Vegetation Monitoring for the MSCP – Jumpstart for Field Season 2008

Final Report

Natural Communities Conservation Program
Local Assistance Grant #P0782006
June, 2008

Prepared for: California Department of Fish and Game
Contracts Manager: Dr. Brenda S. Johnson

Prepared by: Department of Biology, San Diego State University
Dr. Douglas Deutschman, PI, Spring Strahm, David Bailey,
Dr. Janet Franklin, Dr. Rebecca Lewison

SAN DIEGO STATE UNIVERSITY

Contents

Introduction

San Diego's Multiple Species Conservation Program (MSCP) intends to conserve the diversity and function of the southwestern San Diego County ecosystem through preservation and adaptive management of habitat. The MSCP also aims to conserve 85 specific "covered" species. The reserve system currently includes over 127,000 acres of land. Monitoring and management responsibility for this large network of land lies with multiple jurisdictions, particularly the County and City of San Diego, and participating wildlife agencies such as U.S. Fish and Wildlife Service, California Department of Fish and Game, and U.S. Geological Survey.

The *Biological Monitoring Plan for the Multiple Species Conservation Program* (MSCP) in San Diego was developed initially by Ogden Environmental and Energy Services in 1996 (Ogden 1998). The original monitoring plan has been criticized as cumbersome, inefficient and of limited scientific utility. In the past 10 years, several attempts have been made to address the criticisms of the original MSCP monitoring plan. Although some revisions have been proposed, none have been widely implemented, and there is still debate about how to meet the monitoring goals of the MSCP.

San Diego's Multiple Species Conservation Program (Ogden 1996) describes two primary biological goals:

- Conserve the diversity and function of the ecosystem through the preservation and adaptive management of large blocks of interconnected habitat and smaller areas that support rare vegetation communities (e.g. vernal pools).
- Conserve specific species at levels that meet the take authorization issuance standards of the federal Endangered Species Act and California's Natural Community Conservation Planning Act.

This project builds on the Deutschman et al. LAG project (Agreement #P0685105) and the Franklin, Regan and Deutschman LAG project (Agreement #P0450009, (Hierl 2005; Franklin 2006; Regan 2006; Deutschman 2007; Hierl, Deutschman et al. 2007)) and complements the ongoing LAG to the City of San Diego to develop animal species monitoring protocols (Agreement #P0585100, (McEachern, Pavlik et al. 2007)). This project provided jumpstart funding for the second year of data collection started in the Deutschman et al. LAG project in 2007. The data are being collected to evaluate the accuracy of different sampling designs and field protocols for monitoring Coastal Sage Scrub (CSS) and chaparral habitats. Ongoing support for the project after July 1, 2008 is expected from monitoring moneys allocated as part of the TransNet Environmental Mitigation Program.

In 2007, we began testing several protocols for monitoring vegetation communities across 8 sites (4 in chaparral, 4 in coastal sage scrub) reserves within the MSCP (Figure 1).

