REFERENCE SITE CONDITIONS FOR RESTORATION OF COASTAL PRAIRIE NEAR SANTA CRUZ, CA, USA

Note: This report was excerpted from a survey and report to establish reference conditions for the University of California, Younger Lagoon Natural Reserve. It should be cited as "Holl, K. D. and L. K. Reed. 2010. Reference and baseline vegetation sampling for younger lagoon natural reserve. Report for the California Coastal Commission." Any questions about the report or data should be directed to Dr. Karen Holl, kholl@ucsc.edu.

Introduction

Coastal grassland and coastal scrub exist as a dynamic gradient from herbaceous to woody plant communities along a narrow strip of California that is strongly influenced by proximity to the Pacific Ocean (Ford and Hayes 2007). Extensive modification of coastal lands for agricultural and urban development has lead to drastic reductions in these once vast habitats. Given the disproportionately high biodiversity, including a multitude of rare and endemic species, and continued pressure for development in coastal lands, these habitats are of extremely high conservation value (Stromberg et al. 2002). Even on protected lands two factors challenge conservation management of these communities: presence of persistent or invasive exotic species and lack of appropriate disturbance regimes.

Restoration can broadly be defined as: "the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed" (Society for Ecological Restoration 2004). Defining restoration targets can be complicated. This is particularly true in cases such as that of the coastal prairie in which onsite analogs are entirely non-existent and variability in composition and percent native cover of local reference sites is not well known and notoriously variable. To overcome this challenge we consulted local experts and conducted extensive surveys of local reference sites. The following report summarizes the results a series of coastal prairie reference site surveys. We aimed to characterize the highest quality coastal prairie reference systems with respect to native cover (both total amount and variability), native species richness, and native composition in order to provide realistic targets for restoration, as well inform restoration species lists.

Materials and Methods

To inform the process of defining restoration goals, we identified and characterized a network of local remnant coastal prairie reference sites. Initially eight sites between Point Lobos at the south end of the Monterey Bay and Franklin Point just north of Davenport were identified as potential reference sites through consultation with local experts (Grey Hayes – Elkhorn Slough Coastal Training Program, Tim Hyland - California State Parks and YLR SAC member, Karen Holl – UCSC and YLR SAC chair). The main criteria were for sites to have a known high abundance of native grassland species and to be either located on the first marine terrace (an important geographic formation with unique edaphic features) or particularly close to the project location. Of the initial eight sites selected two (Lighthouse Field and Arana Gulch Greenbelt) were removed after field surveys revealed their relatively low abundance of native grassland species as compared to the rest of the reference sites (Table 1). The remaining six sites were surveyed between late-April and mid-May 2010 to capture peak cover for most species.

Vegetation at each site was measured along 50-m transects that were established along a randomly selected bearing. Herbaceous species composition was measured by visual estimation of absolute cover for each species in ten 0.25-m^2 quadrats along the transect. Quadrats were lain every 5 m on alternating sides of the transect starting at a randomly selected point between 1 and 5 meters (a total of 10 quadrats per transect). A clear plastic card with squares representing 1, 5, and 10% of the sampling frame was used to help guide visual cover estimations. Cover of each species (both native and exotic), bare ground, and litter were estimated at 5% intervals. Litter was specifically defined as residue from previous year's growth while any senescent material that was recognizable as growth from earlier in the current growing season was counted as cover

for that species. Shrub seedlings that were <0.25 m tall and wide were also included in these estimates. After all cover estimates had been made, observers surveyed within 2 m of either side of the transect (a 4 × 50 m belt) for any species not encountered in the frames. When transects intersected shrub cover, the starting and ending point of each shrub species' canopy was recorded to the nearest 0.10 m as a measure of shrub cover.

In addition literature was reviewed for other data on coastal terrace prairie plant composition; this included both published papers, as well as ongoing monitoring data from grasslands on the UCSC main campus.

Data analysis

We report means and standard deviation throughout. In summarizing the cover data we used midpoints of each cover class (e.g. 2.5, 7.5, 12.5) for absolute values. We calculated relative native cover as native cover/(native + exotic cover) excluding litter and bare ground from the calculation. We treated the quadrat as the sampling unit for averaging native cover values. We calculated species richness at the quadrat, transect, and site level.

Results

Reference site surveys

Reference sites exhibited wide variation both in native cover and composition of native plant species. Absolute native cover ranged from 20.2% (Moore Creek) to 39.5% (Whitehouse Creek) (Fig. 1, Table 1). Relative native cover was much higher than absolute cover at some sites where there was substantial litter cover (e.g. Point Lobos) or bare ground (e.g. Whitehouse Creek). Litter cover and bare ground ranged from 5.3% to 77.8% and 0 to 12.8%, respectively (Table 1).

The variability in absolute native cover across these sites was high with an average standard deviation of 18.1% across all sites (Fig. 1, Table 1) and a wide range of native cover classes represented within all sites (Fig. 2).

Native species richness at both the plot and transect scale varied widely among sites but was relatively consistent among transects within the same site (Figs. 3 & 4). The total number of species at a given site ranged from 5 at New Brighton to 41 at Point Lobos (Fig. 5).

