isocoma menziesii*	*Isocoma* spp.	*Isomeris arborea*	*Jepsonia malvifolia*	*Jepsonia* spp.	*Lamarckia aurea*	*Lasthenia californica*	*Layia platyglossa*	*Lepidium lasiocarpum* var. *lasiocarpum*
Del Mar Mesa																																			
	H 1-15	Del Mar Mesa					•	•	•						•										•							•	•		
	H 17	Shaw Texas				•			•														•		•										
	H 18-23	Rhodes													•										•										
	H 39	Greystone Torrey Highlands																																	
	H 40	Li Collins																																	
Carmel Mountain																																			
	H 38	Carmel Mountain		•				•	•						•										•								•		
Mira Mesa																																			
	B 5-8	Lopez Ridge		•					•					•			•							•		•							•		•
	B 5-8	Crescent Heights		•					•					•			•							•		•							•		•
	B 5-8	Tierra Alta		•	•	•							•		•				•							•							•		
	B 11	Mesa Norte				•	•		•					•						•				•	•		•							•		
	C 10-16	Winterwood		•					•	•																									
	C 17-18	Fieldstone							•					•			•								•	•									
	C 27	Mira Mesa Market Center																																	
	C 28	Maddox							•					•												•							•		
	D 5-8	Carroll Canyon				•			•	•				•												•									•
	D 5-8	Parkdale Carroll Canyon				•			•	•				•												•									•
	I 1	Arjons																																	

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Upland Species

	Bauder Complex		UPLAND SPECIES	*Eriogonum fasciculatum*	*Eriophyllum confertiflorum*	*Erodium botrys*	*Erodium cicutarium*	*Erodium moschatum*	*Erodium* spp.	*Eschscholzia californica*	*Euphorbia misera*	*Eucalyptus* spp.	*Ferocactus viridescens*	*Filago californica*	*Filago* spp.	*Geranium carolinianum*	*Gnaphalium californicum*	*Gutierrezia californica*	*Hedypnois cretica*	*Herniaria hirsuta* ssp. *cinerea*	*Hirschfeldia incana*	*Holocarpha virgata*	*Hordeum* spp.	*Hordeum jubatum*	*Hypochoeris glabra*	*Isocoma arborea*	*Isocoma menziesii*	*Isocoma* spp.	*Isomeris arborea*	*Jepsonia malvifolia*	*Jepsonia* spp.	*Lamarckia aurea*	*Lasthenia californica*	*Layia platyglossa*	*Lepidium lasiocarpum* var. *lasiocarpum*
Nobel Drive																																			
	I 6	Bob Baker/ Bob Baker 2		•			•													•															
	I 12	Pueblo Lands		•					•						•								•		•	•									
	X 5	Nobel Drive		•		•	•	•						•						•			•			•		•							
	X 7	Nobel Research Park		•	•																		•				•							•	
Kearny Mesa																																			
	N 1-6	Montgomery Field		•																				•	•										
	N 7	Serra Mesa Library																																	
	N 8	General Dynamics																																	
	U 15	Magnatron																																	
	U 15	Sander		•					•			•			•									•											
	U 19	Cubic																																	
Mission Trails Regional Park																																			
	Q 2	Mission Trails Regional Park		•					•				•	•										•	•						•		•		
Urban San Diego																																			
	S 4	Kelton		•	•				•						•		•		•			•			•									
Otay Lakes																																			

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Upland Species

	Bauder Complex		UPLAND SPECIES	*Eriogonum fasciculatum*	*Eriophyllum confertiflorum*	*Erodium botrys*	*Erodium cicutarium*	*Erodium moschatum*	*Erodium* spp.	*Eschscholzia californica*	*Euphorbia misera*	*Eucalyptus* spp.	*Ferocactus viridescens*	*Filago californica*	*Filago* spp.	*Geranium carolinianum*	*Gnaphalium californicum*	*Gutierrezia californica*	*Hedypnois cretica*	*Herniaria hirsuta* ssp. *cinerea*	*Hirschfeldia incana*	*Holocarpha virgata*	*Hordeum* spp.	*Hordeum jubatum*	*Hypochoeris glabra*	*Isocoma arborea*	*Isocoma menziesii*	*Isocoma* spp.	*Isomeris arborea*	*Jepsonia malvifolia*	*Jepsonia* spp.	*Lamarckia aurea*	*Lasthenia californica*	*Layia platyglossa*	*Lepidium lasiocarpum* var. *lasiocarpum*
	K 3, 5, 10, 13	Otay Lakes		•			•	•		•														•	•	•		•				•		•
	R 1	Proctor Valley												•																					
Otay Mesa																																		
	J 2 S	Otay Mesa Road Helix												•										•		•							•		
	J 2 W	J 2 W												•					•					•			•							•
	J 2 W; J 31	Hidden Trails							•																									
	J 3	J 3																																
	J 4	J 4																																
	J 4-5	Robinhood Ridge		•					•				•	•			•		•				•	•		•						•		•
	J 11 E	J 11 E		•			•	•	•		•		•											•			•				•	•		•
	J 11 W	J 11 W						•	•													•		•		•	•	•				•		•
	J 12	J 12		•			•	•	•	•					•									•			•				•		•	•
	J 13 E	J 13 E				•			•	•				•			•								•	•	•				•		•	
	J 13 N	J 13 N				•																		•		•								
	J 13 S	J 13 S																						•		•								
	J 14	J 14																						•										
	J 16-18	J 16-18		•			•	•	•				•		•																	•		•
	J 21	J 21		•				•																		•								
	J 27	J 27		•			•	•							•				•					•			•					•		•
	J 28 E	J 28 E		•		•		•					•		•									•		•								•

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Upland Species

	Bauder Complex		UPLAND SPECIES	*Eriogonum fasciculatum*	*Eriophyllum confertiflorum*	*Erodium botrys*	*Erodium cicutarium*	*Erodium moschatum*	*Erodium* spp.	*Eschscholzia californica*	*Euphorbia misera*	*Eucalyptus* spp.	*Ferocactus viridescens*	*Filago californica*	*Filago* spp.	*Geranium carolinianum*	*Gnaphalium californicum*	*Gutierrezia californica*	*Hedypnois cretica*	*Herniaria hirsuta* ssp. *cinerea*	*Hirschfeldia incana*	*Holocarpha virgata*	*Hordeum* spp.	*Hordeum jubatum*	*Hypochoeris glabra*	*Isocoma arborea*	*Isocoma menziesii*	*Isocoma* spp.	*Isomeris arborea*	*Jepsonia malvifolia*	*Jepsonia* spp.	*Lamarckia aurea*	*Lasthenia californica*	*Layia platyglossa*	*Lepidium lasiocarpum* var. *lasiocarpum*
	J 29-30	J 29-30		•		•	•	•	•				•		•									•		•			•			•		•
	J 31	J 31		•		•	•	•					•		•				•							•	•					•	•		•
	J 33	Sweetwater High School				•			•															•		•									•
	J 34	J 34																																	
Marron Valley																																			
	MM 1	Marron Valley																•					•					•		•			•	•	