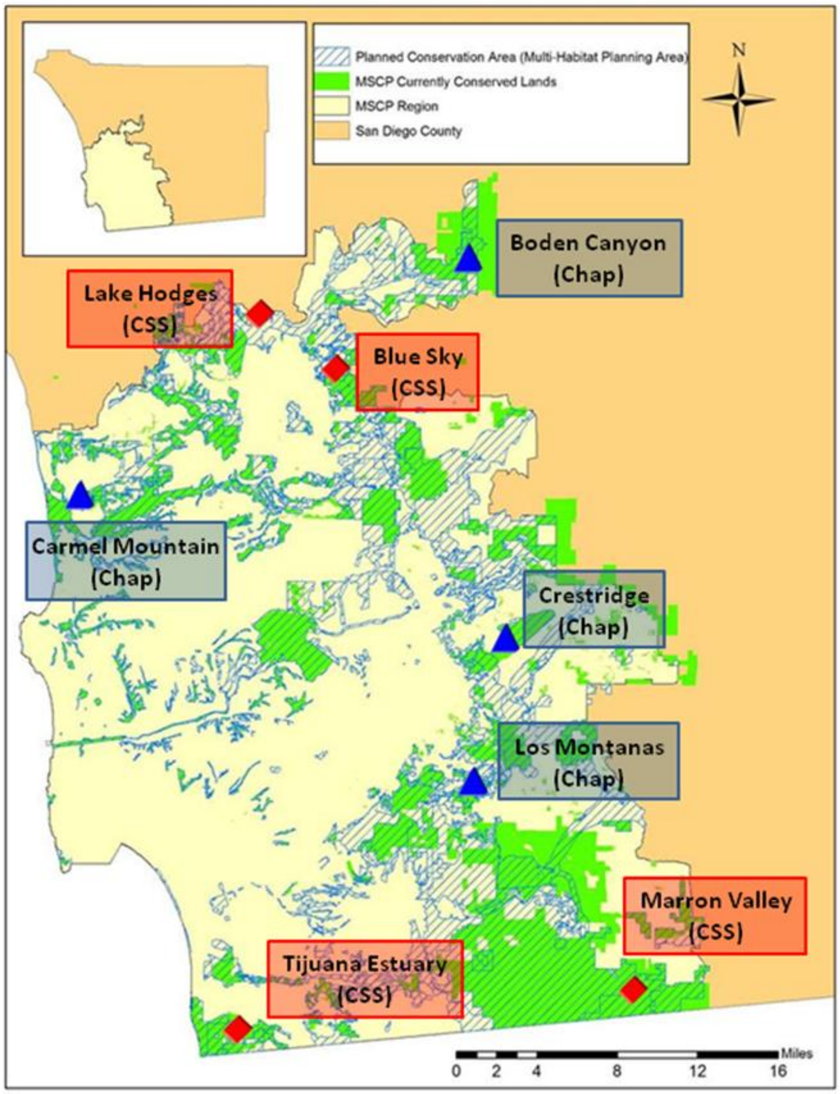

Figure 1: *Sampling at 8 sites (4 CSS – red diamonds, 4 chaparral –blue triangles). Each site contains three 50m by 20m plots.*

We used 3 different protocols on our 20 by 50m plots (.1ha) (figure 2). First, we estimated cover in 10m by 10m subplots using visual estimation (similar to the CNPS relevé method (CNPS 2004), Figure 2 and 3). Second, we used point intercept (transect) to estimate relative abundance along the long axes of the plot (Figure 2 and 3). Third, we placed twenty 1 m^2 quadrats in a systematic design (Figure 2 and 3). In addition, each plot was visited by at least two different field teams in order to estimate inter-observer bias and variability.

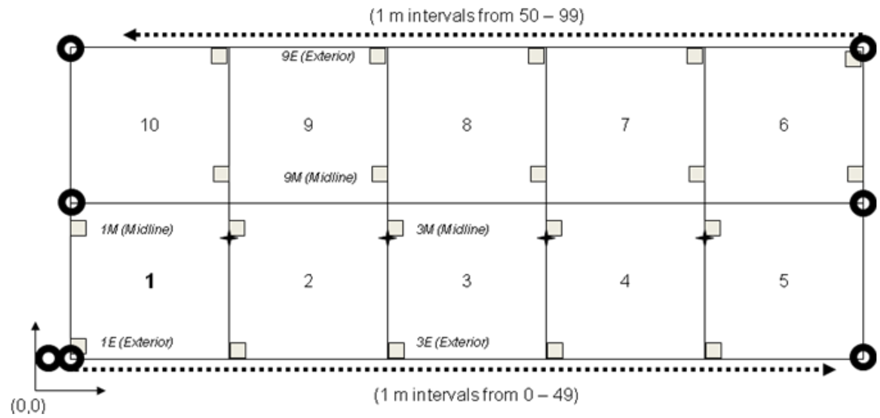

Figure 2: *Modified Keeley plot (Keeley and Fotheringham 2005). Large boxes represent visual cover sub-plots, dashed lines represent point intercept transects, small grey squares represent quadrats.*

Comparison across protocols and field teams revealed several significant results.