Nearly 75% of native cover was comprised of native perennial grasses (Fig. 6) although they constituted only 8 of the over 50 species recorded. Common native community dominants included the perennial grasses *Danthonia californica*, *Nassella pulchra*, *Deschampsia cespitosa,* and *Hordeum brachyantherum*. Perennial graminoids in the genera *Carex* and *Juncus* were also prominent in these sites and these were accompanied by a suite of at least 31 identified native forbs (Table 2). Native perennial forb cover was over twice as high as native annual forb cover.

Review of literature

Reference sites – Review of available numbers from the literature (Stromberg et al. 2001, Hayes and Holl 2003 a,b, Hopkinson et al. 2009) and monitoring data on the main UCSC campus indicate a high variability in the cover of both native grasses and forbs. Average native grass cover at multiple sites was 50-60% in Stromberg et al. (2001), 36-71% (relative cover) in Hopkinson et al. (2009), and 30-35% in Hayes and Holl (2003a); all three studies targeted sites where native cover was known to be high. On the UCSC main campus native grass cover values range from 0-25% (Table 3). Absolute native forb cover (primarily perennials) was 10-15% in Stromberg et al. (2001) and Hayes and Holl (2003a), and annual forb cover was always <1%.

Restoration – Rein et al. (2007) aimed to establish native grass buffer strips adjacent to agricultural lands at two sites near Elkhorn Slough. At both sites they found that seeded native grasses took two years to establish fully. At Azevedo Ranch, native grasses (primarily *Bromus carinatus*) reached >80% cover in the second year, but by the fourth year native cover dropped to <5% due to competition with exotic grasses (*Lolium multiflorum* and *Vulpia myuros*) and forbs (primarily *Picris echioides* and *Senecio* sp.). At Blohm Ranch native cover only reached 20-25% in the second year, after which time monitoring ceased. Corbin and D'Antonio (2004) found that densely planted (12-cm separation) native grass plugs established well and were able to withstand exotic invasion over the four years of their study at a coastal prairie site in Marin County. Stromberg et al. (2007) summarize a number of California grassland restoration projects, mostly from inland grasslands. Their results show that while many grassland restoration projects have good native establishment in the first few years that competition from exotics is an ongoing issue and that in many sites native cover drops to 30% or less a few years after planting.

Discussion

Reference sites and target conditions

A variety of site histories and recent management may strongly influence the likelihood for a site to support native assemblages. The three reference sites with the highest native cover and richness (Whitehouse Creek, Point Lobos, and Palo Corona) all have large areas that have not been tilled for conventional agriculture and all of the sites are actively managed with either

seasonal cattle grazing or periodic fire. Two of the sites with the lowest native cover and richness (New Brighton and Wilder Ranch) are neither grazed nor burned (Table 1). Given past research showing the strong effect of tilling on coastal prairie native plant diversity and richness (Stromberg and Griffin 1996) and the challenge of restoring these systems (Corbin et al. 2004, Stromberg et al. 2007), it is unrealistic to think that the higher cover values of Whitehouse Creek and Point Lobos State Park are achievable in an area with extensive past agricultural usage. Much past research has shown the importance of ongoing management such as grazing, fire, or mowing (Hayes & Holl 2003 a,b, Corbin et al. 2004, Hopkinson et al. 2009) in maintaining native cover in many coastal prairie sites.

Recommendations for species to be planted

The results of the reference site surveys provide useful information for the refinement of a species pallet for coastal prairie restoration near Santa Cruz. Two important parameters in this regard are species composition and functional group representation. Spatial and temporal variation in species composition in these grasslands limit the amount of diversity that can be captured in any one survey so this list is certainly not a complete list of appropriate native species that might be found in local reference sites. Several of the studies included in Table 3 also include species lists that could be consulted in developing species palettes. Figure 6 shows the relative contribution of each functional group to cover in the reference sites, which could be used as a guide in developing composition targets. It should be noted that maintaining representation of some functional groups, particularly any of the native annuals, may require introducing propagules at higher rates than their proportional representation in established communities.

Acknowledgements

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Works Cited

Corbin, J.D., and D'Antonio, C.M. 2004. Competition between native perennial and exotic annual grasses: implications for an historical invasion. *Ecology* **85**, 1273-1283.

Corbin, J.D., D'Antonio, C.M., and Bainbridge, S.J., 2004. Tipping the balance in the restoration of native plants. In: Gordon, M.S., Bartol, S.M. (Eds.), Experimental approaches to conservation biology. University of California Press, Berkeley, CA, pp. 154-179.

Hayes, G.F. and Ford, L.D. 2007. Northern Coastal Scrub and Coastal Prairie. In: Barbour, M.G., Keeler-Wolf, T., & Schoenherr, A.A. (Eds.), Terrestrial Vegetation of California. University of California Press. Berkeley, pp 180-207.

Hayes, G.F., and Holl, K.D. 2003a. Cattle grazing impacts on annual forbs and vegetation composition of mesic grasslands in California. *Conservation Biology* **17**, 1694-1702.

Hayes, G.F., and Holl, K.D. 2003b. Site-specific responses of native and exotic species to disturbances in a mesic grassland community. *Applied Vegetation Science* **6**, 235-244.