Appendix F
Upland Species

	Bauder Complex		UPLAND SPECIES	*Lepidium nitidum*	*Lepidium* spp.	*Leymus condensatus*	*Linanthus dianthiflorus*	*Linaria canadensis*	*Lomatium dasycarpum*	*Lomatium* spp.	*Lotus scoparius*	*Lotus* spp.	*Lotus strigosus*	*Lupinus bicolor*	*Lupinus* spp.	*Lycium californicum*	*Malacothamnus fasciculatus*	*Malosma laurina*	*Malva parviflora*	*Malvella leprosa*	*Marah macrocarpus*	*Medicago polymorpha*	*Melica imperfecta*	*Melilotus* spp.	*Mesembryanthemum crystallinum*	*Mesembryanthemum nodiflorum*	*Mimulus aurantiacus*	*Mirabilis californica*	*Muilla clevelandii*	*Muilla maritima*	*Muilla* spp.	*Nassella lepida*	*Nassella pulchra*	*Navarretia hamata*	*Navarretia prolifera*
Del Mar Mesa																																		
	H 1-15	Del Mar Mesa						•			•						•	•			•														
	H 17	Shaw Texas																																
	H 18-23	Rhodes						•			•										•								•					
	H 39	Greystone Torrey Highlands																																
	H 40	Li Collins																																
Carmel Mountain																																		
	H 38	Carmel Mountain				•		•			•							•	•															•	
Mira Mesa																																		
	B 5-8	Lopez Ridge									•				•													•					•	•	
	B 5-8	Crescent Heights									•				•													•					•	•	
	B 5-8	Tierra Alta			•		•	•										•			•		•	•					•					•	
	B 11	Mesa Norte									•								•			•												•	
	C 10-16	Winterwood									•							•			•					•						•	•	•	
	C 17-18	Fieldstone									•							•			•			•									•	•	
	C 27	Mira Mesa Market Center																																		
	C 28	Maddox									•							•						•		•									
	D 5-8	Carroll Canyon						•			•							•			•			•									•	•	
	D 5-8	Parkdale Carroll Canyon						•			•							•			•			•									•	•	
	I 1	Arjons																																		

Appendix F

Upland Species

	Bauder Complex		UPLAND SPECIES	*Lepidium nitidum*	*Lepidium* spp.	*Leymus condensatus*	*Linanthus dianthiflorus*	*Linaria canadensis*	*Lomatium dasycarpum*	*Lomatium* spp.	*Lotus scoparius*	*Lotus* spp.	*Lotus strigosus*	*Lupinus bicolor*	*Lupinus* spp.	*Lycium californicum*	*Malacothamnus fasciculatus*	*Malosma laurina*	*Malva parviflora*	*Malvella leprosa*	*Marah macrocarpus*	*Medicago polymorpha*	*Melica imperfecta*	*Melilotus* spp.	*Mesembryanthemum crystallinum*	*Mesembryanthemum nodiflorum*	*Mimulus aurantiacus*	*Mirabilis californica*	*Muilla clevelandii*	*Muilla maritima*	*Muilla* spp.	*Nassella lepida*	*Nassella pulchra*	*Navarretia hamata*	*Navarretia prolifera*
Nobel Drive																																		
	I 6	Bob Baker/ Bob Baker 2									•																		•					
	I 12	Pueblo Lands									•													•		•				•			•	•	
	X 5	Nobel Drive						•			•							•			•									•				
	X 7	Nobel Research Park						•										•												•			•	
Kearny Mesa																																		
	N 1-6	Montgomery Field									•			•				•			•												•	•	
	N 7	Serra Mesa Library																																	
	N 8	General Dynamics																•																	
	U 15	Magnatron																•																	
	U 15	Sander								•										•															
	U 19	Cubic																•																	
Mission Trails Regional Park																																		
	Q 2	Mission Trails Regional Park		•							•							•															•		
Urban San Diego																																		
	S 4	Kelton									•							•								•					•	•	•	
Otay Lakes																																		

Appendix F

Upland Species

	Bauder Complex		UPLAND SPECIES	*Lepidium nitidum*	*Lepidium* spp.	*Leymus condensatus*	*Linanthus dianthiflorus*	*Linaria canadensis*	*Lomatium dasycarpum*	*Lomatium* spp.	*Lotus scoparius*	*Lotus* spp.	*Lotus strigosus*	*Lupinus bicolor*	*Lupinus* spp.	*Lycium californicum*	*Malacothamnus fasciculatus*	*Malosma laurina*	*Malva parviflora*	*Malvella leprosa*	*Marah macrocarpus*	*Medicago polymorpha*	*Melica imperfecta*	*Melilotus* spp.	*Mesembryanthemum crystallinum*	*Mesembryanthemum nodiflorum*	*Mimulus aurantiacus*	*Mirabilis californica*	*Muilla clevelandii*	*Muilla maritima*	*Muilla* spp.	*Nassella lepida*	*Nassella pulchra*	*Navarretia hamata*	*Navarretia prolifera*
	K 3, 5, 10, 13	Otay Lakes					•	•	•	•	•			•				•												•			•		
	R 1	Proctor Valley																													•			•	•	
Otay Mesa																																				
	J 2 S	Otay Mesa Road Helix																																		
	J 2 W	J 2 W									•															•									
	J 2 W; J 31	Hidden Trails																																		
	J 3	J 3																																		
	J 4	J 4																																		
	J 4-5	Robinhood Ridge																								•							•			
	J 11 E	J 11 E			•		•				•							•		•	•			•		•		•					•		
	J 11 W	J 11 W																•			•				•	•									
	J 12	J 12					•											•			•		•	•			•								
	J 13 E	J 13 E																	•							•										
	J 13 N	J 13 N																		•																
	J 13 S	J 13 S																								•										
	J 14	J 14																																		
	J 16-18	J 16-18					•														•															
	J 21	J 21																							•											
	J 27	J 27																				•				•								•		
	J 28 E	J 28 E																				•				•								•		

Appendix F

Upland Species

	Bauder Complex		UPLAND SPECIES	*Lepidium nitidum*	*Lepidium* spp.	*Leymus condensatus*	*Linanthus dianthiflorus*	*Linaria canadensis*	*Lomatium dasycarpum*	*Lomatium* spp.	*Lotus scoparius*	*Lotus* spp.	*Lotus strigosus*	*Lupinus bicolor*	*Lupinus* spp.	*Lycium californicum*	*Malacothamnus fasciculatus*	*Malosma laurina*	*Malva parviflora*	*Malvella leprosa*	*Marah macrocarpus*	*Medicago polymorpha*	*Melica imperfecta*	*Melilotus* spp.	*Mesembryanthemum crystallinum*	*Mesembryanthemum nodiflorum*	*Mimulus aurantiacus*	*Mirabilis californica*	*Muilla clevelandii*	*Muilla maritima*	*Muilla* spp.	*Nassella lepida*	*Nassella pulchra*	*Navarretia hamata*	*Navarretia prolifera*
	J 29-30	J 29-30									•					•															•		•		
	J 31	J 31																																	
	J 33	Sweetwater High School																																•	
	J 34	J 34																																	
Marron Valley																																			
	MM 1	Marron Valley										•	•	•					•								•						•		