- Point intercept transects were the most time efficient and repeatable method in the field. It took the least amount of time to set up the plot, the least amount of time to collect data, and was less prone to differences among observers. Unfortunately, point intercept also yielded the lowest estimate of species richness.
- Visual cover, counter to expectations, was almost as slow as quadrats, but was highly variable from team to team.
- Quadrats were time consuming, but excellent at picking up less common species missed during point intercept transects.
- Travel time to sites and between plots put an upper limit on the number of plots that could be finished in a day.

Figure 3: *Implementing field methods. From left to right: Visual cover, point intercept transects, quadrats.*

Variance components analysis revealed additional information about the sources of spatial and methodological variability.

- Spatial factors, such as site and plot play a significant role in the cover of individual species, species functional group cover and species richness. At the end of 2007 it was therefore advisable to expand the number of sites visited and the number of plots sampled.
- Team played a significant role in estimating the cover of easily misidentified or less common species. Team also played a role in species diversity estimates. This signal is largely attributable to team experience, and therefore it was advisable to attempt to spend more time training teams, and attempt to retain team members as their experience increased.
- Method played a significant role in functional group cover, the cover of certain exotic species, and species richness. Given other factors, including the speed of the method, it was decided to drop the visual cover method

These results suggest that the impact of different methods and observers is dependent on the specific question (for example richness versus cover of a dominant shrub). In addition, these differences may have been less obvious in 2007 because of the extended drought. In wetter years, it is likely that more species would have been detected and may have had higher cover. These factors could impact the variance components analysis as natural temporal variability. It is therefore crucial to continue the sampling effort.

Field Work

This year we adapted our training and sampling protocols to reflect what we learned in 2007. We targeted the two most accurate and efficient protocols, spent more time training field crews and greatly expanded our number of sites and plots.

The project also had to make numerous unplanned adjustments, following the October 2007 wildfires, followed by average rainfall that winter. In some cases we were not able to fulfill our ideal experimental design (e.g. many sites we planned to analyze across years burned in 2007), however the fires also afforded us the opportunity to address a phenomena of major importance to San Diego's MSCP.

This year field work began March 1st and ended April 30th. This time frame was approximately 2 weeks earlier than last year (starting March 15th). The decision to start earlier was made when it became apparent that this year's rainfall had come earlier and was far greater than that of the previous spring. Fortunately most of the sites were visited before the growing season ended abruptly at the end of April.

Training

In 2007 we identified differences among observers as a major source of variability, especially for species richness, and the cover of less common and less well known species. We therefore implemented a three stage training program, which provided more instruction than we did in 2007.

The first part of the training program was a lecture and question/answer session given by one of the senior project biologists. The project was introduced, goals were explained, and methods were discussed. Field teams also took time to experiment and practice with GPS units.

The second stage of training involved a field exercise. Field teams were driven to Mission Trails Regional Park, and given one random coordinate each. They navigated to their assigned point, set up a transect, and collected data using both methods. Once they returned from the field the teams practiced entering data. A senior project biologist worked with each team to ensure that methodological and taxonomic questions were addressed.

The third stage of the training was also the first day of field work for the trainees. On their first day in the field, each team was accompanied by a senior project biologist, who provided taxonomic and methodological assistance.

In addition to an improved training program, we also made an effort to re-hire the 2007 field crew where they were available. Ultimately we had three field teams, one with two returning senior project biologists, and two teams with one new and one returning crew member. Although we had fewer crews than last year's five, these three teams had over all more experience and worked the entire field season (last year 2 teams worked only part of the season).

New plot design

We adapted our plot design based on the results of the 2007 variance components analysis and time comparison. Visual cover was dropped since visual cover was the least reliable between teams and failed to yield additional information. Plots were reduced in size since our \analysis of plot size demonstrated that with the notable exception of species richness, smaller plots preformed just as well as larger plots.

We ultimately decided on a linear transect design, almost equivalent to a single side of our 2007 modified Keeley plots with two differences: there were no visual cover sub-plots, and quadrats occurred every 5m (on alternating side, beginning at 0 on the left, Figure 4). Since we were reducing the size of the plot and eliminating a method we anticipated being able to perform thirty to fifty percent more plots per field day.