Hopkinson, P., Hammond, M., Spiegal, S., and Bartolome, J.W., 2009. Quantitative assessment and characterization of selected state parks grasslands. Report prepare for California Department of Parks Recreation.

Lynn, L. 2007. UCSC Site stewardship grassland monitoring program progress report. Senior internship project, UC Santa Cruz.

Rein, F.A., Los Huertos, M., Holl, K.D., and Langenheim, J.H. 2007. Restoring native grasses as vegetative buffers in a coastal California agricultural landscape. *Madroño* **54**, 249-257.

Seabloom, E.W., Harpole, W.S., Reichman, O.J., and Tilman, D. 2003. Invasion, competitive dominance, and resource use by exotic and native California grassland species. *Proceedings of the National Academy of Sciences of the United States of America* **100**, 13384-13389.

Society for Ecological Restoration. 2004.International Primer on Ecological Restoration. Online version retrieved June 22, 2010 from: http://www.ser.org/pdf/primer3.pdf.

Stromberg, M.R., and Griffin, J.R. 1996. Long-term patterns in coastal California grasslands in relation to cultivation, gophers, and grazing. *Ecological Applications* **6**, 1189-1211.

Stromberg, M. R., Kephart, P., and Yadon, V. 2001. Composition, invasibility, and diversity in coastal California grasslands. Madroño **48**, 236-52.

Stromberg, M.R., D'Antonio , C. M., Young, T.P., Wirka, J., and Kephart, P. R., 2007. California grassland restoration. In: Stromberg, M.R., Corbin, J. D., D'Antonio, C. M. (Eds.), California Grasslands. University of California Press, Berkeley, pp. 254-280.

Tables and Figures

Table 1. Site history and management based on personal communication with managers at each site (specific to sampling areas within site). Cover values are mean ± SD.

Site	Tilled	Recent Management	Native Cover (%)	Litter Cover (%)	Bare Ground (%)
Whitehouse Creek – Año Nuevo SP	No	Fall burn every two years for last 15, herbicide for gorse and Harding grass	39.5 ± 19.4	5.3 ± 6.7	12.8 ± 8.7
Point Lobos SP	No	Grazed in past, burned a few times in last 15 years	39.2 ± 20.0	52.8 ± 33.5	7.0 ± 13.9
Palo Corona Ranch	No	Winter and spring cattle grazing.	32.6 ± 15.7	18.7 ± 21.3	0.0
New Brighton SP	Unknown (unclear whether sampling was done in known historically tilled areas)	Manual and herbicide removal of exotic shrubs	24.6 ± 14.6	72.0 ± 26.2	2.5 ± 5.6
Moore Creek	Unknown	Seasonal cattle grazing	20.2 ± 13.5	43.2 ± 24.8	0.8 ± 1.7
Wilder Ranch SP	Unknown	None	25.1 ± 25.4	77.8 ± 18.2	0.0

Table 2. Native species encountered during reference site surveys in spring 2010. AG=annual grass, AGRM=annual graminoid, AF=annual forb, AL=annual legume, PG=perennial grass, PGRM=perennial graminoid, PF=perennial forb, GEO=geophyte

Species	Functional Group	Species	Functional Group
Achillea millefolium	PF	*Juncus patens*	PGRM
Armeria maritima	PF	*Juncus sp1*	PGRM
Aster chilensis	PF	*Juncus sp2*	PGRM
Baccharis pilularis	SHRUB	*Juncus phaeocephalus*	PGRM
Brodiaea terrestris	GEO	*Lasthenia sp*	AF
Bromus carinatus	PG	*Leymus triticoides*	PG
Camissonia ovata	PF	*Lotus formosissimus*	PL
Carex harfordii	PGRM	*Lupinus nanus*	AL
Carex sp. 1	PGRM	*Lupinus veriicolor*	PL
Carex sp 2.	PGRM	*Luzula comosa*	PGRM
Chlorogalum pomeridianum	GEO	*Mimulus aurantiacus*	SHRUB
Cirsium brevistylum	PF	*Nassella pulchra*	PG
Cirsium quercetorum	PF	*Perideridia sp*	PF
Cryptantha angustifolia	AF	*Ranunculus californica*	PF
Danthonia californica	PG	*Rubus ursinus*	SHRUB
Deschampsia cespitosa	PG	*Sidalcia malviflora*	PF
Distichlis spicata	PG	*Sisyrinchum bellum*	PF
Elymus glaucus	PG	*Stachys bullata*	AF
Eryngium armatum	PF	*Toxicodendron diversilobum*	SHRUB
Eschscholzia californica	AF	*Trifolium oliganthum*	AL
Gnaphalium sp	PF	*Triphysaria versicolor*	AF
Grindelia sp	PF	*Triteleia hyacinthina*	GEO
Hemizonia sp	AF	*Triteleia ixioides*	GEO
Hordeum brachyantherum	PG		
Juncus bufonius	AGRM		
Juncus effusus	PGRM		
Juncus occidentalis	PGRM		

Table 3. Review of past research on native grass and forb cover in coastal prairie along the central California coast