Appendix F
Upland Species

	Bauder Complex		UPLAND SPECIES	*Nicotiana quadrivalvis*	*Opuntia littoralis*	*Opuntia prolifera*	*Osmadenia tenella*	*Phacelia* spp.	*Phoenix canariensis*	*Pholistoma raccemosum*	*Plantago erecta*	*Quercus dumosa*	*Quercus* spp.	*Raphanus sativus*	*Raphanus* spp.	*Rhamnus crocea*	*Rhus integrifolia*	*Salsola tragus*	*Salvia apiana*	*Salvia mellifera*	*Salvia munzii*	*Sanicula arguta*	*Schismus barbatus*	*Selaginella cinerascens*	*Senecio vulgaris*	*Sidalcea malvaeflora*	*Silene gallica*	*Simmondsia chinensis*	*Sisyrinchium bellum*	*Sonchus asper*	*Sonchus oleraceus*	*Spergula arvensis*	*Spergularia bocconi*	*Spergularia* spp.	*Stephanomeria virgata*
Del Mar Mesa																																		
	H 1-15	Del Mar Mesa																																
	H 17	Shaw Texas																														•		
	H 18-23	Rhodes								•	•												•					•					
	H 39	Greystone Torrey Highlands																										•				•		
	H 40	Li Collins																																
Carmel Mountain																																		
	H 38	Carmel Mountain						•		•	•									•				•			•							
Mira Mesa																																		
	B 5-8	Lopez Ridge								•									•		•		•			•		•	•					
	B 5-8	Crescent Heights								•									•		•		•			•		•	•					
	B 5-8	Tierra Alta								•	•					•			•							•			•					•
	B 11	Mesa Norte																								•		•		•		•	•	
	C 10-16	Winterwood			•				•		•		•			•								•			•			•	•			
	C 17-18	Fieldstone																	•					•				•		•				
	C 27	Mira Mesa Market Center																						•				•						
	C 28	Maddox																	•										•			•		
	D 5-8	Carroll Canyon			•						•																		•					
	D 5-8	Parkdale Carroll Canyon			•						•																		•					
	I 1	Arjons																						•										

Appendix F

Upland Species

	Bauder Complex		UPLAND SPECIES	*Nicotiana quadrivalvis*	*Opuntia littoralis*	*Opuntia prolifera*	*Osmadenia tenella*	*Phacelia* spp.	*Phoenix canariensis*	*Pholistoma raccemosum*	*Plantago erecta*	*Quercus dumosa*	*Quercus* spp.	*Raphanus sativus*	*Raphanus* spp.	*Rhamnus crocea*	*Rhus integrifolia*	*Salsola tragus*	*Salvia apiana*	*Salvia mellifera*	*Salvia munzii*	*Sanicula arguta*	*Schismus barbatus*	*Selaginella cinerascens*	*Senecio vulgaris*	*Sidalcea malvaeflora*	*Silene gallica*	*Simmondsia chinensis*	*Sisyrinchium bellum*	*Sonchus asper*	*Sonchus oleraceus*	*Spergula arvensis*	*Spergularia bocconi*	*Spergularia* spp.	*Stephanomeria virgata*
Nobel Drive																																		
	I 6	Bob Baker/ Bob Baker 2								•	•						•			•															
	I 12	Pueblo Lands																•					•												
	X 5	Nobel Drive								•		•					•										•				•	•		•	•
	X 7	Nobel Research Park					•										•																	•	
Kearny Mesa																																		
	N 1-6	Montgomery Field																		•				•			•			•	•				
	N 7	Serra Mesa Library																																		
	N 8	General Dynamics																																		
	U 15	Magnatron																																		
	U 15	Sander								•				•		•								•			•								
	U 19	Cubic																																		
Mission Trails Regional Park																																		
	Q 2	Mission Trails Regional Park			•																			•			•			•			•		
Urban San Diego																																		
	S 4	Kelton			•												•	•	•				•					•				•		•
Otay Lakes																																		

Appendix F

Upland Species

	Bauder Complex		UPLAND SPECIES	*Nicotiana quadrivalvis*	*Opuntia littoralis*	*Opuntia prolifera*	*Osmadenia tenella*	*Phacelia* spp.	*Phoenix canariensis*	*Pholistoma raccemosum*	*Plantago erecta*	*Quercus dumosa*	*Quercus* spp.	*Raphanus sativus*	*Raphanus* spp.	*Rhamnus crocea*	*Rhus integrifolia*	*Salsola tragus*	*Salvia apiana*	*Salvia mellifera*	*Salvia munzii*	*Sanicula arguta*	*Schismus barbatus*	*Selaginella cinerascens*	*Senecio vulgaris*	*Sidalcea malvaeflora*	*Silene gallica*	*Simmondsia chinensis*	*Sisyrinchium bellum*	*Sonchus asper*	*Sonchus oleraceus*	*Spergula arvensis*	*Spergularia bocconi*	*Spergularia* spp.	*Stephanomeria virgata*
	K 3, 5, 10, 13	Otay Lakes									•										•			•		•	•		•					
	R 1	Proctor Valley					•																									•		
Otay Mesa																																		
	J 2 S	Otay Mesa Road Helix																															•		
	J 2 W	J 2 W															•	•												•				
	J 2 W; J 31	Hidden Trails																																	
	J 3	J 3																•																
	J 4	J 4																																
	J 4-5	Robinhood Ridge									•							•											•		•		•		
	J 11 E	J 11 E						•		•	•						•	•	•					•				•		•			•	
	J 11 W	J 11 W						•								•	•											•					•	
	J 12	J 12								•	•																	•			•		•		
	J 13 E	J 13 E									•													•				•			•		•		
	J 13 N	J 13 N																																	
	J 13 S	J 13 S																															•		
	J 14	J 14									•																								
	J 16-18	J 16-18		•		•					•						•							•				•							
	J 21	J 21																						•	•				•						
	J 27	J 27			•													•						•	•	•			•	•					
	J 28 E	J 28 E																•					•	•					•						

Appendix F

Upland Species

	Bauder Complex		UPLAND SPECIES	*Nicotiana quadrivalvis*	*Opuntia littoralis*	*Opuntia prolifera*	*Osmadenia tenella*	*Phacelia* spp.	*Phoenix canariensis*	*Pholistoma raccemosum*	*Plantago erecta*	*Quercus dumosa*	*Quercus* spp.	*Raphanus sativus*	*Raphanus* spp.	*Rhamnus crocea*	*Rhus integrifolia*	*Salsola tragus*	*Salvia apiana*	*Salvia mellifera*	*Salvia munzii*	*Sanicula arguta*	*Schismus barbatus*	*Selaginella cinerascens*	*Senecio vulgaris*	*Sidalcea malvaeflora*	*Silene gallica*	*Simmondsia chinensis*	*Sisyrinchium bellum*	*Sonchus asper*	*Sonchus oleraceus*	*Spergula arvensis*	*Spergularia bocconi*	*Spergularia* spp.	*Stephanomeria virgata*
	J 29-30	J 29-30			•	•					•						•	•						•	•	•	•		•	•	•			
	J 31	J 31				•																		•			•		•	•				
	J 33	Sweetwater High School									•																						•		
	J 34	J 34																																	
Marron Valley																																		
	MM 1	Marron Valley				•	•	•			•			•		•			•			•					•		•					•	