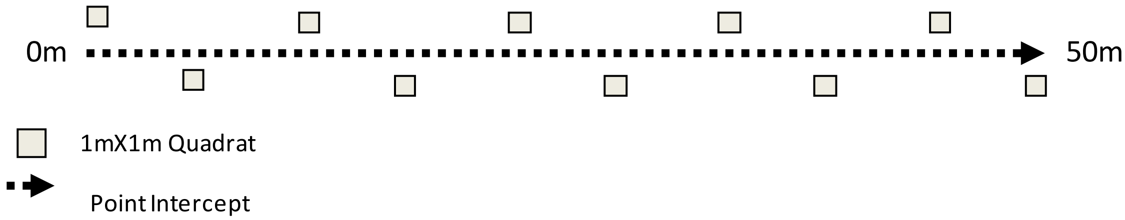

Figure 4: *2008 transect/plot field protocol. 50 m point intercept transects were located using a restricted stratified random sampling procedure, quadrats were read on the same transect every 5 meters on alternating sides, beginning at 0 and starting on the left.*

This year we also implemented a spatially stratified random sampling method for choosing additional transect locations and orientations. Points were selected prior to field work based on the vegetation type and apparent aerial cover, slope, aspect and access. All points were located between 30 and 300m of the nearest access point. In additional alternative points were selected in case some points were too dangerous for sampling (e.g. too steep).

Sites and plots sampled

This year we sampled 13 (8 CSS and 5 chaparral) sites using a total of 70 plots throughout San Diego County (see figure 5 and appendix A). Of the original 8 sentinel sites monitored in 2007, 3 CSS and 1 chaparral burned in the October 2007 wildfires (table 1).