Location of Sites	History of site	Year sampled	cover of native grasses	cover native forbs	Source of data
UCSC - Marshall Meadows	burned periodically, not tilled	2006-2007	17-26	ND	Lynn 2007
UCSC - Inclusion Area A	grazed, mima mounds, not tilled	2005-2007	2-6	ND	Lynn 2007
UCSC - Inclusion Area D	mowed in recently years	2006-2007	15-18	ND	Lynn 2007
UCSC - Great Meadow	parts mowed but not managed in most of the area in recent years	2004-2007	1-7	ND	Lynn 2007
UCSC - Lower Hagar Meadow	grazed	2006-2007	2-8	ND	Lynn 2007
UCSC - East Field	grazed	2004-2007	1-3	ND	Lynn 2007
25 paired grazed-undergrazed plots along the California coast	half were grazed and half ungrazed	2000-2001	30-35	8-18	Hayes and Holl 2003a
UCSC - East Field	research plots with different clipping regimes	1999-2008	0-1	0-1	Hayes and Holl 2003b and unpublished data
Swanton Pacific Ranch	research plots with different clipping regimes	1999-2008	10-20	0-1	Hayes and Holl 2003b and unpublished data
Porter Ranch - Elkhorn Slough	research plots with different clipping regimes	1999-2008	15-50 in clipped or grazed plots, 1-20 in controls	0-1	Hayes and Holl 2003b and unpublished data
33 coastal grassland stands from Morro Bay to San Francisco	not recently cultivated of grazed, selected because of known high native grass cover	1996-1997	50-60	12.2 ± 2.7 (perennial forbs)	Stromberg et al. 2001
Wilder Ranch State Park	targeted areas with high native grass cover	2008	61	1	Hopkinson et al. 2008
Año Nuevo State Park	targeted areas with high native grass cover	2008	46	31	Hopkinson et al. 2008

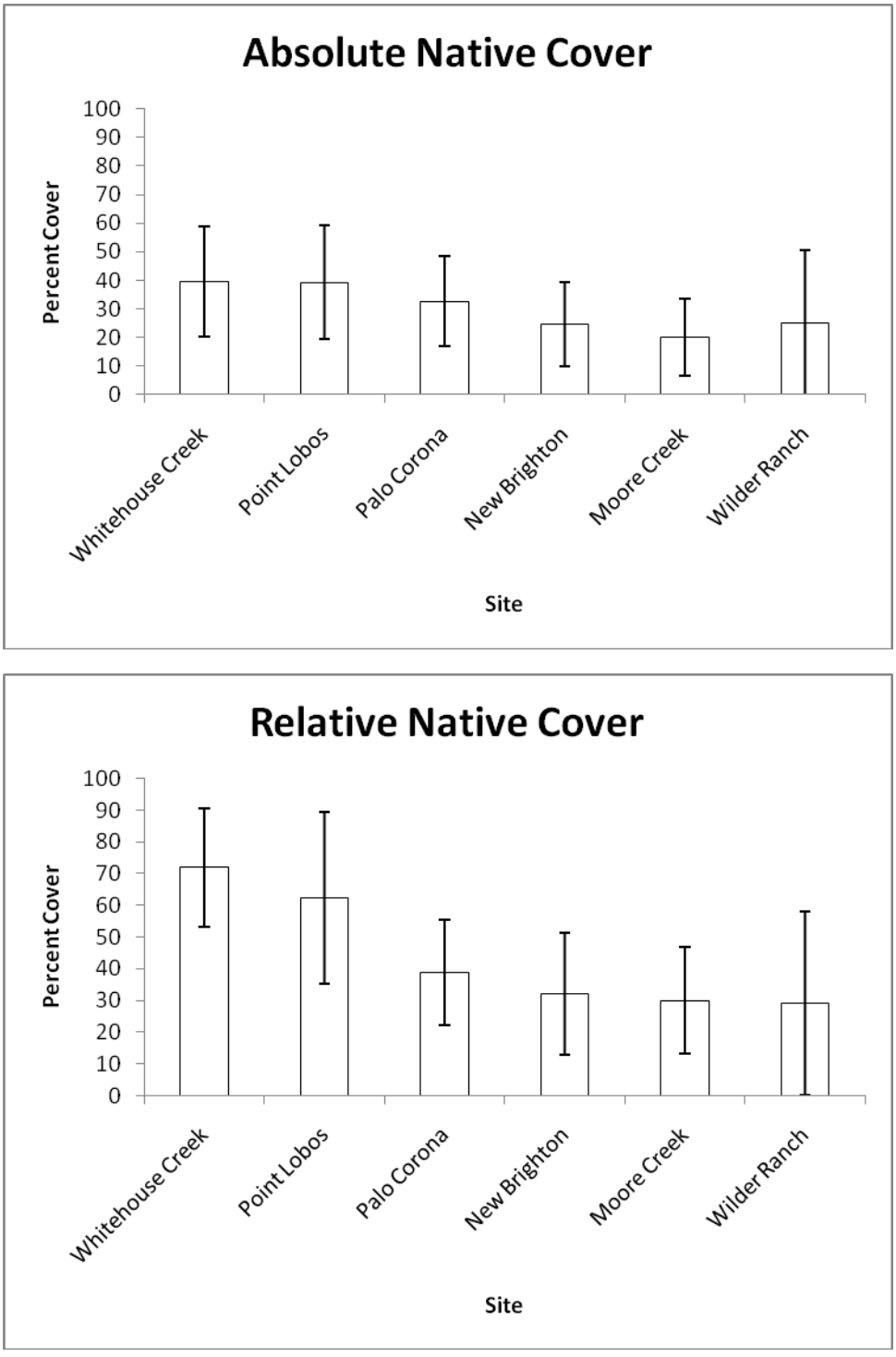

Figure 1. Absolute cover (top) and relative cover (bottom) of native species at six reference sites. Values are means of all quadrats (n=20-40) and errors bars indicate 1 SD.