Appendix F

Upland Species

	Bauder Complex		UPLAND SPECIES	*Stylocline* spp.	*Uropappus lindleyi*	*Urtica urens*	*Verbena menthifolia*	*Verbena* spp.	*Viguiera laciniata*	*Viola pedunculata*	*Vulpia myuros*	*Vulpia octoflora*	*Yucca schidigera*	*Yucca* spp.	*Yucca whipplei*	*Xylococcus bicolor*	*Zigadenus fremontii*
Del Mar Mesa																	
	H 1-15	Del Mar Mesa									•	•				•	
	H 17	Shaw Texas									•						
	H 18-23	Rhodes									•	•					
	H 39	Greystone Torrey Highlands															
	H 40	Li Collins															
Carmel Mountain																	
	H 38	Carmel Mountain		•										•		•	
Mira Mesa																	
	B 5-8	Lopez Ridge		•													
	B 5-8	Crescent Heights		•													
	B 5-8	Tierra Alta											•			•	
	B 11	Mesa Norte									•						
	C 10-16	Winterwood							•				•				
	C 17-18	Fieldstone															•
	C 27	Mira Mesa Market Center															
	C 28	Maddox															
	D 5-8	Carroll Canyon									•						
	D 5-8	Parkdale Carroll Canyon									•						
	I 1	Arjons										•					

Appendix F

Upland Species

	Bauder Complex		UPLAND SPECIES	*Stylocline* spp.	*Uropappus lindleyi*	*Urtica urens*	*Verbena menthifolia*	*Verbena* spp.	*Viguiera laciniata*	*Viola pedunculata*	*Vulpia myuros*	*Vulpia octoflora*	*Yucca schidigera*	*Yucca* spp.	*Yucca whipplei*	*Xylococcus bicolor*	*Zigadenus fremontii*
Nobel Drive																	
	I 6	Bob Baker/ Bob Baker 2															
	I 12	Pueblo Lands															
	X 5	Nobel Drive								•	•						
	X 7	Nobel Research Park									•					•	
Kearny Mesa																	
	N 1-6	Montgomery Field															
	N 7	Serra Mesa Library															
	N 8	General Dynamics															
	U 15	Magnatron															
	U 15	Sander															
	U 19	Cubic															
Mission Trails Regional Park																	
	Q 2	Mission Trails Regional Park							•								
Urban San Diego																	
	S 4	Kelton		•					•				•				
Otay Lakes																	

Appendix F

Upland Species

	Bauder Complex		UPLAND SPECIES	*Stylocline* spp.	*Uropappus lindleyi*	*Urtica urens*	*Verbena menthifolia*	*Verbena* spp.	*Viguiera laciniata*	*Viola pedunculata*	*Vulpia myuros*	*Vulpia octoflora*	*Yucca schidigera*	*Yucca* spp.	*Yucca whipplei*	*Xylococcus bicolor*	*Zigadenus fremontii*
	K 3, 5, 10, 13	Otay Lakes									•						
	R 1	Proctor Valley									•						
Otay Mesa																	
	J 2 S	Otay Mesa Road Helix									•						
	J 2 W	J 2 W															
	J 2 W; J 31	Hidden Trails															
	J 3	J 3															
	J 4	J 4															
	J 4-5	Robinhood Ridge									•						
	J 11 E	J 11 E					•		•								
	J 11 W	J 11 W					•										
	J 12	J 12									•						
	J 13 E	J 13 E															•
	J 13 N	J 13 N															
	J 13 S	J 13 S															
	J 14	J 14															
	J 16-18	J 16-18							•		•						•
	J 21	J 21				•					•						
	J 27	J 27															
	J 28 E	J 28 E			•												

Appendix F

Upland Species

	Bauder Complex		UPLAND SPECIES	*Stylocline* spp.	*Uropappus lindleyi*	*Urtica urens*	*Verbena menthifolia*	*Verbena* spp.	*Viguiera laciniata*	*Viola pedunculata*	*Vulpia myuros*	*Vulpia octoflora*	*Yucca schidigera*	*Yucca* spp.	*Yucca whipplei*	*Xylococcus bicolor*	*Zigadenus fremontii*
	J 29-30	J 29-30															
	J 31	J 31															
	J 33	Sweetwater High School						•			•						
	J 34	J 34															
Marron Valley																	
	MM 1	Marron Valley					•				•				•		

APPENDIX G
SENSITIVE SPECIES BY SITE

Appendix G

Threatened/Endangered Plant Species by Site

Area	Revised Bauder ID	Site	Number of Basins	Basin Acreage	Erar Basins	Erar Sq. Feet	Nafo Basins	Nafo Sq. Feet
Otay Lakes								
	K 3, 5, 10, 13	Otay Lakes	87	2.89	47	1,645	2	24
	R 1	Proctor Valley	19	0.25	0	0	0	0
Otay Mesa								
	J 2 S	Otay Mesa Road Helix	13	0.21	13	3,058	1	3
	J 2 S, J 2 W	Otay Mesa Road Pardee	31	0.31	0	0	0	0
	J 2 W	Otay Mesa Road Recon	20	0.45	20	2,152	9	41
	J 2 W	J 2 W	59	0.68	1	16	0	0
	J 2 N/W/S	Recon Cal Terraces	271	2.89	243	58,341	69	1,314
	J 2 W; J 31	Hidden Trails	42	0.13	0	0	0	0
	J 3	J 3	5	0.087	0	0	0	0
	J 4	J 4	11	0.094	0	0	0	0
	J 4-5	Robinhood Ridge	83	0.56	46	5,225	4	13
	J 11 E	J 11 E	2	0.63	0	0	0	0
	J 11 W	J 11 W	5	0.49	0	0	0	0
	J 12	J 12	5	0.28	0	0	0	0
	J 13 E	J 13 E	8	0.059	1	15	0	0
	J 13 N	J 13 N	41	0.28	2	53	1	17
	J 13 S	J 13 S	44	0.62	7	393	0	0
	J 14	J 14	58	0.60	0	0	1	52
	J 14	905	7	0.069	0	0	0	0
	J 14	Recon South	64	1.4	48	1,760	4	7
	J 15	Arnie's Point	29	0.65	16	347	0	0
	J 16-18	J 16-18	13	0.40	4	206	0	0
	J 16-18	Wruck Canyon	6	0.016	0	0	0	0
	J 21	J 21	7	0.21	0	0	0	0
	J 27	J 27	10	0.23	9	564	0	0
	J 28 E	J 28 E	5	0.16	0	0	0	0
	J 29-30	J 29-30	76	0.98	42	1,155	0	0
	J 32	West Otay A + B	44	0.34	4	48	3	18
	J 33	Sweetwater High School	8	0.065	2	15	3	7
	J 34	J 34	14	0.15	0	0	0	0
	J 35	Brown Field	2	0.010	0	0	0	0
Marron Valley								
	MM 1	Marron Valley	14	0.18	0	0	0	0
Totals			**2,516.00**	**38.96**	**804.00**	**98,383.00**	**99.00**	**1,516.00**