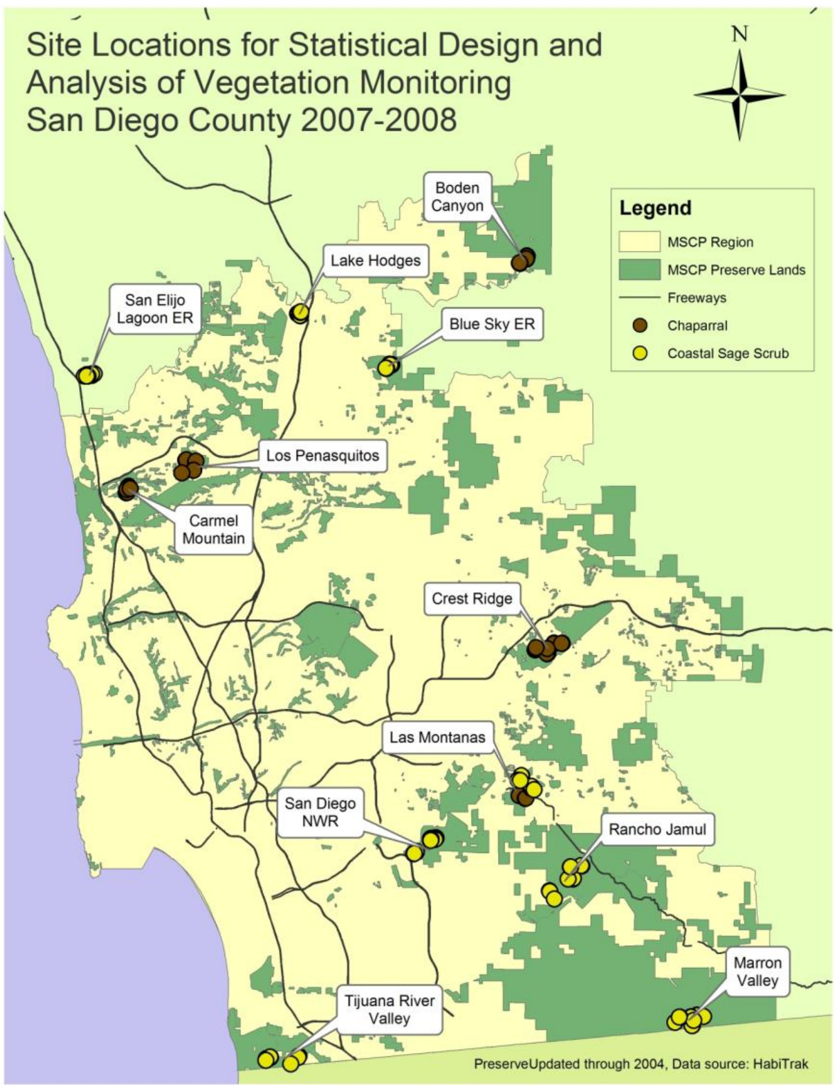

Figure 5: *Location of CSS and chaparral plots in San Diego County. Yellow circles mark the location of plots in CSS and olive circles mark the locations of chaparral plots.*

Vegetation Community and Site	New Plots	Sentinel Plots	Total Plots	Burned Plots	Double sampled
Coastal Sage Scrub	**32**	**12**	**44**	**12**	**9**
Blue Sky ER		3	**3**	3	
Lake Hodges		3	**3**	3	
Los Montanas, CSS	6		**6**		2
Marron Valley	4	3	**7**		
Rancho Jamul ER	6		**6**		3
San Diego NWR	6		**6**	6	
San Elijo Lagoon ER	7		**7**		2
Tijuana Estuary	3	3	**6**		2
Chaparral	**15**	**11**	**26**	**3**	**7**
Boden Canyon		3	**3**	3	
Carmel Mountain	4	2	**6**		2
Crestridge	3	3	**6**		2
Los Montanas, chaparral	4	3	**7**		3
Penasquitos	4		**4**		
Total:	**47**	**23**	**70**	**15**	**16**
Proportion	**67%**	**33%**		**21%**	**23%**

Table 1: *2008 site and plot breakdown. Almost all sentinel CSS plots were lost in the 2007 fires, and were replaced with other un-burned sites. Although this provides a huge amount of data for spatial and methodological variance components analysis, it unbalanced the temporal design.*

Overall, 67 percent of our sites were new this year, and will provide an excellent opportunity to refine our understanding of spatial and methodological variability. In addition 23 percent of plots were sampled by 2 teams, which will allow us to continue exploring team to team variability. Unfortunately, the distribution of the fire across the sentinel sites unbalanced our original experimental design in that more CSS plots were lost than chaparral plots. This will weaken the precision with which we can describe temporal change. On the other hand, it is important to anticipate recurring fires in the MSCP planning area. As a result, this event will allow us an even deeper look into how fire must taken into account in any San Diego monitoring program.

Preliminary data analysis

At this time we are just beginning our data analysis process. Field teams finished entering their data in the month of May, and are currently quality checking it in June. The results reported here are not final, but should be a close approximation. Data analysis and future field work will continue under funding from the TransNet Environmental Mitigation Program.

In this report we describe species composition and cover of all sites monitored in 2008. Several plots were burned in October 2007. In addition, we more than doubled our sampling effort in 2008 by visiting 6 additional sites and increasing the number of plots at all sites. In order to interpret year to year comparisons, we report results from Los Montanas (chaparral) and Tijuana River Valley (CSS) as examples sites because both were monitored in 2007 and 2008, and neither burned.

Species Richness

This year we observed a total of 218 species in San Diego County, distributed across our 70 plots. Of those, 75 percent were native (Table 2, including 5 native species noted in the "other" category), and the remaining 25 percent were non-native.

2008 All Plots	All Species	Native			Non-native		Other
		Shrub	Herb	Grass	Herb	Grass	
All Sites	**218**	48	103	9	33	16	9
Chapparal	**149**	33	74	6	19	11	6
Coastal Sage Scrub	**189**	37	92	5	31	15	9

Table 2: *Observed richness in 2008. These data include all surveyed plots including new plots and sites in 2008, and those burned in October 2007. Other species include vines (dicots), bulb (monocots), and rushes (monocots).*

Species richness increased tremendously this year at individual unburned sites (burned sites have been eliminated from year to year comparisons as they would introduce bias, Table 3). The number of species more than doubled at both sites (Table 3). The increases were driven by the native forbs, and to lesser extent non-native forbs. Many herbs seen in 2008 were not recorded in 2007. Species in these groups either did not germinate in 2007, or were undetectable (small and withered) because of the drought conditions.