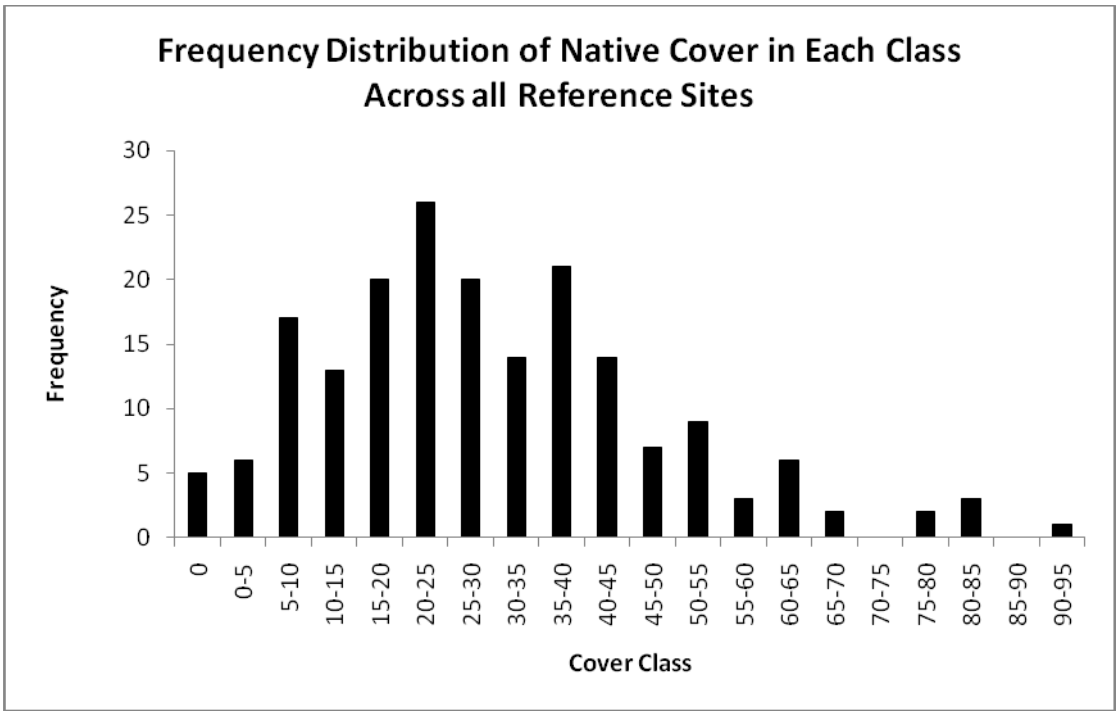

Figure 2. Number of quadrats (frequency) with different native cover classes across all reference sites.

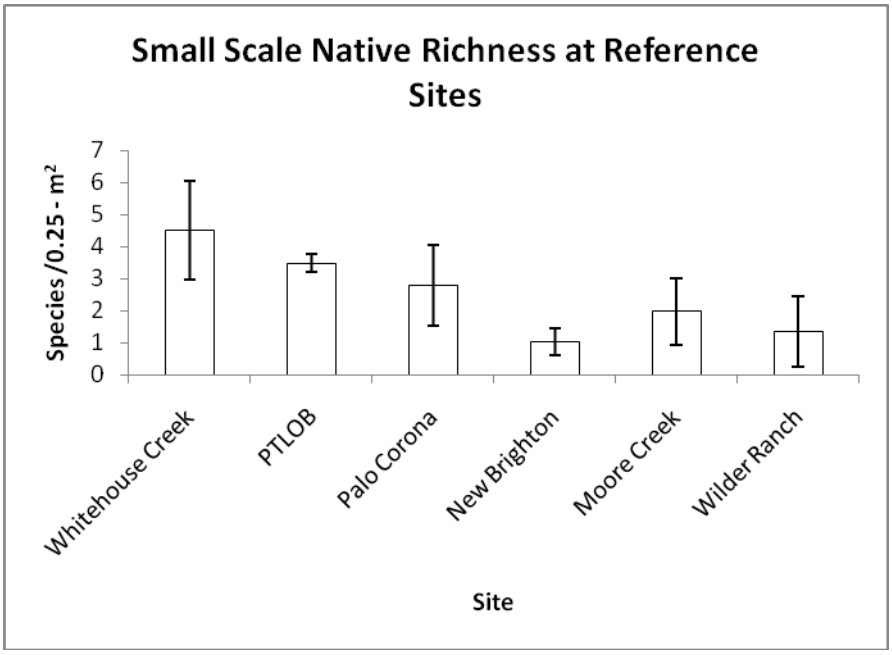

Figure 3. Average number of species (S) in individual 0.25-m^2 quadrats at each reference site. Values are means of all quadrats (n=20-40) and errors bars indicate 1 SD.