Appendix G

Threatened/Endangered Plant Species by Site

Area	Revised Bauder ID	Site	Orca		Poab		Ponu	
			Basins	Sq. Feet	Basins	Sq. Feet	Basins	Sq. Feet
Del Mar Mesa								
	H 1-15	Del Mar Mesa	0	0	63	2,490	0	0
	H 17	Shaw Texas	0	0	0	0	0	0
	H 18-23	Rhodes	0	0	7	80	0	0
	H 39	Greystone Torrey Highlands	0	0	5	51	0	0
	H 40	Li Collins	0	0	0	0	0	0
Carmel Mountain								
	H 38	Carmel Mountain	0	0	0	0	0	0
Mira Mesa								
	B 5-6	Tierra Alta	0	0	0	0	0	0
	B 5-8	Lopez Ridge	0	0	13	395	0	0
	B 5-8	Crescent Heights	0	0	0	0	0	0
	B 11	Mesa Norte	0	0	13	296	0	0
	C 10-16	Winterwood	0	0	27	1,128	0	0
	C 17-18	Fieldstone	0	0	8	4,754	0	0
	C 27	Mira Mesa Market Center	0	0	1	12	0	0
	C 28	Maddox	0	0	0	0	0	0
	D 5-8	Parkdale Carroll Canyon	0	0	0	0	0	0
	D 5-8	Carroll Canyon Preserve	0	0	42	361	0	0
	I 1	Arjons	0	0	22	3,569	0	0
Nobel Drive								
	I 6 B	Bob Baker	0	0	7	76	0	0
	I 6 C	Bob Baker 2	0	0	11	606	0	0
	I 12	Pueblo Lands	0	0	0	0	0	0
	X 5	Nobel Drive	0	0	0	0	0	0
	X 7	Nobel Research Park	0	0	0	0	0	0
Kearny Mesa								
	N 1-6	Montgomery Field	0	0	131	19,523	0	0
	N 7	Serra Mesa Library	0	0	0	0	0	0
	N 8	General Dynamics	0	0	20	2,222	0	0
	U 15	Magnatron	0	0	0	0	0	0
	U 15	Sander	0	0	1	652	0	0
	U 19	Cubic	0	0	1	3	0	0
Mission Trails Regional Park								
	Q 2	Mission Trails Regional Park	0	0	0	0	0	0
Urban San Diego								
	S 4	Kelton	0	0	0	0	0	0

Appendix G

Threatened/Endangered Plant Species by Site

Area	Revised Bauder ID	Site	Number of Basins	Basin Acreage	Erar Basins	Erar Sq. Feet	Nafo Basins	Nafo Sq. Feet
Del Mar Mesa								
	H 1-15	Del Mar Mesa	344	5.5	186	19,342	0	0
	H 17	Shaw Texas	26	0.23	0	0	0	0
	H 18-23	Rhodes	152	0.75	6	268	0	0
	H 39	Greystone Torrey Highlands	19	0.68	3	188	0	0
	H 40	Li Collins	2	0.38	0	0	0	0
Carmel Mountain								
	H 38	Carmel Mountain	30	0.32	0	0	0	0
Mira Mesa								
	B 5-6	Tierra Alta	1	0.0055	0	0	0	0
	B 5-8	Lopez Ridge	13	0.48	1	>1	0	0
	B 5-8	Crescent Heights	7	0.042	0	0	0	0
	B 11	Mesa Norte	45	0.58	10	186	0	0
	C 10-16	Winterwood	61	0.81	7	71	0	0
	C 17-18	Fieldstone	9	0.32	0	0	0	0
	C 27	Mira Mesa Market Center	1	0.057	0	0	0	0
	C 28	Maddox	82	0.97	0	0	0	0
	D 5-8	Parkdale Carroll Canyon	4	0.021	0	0	0	0
	D 5-8	Carroll Canyon Preserve	119	1.19	65	2,550	1	9
	I 1	Arjons	34	0.73	15	617	0	0
Nobel Drive								
	I 6 B	Bob Baker	8	0.077	0	0	0	0
	I 6 C	Bob Baker 2	15	0.24	2	41	0	0
	I 12	Pueblo Lands	3	0.017	0	0	0	0
	X 5	Nobel Drive	7	0.085	0	0	1	11
	X 7	Nobel Research Park	28	0.098	0	0	0	0
Kearny Mesa								
	N 1-6	Montgomery Field	276	6.76	0	0	0	0
	N 7	Serra Mesa Library	25	0.36	0	0	0	0
	N 8	General Dynamics	21	0.40	2	92	0	0
	U 15	Magnatron	1	0.34	0	0	0	0
	U 15	Sander	33	0.44	0	0	0	0
	U 19	Cubic	29	0.45	2	35	0	0
Mission Trails Regional Park								
	Q 2	Mission Trails Regional Park	15	0.24	0	0	0	0
Urban San Diego								
	S 4	Kelton	3	0.022	0	0	0	0

Appendix G

Threatened/Endangered Plant Species by Site

Area	Revised Bauder ID	Site	Orca		Poab		Ponu	
			Basins	Sq. Feet	Basins	Sq. Feet	Basins	Sq. Feet
Otay Lakes								
	K 3, 5, 10, 13	Otay Lakes	0	0	0	0	0	0
	R 1	Proctor Valley	0	0	0	0	0	0
Otay Mesa								
	J 2 S	Otay Mesa Road Helix	1	5	0	0	13	151
	J 2 S, J 2 W	Otay Mesa Road Pardee	0	0	0	0	0	0
	J 2 W	Otay Mesa Road Recon	9	74	0	0	20	1,938
	J 2 W	J 2 W	0	0	0	0	0	0
	J 2 N/W/S	Recon Cal Terraces	42	2,350	0	0	254	27,972
	J 2 W; J 31	Hidden Trails	0	0	0	0	0	0
	J 3	J 3	0	0	0	0	0	0
	J 4	J 4	0	0	0	0	0	0
	J 4-5	Robinhood Ridge	0	0	0	0	19	182
	J 11 E	J 11 E	0	0	0	0	0	0
	J 11 W	J 11 W	0	0	0	0	0	0
	J 12	J 12	0	0	0	0	0	0
	J 13 E	J 13 E	0	0	0	0	0	0
	J 13 N	J 13 N	1	248	0	0	0	0
	J 13 S	J 13 S	0	0	0	0	0	0
	J 14	J 14	0	0	0	0	1	52
	J 14	905	0	0	0	0	0	0
	J 14	Recon South	5	>1	0	0	55	1,505
	J 15	Arnie's Point	0	0	0	0	0	0
	J 16-18	J 16-18	0	0	0	0	0	0
	J 16-18	Wruck Canyon	0	0	0	0	0	0
	J 21	J 21	0	0	0	0	0	0
	J 27	J 27	0	0	0	0	0	0
	J 28 E	J 28 E	0	0	0	0	0	0
	J 29-30	J 29-30	0	0	0	0	1	2
	J 32	West Otay A + B	0	0	0	0	8	22
	J 33	Sweetwater High School	0	0	0	0	5	9
	J 34	J 34	0	0	0	0	0	0
	J 35	Brown Field	0	0	0	0	0	0
Marron Valley								
	MM 1	Marron Valley	0	0	0	0	0	0
Totals			**58**	**2,677.00**	**372**	**36,218.00**	**376**	**31,833.00**

APPENDIX H
PRELIMINARY RESULTS OF FAIRY SHRIMP GENETICS STUDY

MSCP vernal pool inventory
City of San Diego (USFWS)
Conservation genetics of the endangered fairy shrimp species Branchinecta sandiegonensis

Andrew J. Bohonak, Department of Biology, San Diego State University

May 17. 2004

This is a preliminary report for the contract "*Genetic testing of the endangered fairy shrimp species* Branchinecta sandiegonensis" to A.J. Bohonak from the City of San Diego. This two year contract was set up in late 2002 and work for the project officially began January 1, 2003.

The information here supersedes that from reports submitted in November and December 2003, but should still be considered preliminary.