2008 All Plots	All Species	Native			Non-native		Other Species
		Shrub	Herb	Grass	Herb	Grass	
2007							
Los Montanas	**32**	12	11	0	3	2	4
Tiajuana	**31**	15	4	0	7	4	1
2008							
Los Montanas	**77**	18	40	1	8	6	4
Tiajuana	**83**	23	33	0	15	8	4
% Change							
Los Montanas	**141%**	50%	264%	N/A	167%	200%	0%
Tiajuana	**168%**	53%	725%	N/A	114%	100%	300%

Table 3: *Species richness at two example sentinel sites. Richness values vary sharply year to year, due to rain.*

The dramatic increase in species richness was important for implementation and analysis for a number of reasons. 2008 is likely a better benchmark for potential species richness than 2007. The increase in richness often came from rare and uncommon species, which made species identifications more challenging and could potentially influence the inter-observer variance component for richness and herbaceous cover. In addition there were simply more species to look at which increased the time it took to read plots.

Cover

This year we analyzed cover and dominance only at unburned sites to avoid bias. If burned sites were included in the average cover of all species, the burned sites would dramatically lower that average, and suppress the positive effect of average rain. For our evaluation of cover we will use the one unburned CSS site (Tijuana River Valley Regional Park) and the three unburned chaparral sites (Los Montanas, Carmel Mountain, and Crestridge Ecological Reserve). Burned sites will be addressed in future analysis.

Herbaceous and annual cover increased dramatically this year (Figure 6). Some herbaceous species that weren't found or found at very low cover last year, were some of the top species in terms of cover this year. Annuals present in large numbers in 2007 expanded their cover even more this year (for example *Bromus madritensis* (red brome) in chaparral and *Chrysanthemum coronarium* (crown daisy) in CSS, Figure 6). Native shrub cover stayed about the same because shrubs grow more slowly and later in the year, so we may capture their response to the average rainfall next year (Figure 6).