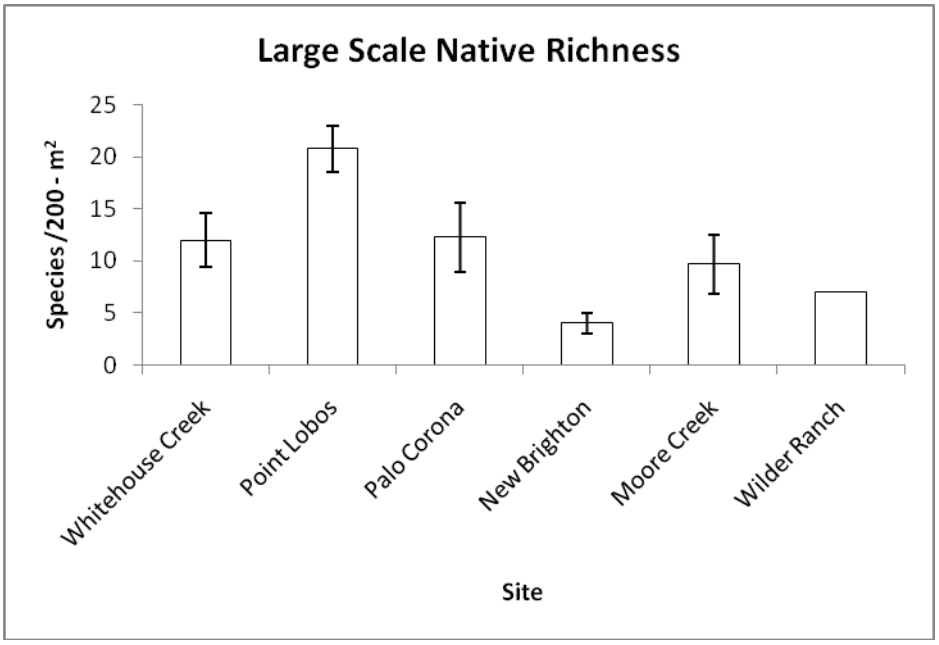

Figure 4. Average number of species along each belt transect (4 × 50 m) at each site. Values are means of all transects (n=2-4) and errors bars indicate 1 SD. Note that both transects at Wilder Ranch had the same number of species so there was no error estimate.

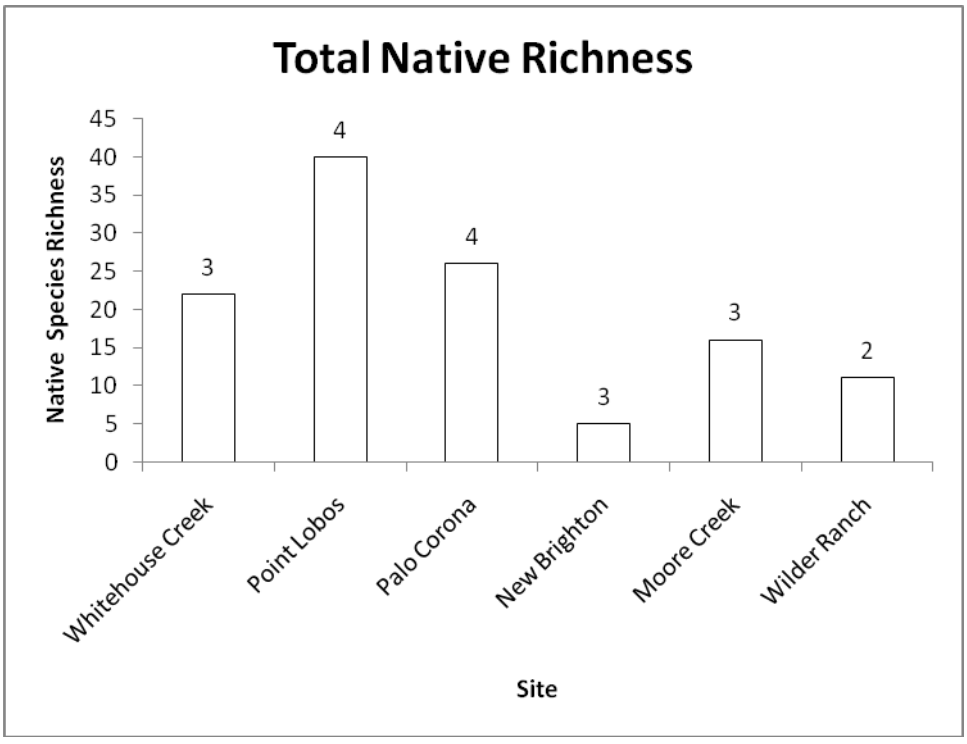

Figure 5. Number of total species found at each site. The number above the bar indicates the number of transects taken at that site.