Motivation

Worldwide changes in land use (primarily agriculture and urbanization) have led to a global loss of temporary wetlands. In southern California, it is estimated that 95% of the vernal pools have been lost (Bauder 1998 and references therein). The threats to these naturally fragmented habitats are compounded by their inherent natural isolation at both local and regional scales. (Local metapopulations of ponds are found in areas where hydrologic conditions facilitate pool formation. Regionally, these pool complexes are separated kilometers or tens of kilometers by geologically unfavorable terrain.) Contemporary and historical connectivity between pools at these two scales is largely a matter of speculation (Bohonak & Jenkins, 2003). Because the continued loss of vernal pools may interact in complex ways with future climate change, there are many uncertainties concerning the persistence of vernal pool habitats, their associated ecosystem services and the endangered species they maintain (Pyke 2004).

Fairy shrimp (Crustacea: Branchiopoda: Anostraca) are relatively large crustacean zooplankton (> 10 mm) restricted almost entirely to temporary wetlands worldwide. Five Anostracan species are listed on the U.S. Endangered Species list, and several more are under consideration. Over 30 fairy shrimp are considered threatened or endangered worldwide. This project examined population genetic structure in the federally endangered fairy shrimp *Branchinecta sandiegonensis* in order to gain insight into contemporary and historical connectivity among pools and pool complexes, and make conservation recommendations.

To date, only allozymes have been used to study genetic structure in this species (Davies et al. 1997), and there are no DNA-level population genetic studies for any fairy shrimp. Davies et al. (1997) found significant genetic differentiation among 10 pools for *B. sandiegonensis* using allozymes, and evidence for a "temporal Wahlund effect" within pools. (The importance of overlapping generations created by the fairy shrimp cyst bank may be reflected by heterozygote deficiencies within each pond.) The goal of this study is to expand coverage to include the majority of the species range, including all pool complexes on City property. The choice of mitochondrial DNA sequence variation over allozymes for this study reflects the higher degree of precision that can be obtained with mtDNA sequencing. Also, sequence-level variation permits a wider range of analyses that can be used to unravel contemporary and historical processes such as allopatric isolation and gene flow.

Methods

Fairy shrimp were collected as adults or hatched from sediment samples by Marie A. Simovich (University of San Diego), a subcontractee and collaborator on this project. Simovich is permitted by USFWS for work on *B. sandiegonensis*, and Bohonak is listed under that permit. Individuals were collected from across southern California, identified to species according to Eriksen and Belk (1999), and stored in 95% ethanol or at -80° C until analysis. A map containing most of the collection locations is provided in Figure 1. We sampled additional ponds not specifically located on City of San Diego property, so that our results represent the dispersal biology and evolutionary history of this species across its entire range.

Protocol for amplifying a 658 bp portion of the mitochondrial gene cytochrome oxidase I (COI) was adapted from existing lab protocol for arthropods. (Bohonak has developed universal primers similar to LCO-1490 and HCO-2198 of Folmer et al. 1994). PCR products were cycle sequenced using BigDye v. 3 termination (Perkin-Elmer) and sequenced on an ABI 377 automated sequencer. Sequence alignments were conducted by eye using the program Sequencher. (Alignment is largely trivial, since COI is a protein-coding gene, and no insertions or deletions were detected.) Most individuals were cycle sequenced once in each direction.

For the final data set, evolutionary relationships among haplotypes will be determined using maximum parsimony with PAUP 4.0 (Swofford 2001), using Bayesian analysis with Mr. Bayes (Huelsenbeck and Ronquist 2004) and with network parsimony reconstruction as implemented in TCS (Clement et al. 2000). General population genetics summary statistics will be calculated using Arlequin v. 2.0 (Schneider et al. 2001). Geographic patterns will be interpreted using isolation by distance analyses (Bohonak 2002), standard phylogeography and nested clade analysis (Templeton 1998) using GeoDis (Posada et al. 2000). For this preliminary report on the preliminary data set, only a small subset of these analyses is presented.

Results

To date, DNA has been extracted from over 520 individual *B. sandiegonensis* from over 65 pools in 24 "pool complexes". (A pool complex is a local metapopulation of hydrologically linked pools). An additional 50 fairy shrimp from other species have also been extracted for use in comparative studies and as outgroups. Because data collection will be ongoing for another seven months, I present here a preliminary summary of haplotype distributions within and among pools for 223 individuals that have been sequenced to date.

Haplotype distributions

From the 223 *B. sandiegonensis* sequenced, 39 unique haplotypes ("alleles") have been found. Each of these alleles is a sequence that differs from all others by one or more base pairs. Table 1 summarizes allele distributions within and among pools, pool complexes and geographic regions. Unfortunately, there may be some confusion in nomenclature: the City's labeling scheme calls geographic regions "Complexes" and local metapopulation of hydrologically connected pools "Sites", although I prefer to call a local hydrologically linked set of pools a "complex. For clarity, Table 1 lists pools nested within complexes, nested within regions.

There are two dominant features in this data set. First, the numbers generally fall out along a diagonal, indicating that pool complexes are often fixed for unique haplotypes found nowhere else in the species. There is a high degree of endemicity apparent within local groups of hydrologically linked pools, and genetic differentiation among regions is high. This is particularly obvious in areas such as Ramona, Otay Mesa, Otay Lakes and Marron Valley, which have less influence from development and recreation than sites in Mira Mesa and Del Mar.

Second, two groups of haplotypes can be distinguished: "A" and "B". Haplotypes within group A or B differ from each other by relatively few mutational differences (<1% divergence). Divergence between A and B is much more pronounced (approximately 2.5% between pairs of alleles). This indicates that individuals from Group A and B have been isolated from one another biologically for tens of thousands or perhaps millions of years with little or no dispersal or hybridization.

Sample sizes are too small at this time to make definitive conclusions about variation within pools. However multiple alleles seem to be more prevalent in disturbed pools and those in suburban areas.

Geographic and phylogenetic analysis

A preliminary parsimony analysis was conducted with PAUP (heuristic search, 2000 random additions). Individuals from *B. lynchi, B. lindahli* and *B. coloradensis* were used as outgroups. A sample tree (1of 98 equally parsimonious trees) is presented in Figure 2.

It is clear from this analysis that:

1) *B. sandiegonensis* appears to represent a monophyletic taxon (i.e., a "good species" from an evolutionary perspective), but this can only be verified by a complete genetic and morphological analysis of the genus.
2) There is considerable genetic variation within this species.
3) There is a deep split between clades "A" and "B". Both clades are reciprocally monophyletic on all 98 maximally parsimonious trees.
4) Phylogenetic resolution with clades A and B will require additional analyses (e.g., nested clade analysis).
5) Clades A and B have unusual allopatric distributions (outlined in Figure 1), which do not correspond to any known current or past geologic features.
6) So far only 3 individual fairy shrimp violate the generalized distributions of clade A and B in Figure 1. (Note the outlying "1"s in Table 1.) Further analysis of these individuals will be undertaken to ensure that there were no contamination problems.

<u>Preliminary conclusions</u>

- The taxonomic status of *Branchinecta sandiegonensis* is uncertain, although it appears to be a "proper" monophyletic species at this time.
- There is high mtDNA divergence among hydrologically linked vernal pool "complexes".