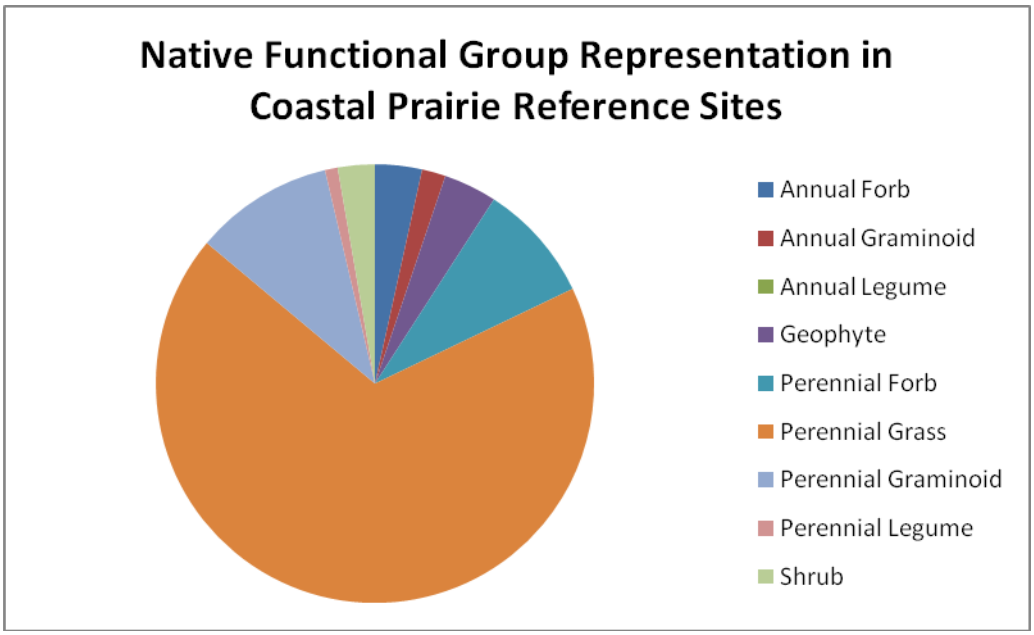

Figure 6. Relative contribution of each functional group to native community cover.

Appendix 1. Reference site transect GPS point.

Transect	Start		End	
Whitehouse Creek 1	10S 0558844	4111132	10S 0558800	4111109
Whitehouse Creek 2	10S 0558528	4111012	10S 0558494	4110974
Whitehouse Creek 3	10S 0558395	4110803	10S 0558407	4110752
Wilder Ranch 1	10S 0581890	4090542	10S 0581955	4090516
Wilder Ranch 2	10S 0581890	4090551	10S 0581933	4090522
Moore Creek 1	10S 0582870	4091732	10S 0582880	4091689
Moore Creek 2	10S 0582934	4091755	10S 0582901	4091798
Moore Creek 3	10S 0583015	4091646	10S 0583023	4091692
New Brighton 1	10S 0595781	4093352	10S 0595735	4093351
New Brighton 2	10S 05095428	4093141	10S 05095417	4093099
New Brighton 3	10S 0595778	4093357	10S 0595810	4093371
Palo Corona 1	10S 0596970	4043190	10S 0596916	4043167
Palo Corona 2	10S 0596880	4043259	10S 0596851	4043223
Palo Corona 3	10S 0596834	4093117	10S 0596883	4043126
Palo Corona 4	10S 0596904	4043124	10S 0596953	4043141
Point Lobos 1	10S 0594346	4041479	10S 0594322	4041513
Point Lobos 2	10S 0594540	4041439	10S 0594598	4041445
Point Lobos 3	10S 0594619	4041407	10S 0594656	4041419
Point Lobos 4	10S 0594953	4042015	10S 0594956	4041974

Appendix 2. Reference site richness data. S quadrat is the number of species found in all quadrats in a transect. S belt is the additional species found in the belt transect but not in individual quadrats and S total is the sum of the two numbers.

Transect	S Quad.	S Belt	S Total
Wilder1	5	2	7
Wilder2	2	5	7
WHCRK1	6	3	9
WHCRK2	10	3	13
WHCRK3	13	1	14
PTLOB1	13	8	20
PTLOB2	12	8	20
PTLOB3	15	9	24
PTLOB4	12	7	19
MRCRK1	7	6	13
MRCRK2	5	3	8
MRCRK3	5	3	8
NBR1	3	1	4
NBR2	2	1	3
NBR3	3	2	5
PALCOR1	10	2	12
PALCOR2	8	2	10
PALCOR3	6	4	10
PALCOR4	12	5	17

Appendix 3. Species list, functional group and origin of all species found at Younger Lagoon Reserve and reference sites.