- It is obvious that gene flow between pool complexes is limited in areas that are less impacted by development and recreation (e.g., vernal pool complexes in Ramona, Otay Mesa, Otay Lakes and Marron Valley).
- Two major clades were found; their distribution does not correspond to any obvious contemporary geographic barrier.
- Evolutionary significant units "ESUs" that should be considered for conservation include the two major clades and individuals pool complexes.
- According to some interpretations of the ESU concept, every pool complex could be considered an ESU worthy of separate consideration. This will require additional genetic analyses with other markers.

Caveats

All conclusions should be considered preliminary at this time. However, the preliminary conclusions regarding low dispersal, high genetic endemicity and ESU identification are unlikely to change with additional data. Additional sequences will help refine them quantitatively. The taxonomic status of Branchinecta coloradensis is outside the scope of this study and will have to be left for future work.

It is expected that this project will be completed by December 2004, with a final report presented in the spring of 2005. Results of this study will be disseminated to the scientific community through one or more peer-reviewed publications submitted beginning in 2004 or 2005.

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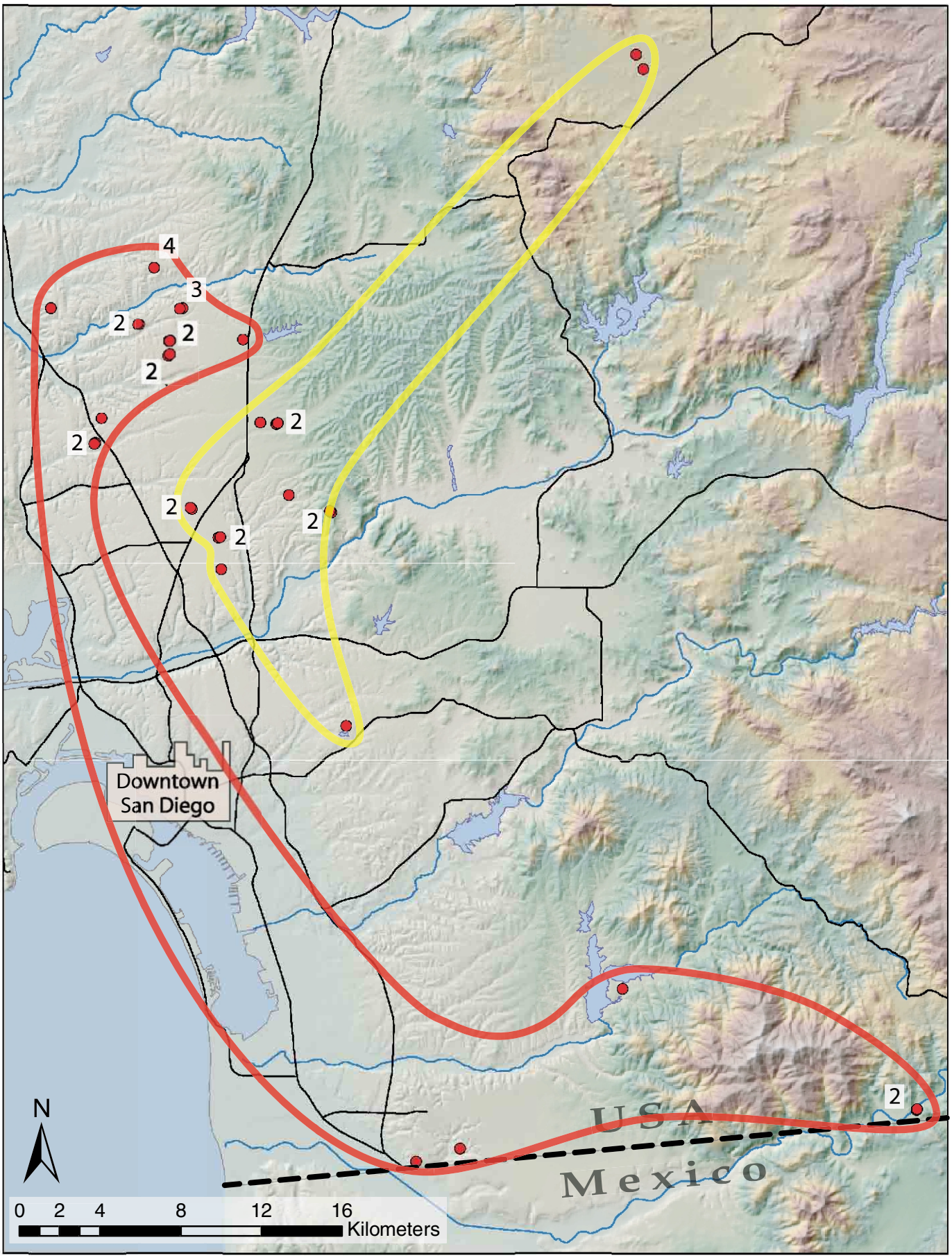
Table 1: Haplotype distributions within and among pool “complexes” (regions) and “sites” (local metapopulations of hydrologically linked pools).

Figure 1: Geographic distribution of samples, with the primary distributions of clades A and B circled. Only 3 of 197 individuals violate these primary distributions (see Table 1). Red dots indicate ponds sampled.

Figure 2: Phylogenetic tree of preliminary data set. This is one of 98 equally parsimonious trees.

-			Haplotype																														
Region	Complex	Pond	A01	A11	A03	A02	A12	A13	A15	A06	A05	A07	A08	A10	A21	A22	A14	A04	A19	A20	A16	A09	A18	A17									
Carmel Mountain	Carmel Mountain	1	4																														
Mira Mesa	Brown	1	1	2																													
		2	3																														
		3	1	1	2																												
	Winterwood	1	2					1																									
		2		1		1	1																										
		3	1						1																								
		4					1																										
		5	2					1		2																							
	Mesa Verde	1				4																											
		2	1			3																											
		3	5																														
	Maddox	1	2																														
		2	3				1																										
		4	3																														
		7									2																						
	Cousins	1	4																														
Nobel Drive	Nobel Drive	1	1			7						1	1																				
		2				4																											
		3				2								1																			
	Eastgate	1	1												1																		
		2				4																											
		4?				2																											
Del Mar	Bowtie	1	1												2	1																	
		2													2	1																	
		3					1								1		1																
	Del Mar Mesa East	2				1	1																										
		3					1																										
		4		3														1														
		5		1			2											1														
		mult. ruts													1																	
		RR1	1				1								1	1			1													
	Del Mar Mesa North	1													1					1												
		2	1												1																	
		3													2																	
Otay Lakes	Otay Lakes	1																			5											
Otay Mesa	Snake Cholla	2																			5	1										
	Goat Mesa	2																					5									
Marron Valley	Marron Valley	3																						5								
		5																						5								
Mission Trails	Mission Trails	1																														
		3																						1								
MFGD	Sander	1																														
		2				1																										
	Montgomery Field	6																														
	General Dynamics	1																														
		2																														
Chollas	Chollas	2																														
Miramar	A4	103.5																														
		105																														
	AA9	MC4																														
		K4																														
	AA10	MC5																														
		MC6																														
		68.3E																														
Ramona	Ramona	7																														
		17B																														
		W6																														
B.lindahli: Carmel Mountain	Carmel Mountain	1																														
		2																														
		4																														
		5																														
B.lindahli: Nobel drive	Pueblo	1																														
		2																														
B.lynchi: Mesa de Colorado	Mesa de Colorado	?																														
B.coloradensis	Mexican Cut	?																														
Grand Total			37	8	2	29	9	2	1	2	2	1	1	1	12	3	1	2	1	1	10	1	5	11								

-																									
Region	Complex	Pond	B07	B01	B02	B04	B09	B12	B13	BO6	B06	B08	B10	B11	B03	B14	B15	B16	B05	B17	LinA	LinB	LinC	x	Grand Total
Carmel Mountain	Carmel Mountain	1																							4
Mira Mesa	Brown	1																							3
		2																							3
		3																							4
	Winterwood	1																							3
		2																							3
		3																							2
		4																							1
		5																							5
	Mesa Verde	1																							4
		2																							4
		3																							5
	Maddox	1																							2
		2																							4
		4																							3
		7																							2
	Cousins	1																							4
Nobel Drive	Nobel Drive	1																							10
		2																							4
		3																							3
	Eastgate	1																							2
		2																							4
		4?																							2
Del Mar	Bowtie	1																							4
		2																							3
		3																							3
	Del Mar Mesa East	2																							2
		3																							1
		4																							4
		5																							4
		mult. ruts																							1
		RR1																							5
	Del Mar Mesa North	1								1															3
		2																							2
		3																							2
Otay Lakes	Otay Lakes	1																							5
Otay Mesa	Snake Cholla	2																							6
	Goat Mesa	2																							5
Marron Valley	Marron Valley	3																							5
		5																							5
Mission Trails	Mission Trails	1	2	2																					4
		3	1		2																				4
MFGD	Sander	1		1		4																			5
		2		2		2																			5
	Montgomery Field	6					1	1		2															4
	General Dynamics	1		1						1	1														3
		2							1	1	1		1	1											5
Chollas	Chollas	2								2	1	2													5
Miramar	A4	103.5		4						1															5
		105		4											1										5
	AA9	MC4															5								5
		K4		3													1								4
	AA10	MC5														2	2								4
		MC6														2	2	1							5
		68.3E														2	2	1							5
Ramona	Ramona	7																	5						5
		17B																	5						5
		W6																	3	1					4
B.lindahli: Carmel Mountain	Carmel Mountain	1																			1				1
		2																			2	1			3
		4																			4	6			10
		5																			3	2			5
B.lindahli: Nobel drive	Pueblo	1																					1		1
		2																					1		1
B.lynchi: Mesa de Colorado	Mesa de Colorado	?																						5	5
B.coloradensis	Mexican Cut	?																						1	1
Grand Total			3	17	2	6	1	1	1	8	3	2	1	1	1	6	12	2	13	1	10	9	2	6	250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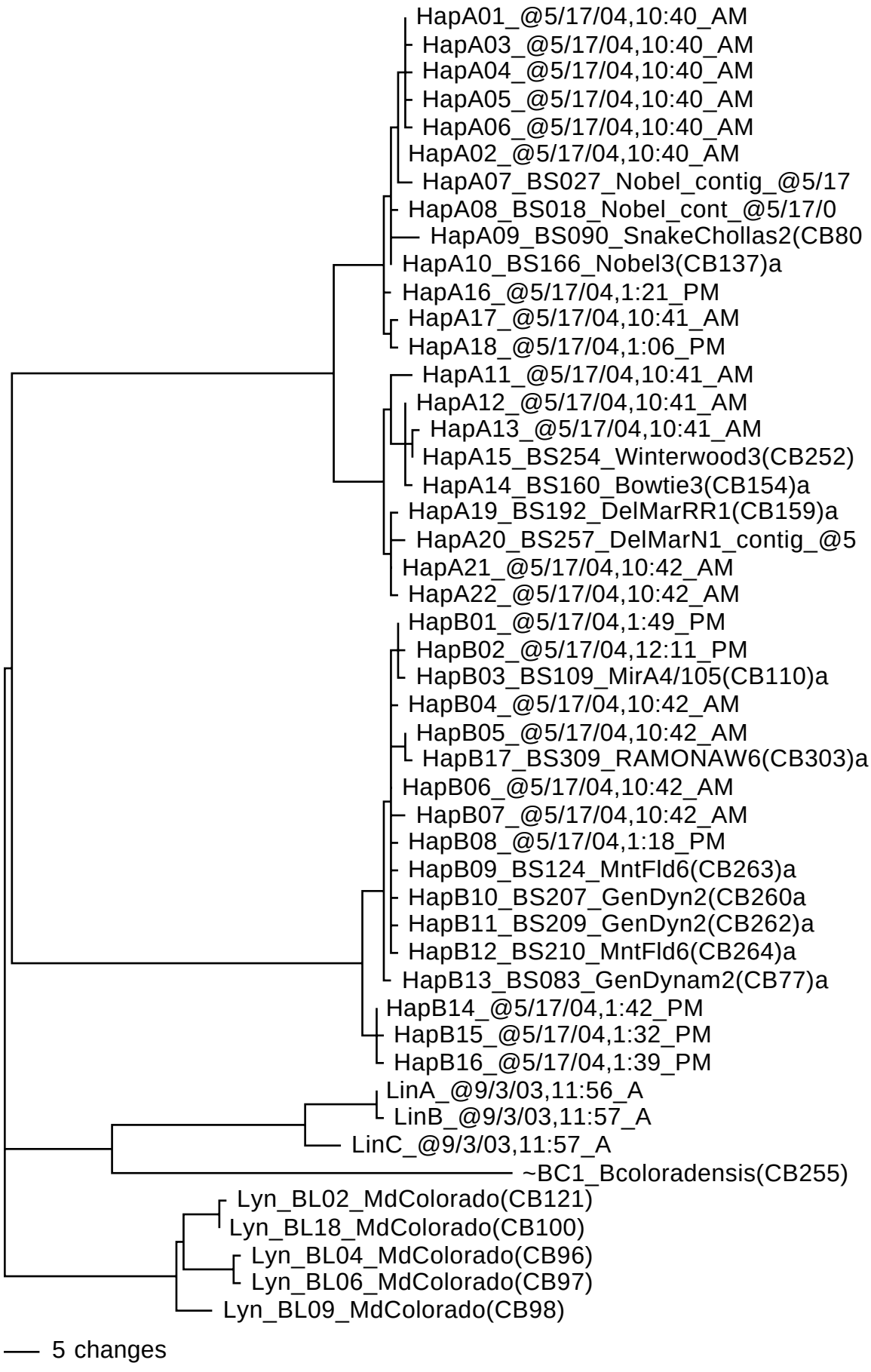
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HapA19_BS192_DelMarRR1(CB159)a
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HapA22_@5/17/04,10:42_AM
HapB01_@5/17/04,1:49_PM
HapB02_@5/17/04,12:11_PM
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HapB05_@5/17/04,10:42_AM
HapB17_BS309_RAMONAW6(CB303)a
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HapB10_BS207_GenDyn2(CB260a
HapB11_BS209_GenDyn2(CB262)a
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HapB14_@5/17/04,1:42_PM
HapB15_@5/17/04,1:32_PM
HapB16_@5/17/04,1:39_PM
LinA_@9/3/03,11:56_A
LinB_@9/3/03,11:57_A
LinC_@9/3/03,11:57_A
~BC1_Bcoloradensis(CB255)
Lyn_BL02_MdColorado(CB121)
Lyn_BL18_MdColorado(CB100)
Lyn_BL04_MdColorado(CB96)
Lyn_BL06_MdColorado(CB97)
Lyn_BL09_MdColorado(CB98)
5 changes