Abbreviation	SPECIES	Functional Group	ORIGIN
ACHMIL	*Achillea millefolium*	PF	N
AIRCAR	*Aira caryophyllea*	AG	E
ANAARV	*Anagallis arvensis*	AF	E
ARMMAR	*Armeria maritima*	PF	N
ASTCHI	*Aster chilensis*	PF	N
AVESP	*Avena sp*	AG	E
BACPIL	*Baccharis pilularis*	SHRUB	N
BRIMAX	*Briza maxima*	AG	E
BRIMIN	*Briza minor*	AG	E
BROCAR	*Bromus carinatus*	PG	N
BRODIA	*Bromus diandrus*	AG	E
BROHOR	*Bromus hordeaceus*	AG	E
BROTER	*Brodiaea terrestris*	GEO	N
CAMOVA	*Camissonia ovata*	BF	N
CARHR	*Carex harfordii*	PGRM	N
CARPYN	*Carduus pyncnocephalus*	AF	E
CARSP1	*Carex sp1*	PGRM	N
CARSP2	*Carex sp2*	PGRM	N
CHLPOM	*Chlorogalum pomeridianum*	GEO	N
CIRBREV	*Cirsium brevistylum*	BF	N
CIRQUE	*Cirsium quercetorum*	PF	N
CIRVUL	*Cirsium vulgare*	BF	E
CONARV	*Convolvulus arvensis*	PF	E
CONMAC	*Conium maculata*	BF	E
CONSP1	*Conyza sp*	BF	E
CRYANG	*Cryptantha angustifolia*	AF	N
DANCAL	*Danthonia californica*	PG	N
DESCES	*Deschampsia cespitosa*	PG	N
DISSPIC	*Distichlis spicata*	PG	N
ELYGLA	*Elymus glaucus*	PG	N
EROBOT	*Erodium botrys*	AF	E
ERYARM	*Eryngium armatum*	PF	N
ESCCAL	*Eschscholzia californica*	AF	N
FILGAL	*Filago galica*	AF	E
GALSP1	*Galium sp1*	AF	U
GALSP2	*Galium sp2*	AF	U
GERDIS	*Geranium dissectum*	AF	E

GNASP1	*Gnaphalium*	PF	N
GRISP	*Grindelia sp.*	PF	N
HEMSP1	*Hemizonia sp.*	AF	N
HOLLAN	*Holcus lanatus*	PG	E
HORBRA	*Hordeum brachyantherum*	PG	N
HORLEP	*Hordeum murinum ssp leporinium*	AG	E
HORMAR	*Hordeum marinum*	AG	E
HYPRAD	*Hypochaeris radicata*	PF	E
JUNBUF	*Juncus bufonius*	AGRM	N
JUNEFF	*Juncus effusus*	PGRM	N
JUNOCC	*Juncus occidentalis*	PGRM	N
JUNPAT	*Juncus patens*	PGRM	N
JUNPHA	*Juncus phaeocephalus*	PGRM	N
JUNSP1	*Juncus sp1*	PGRM	N
JUNSP2	*Juncus sp2*	PGRM	N
LASSP1	*Lasthenia sp*	AF	N
LEYTRI	*Leymus triticoides*	PG	N
LINBIE	*Linum bienne*	AF	E
LOLMUL	*Lolium multiflorum*	AG	E
LOTCOR	*Lotus corniculatus*	PL	E
LOTFOR	*Lotus formosissimus*	PL	N
LUPNAN	*Lupinus nanus*	AL	N
LUPVAR	*Lupinus veriicolor*	PL	N
LUZCOM	*Luzula comosa*	PGRM	N
MEDPOL	*Medicago polymorpha*	AL	E
MELOFF	*Melilotus officinalis*	BL	E
MIMAUR	*Mimulus aurantiacus*	SHRUB	N
NASPUL	*Nassella pulchra*	PG	N
OXAPES	*Oxalis pes-caprae*	PF	E
PERSP1	*Perideridia sp.*	PF	N
PHASP1	*Phalaris sp.*	PG	E
PICECH	*Picris echoides*	BF	E
PINRAD	*Pinus radiata*	TREE	N
PLACOR	*Plantago coronopus*	BF	E
PLALAN	*Plantago lanceolata*	PF	E
POLPOG	*Polypogon monspeliensis*	AG	E
POLPUN	*Polygonum punctatum*	PF	E
RANCAL	*Ranunculus californica*	PF	N
RAPSAT	*Raphanus sativa*	BF	E
RUBURS	*Rubus ursinus*	SHRUB	N
RUMACE	*Rumex acetosella*	PF	E
RUMCRI	*Rumex crispus*	BF	E
SANSP1	*Sanicula sp.*	BF	U

SIDMAL	*Sidalcia malviflora*	PF	N
SILGAL	*Silene galica*	AF	E
SISBEL	*Sisyrinchum bellum*	PF	N
SONASP	*Sonchus asper*	BF	E
STABUL	*Stachys bullata*	AF	N
TOXDIV	*Toxicodendron diversilobum*	SHRUB	N
TRIANG	*Trifolium angustifolium*	AL	E
TRIDUB	*Trifolium dubium*	AL	E
TRIHYA	*Triteleia hyacinthina*	GEO	N
TRIIXI	*Triteleia ixioides*	GEO	N
TRIOLI	*Trifolium oliganthum*	AL	N
TRISUB	*Trifolium subterraneum*	AL	E
TRIVER	*Triphysaria versicolor*	AF	N
VICSAT	*Vicia sativa*	AL	E
VICVIL	*Vicia villosa*	AL	E
VULMYU	*Vulpia myuros*	AG	E