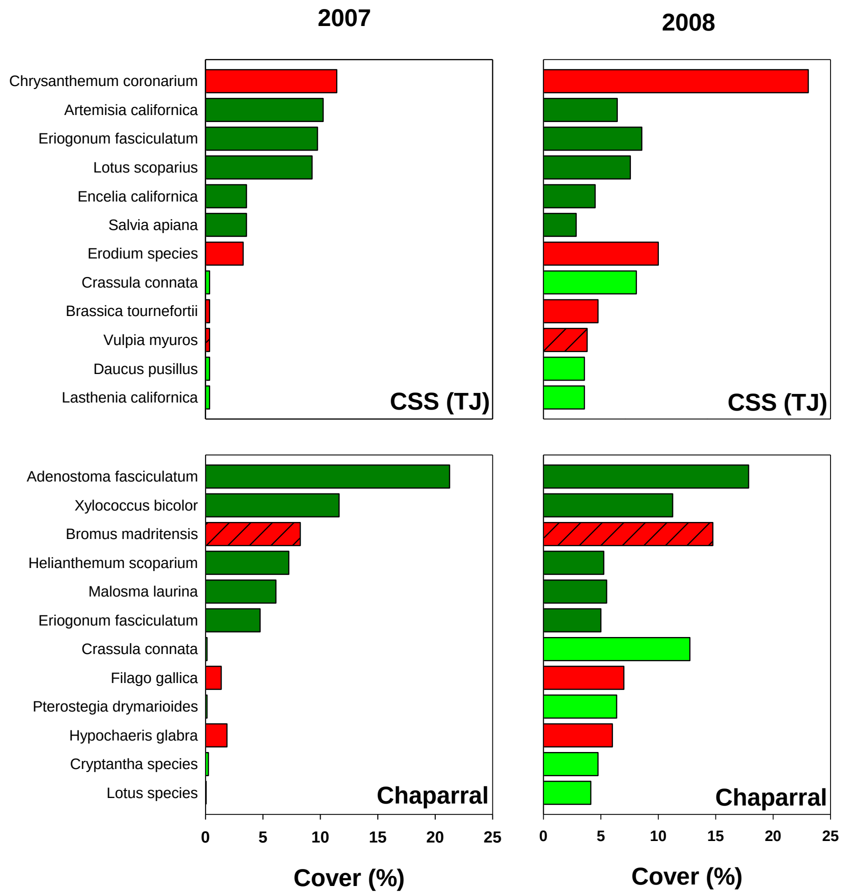

Figure 6: *2008 and 2007 cover of the top twelve species in unburned CSS and chaparral. These data were calculated from plots set up in 2007 only. Dark green indicates a native shrub, light green indicates a native annual, red indicates a non-native and cross hatching indicates grass species.*

Individual sites showed much the same result (Figure 7). For example, both Tijuana River Valley Regional Park and Los Montanas there was virtually no significant annual cover in 2007, however in 2008, annuals became much more important, and some even had higher cover than some shrubs (Figure 7).

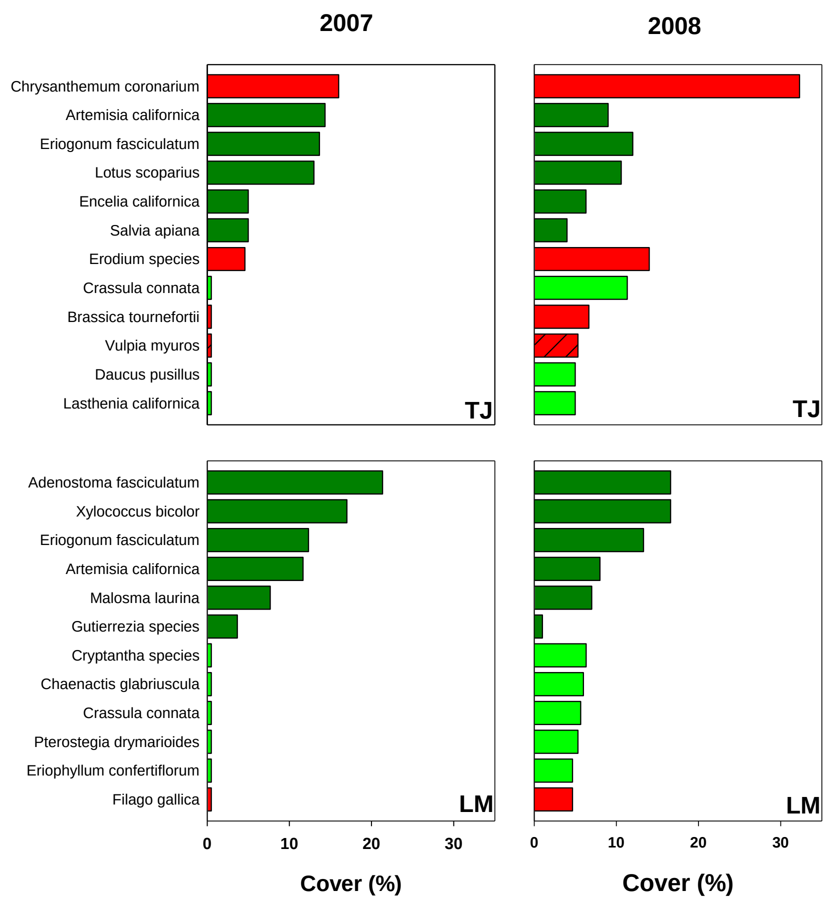

Figure 7: *Changes in cover at Los Montanas and Tijuana River Valley demonstrate the effect of above average rain on cover. Herbaceous cover increases over all, and some previously rare species occur at high cover values.*

Teams and methods

Last year we identified travel to sites and between plots as one factor limiting the number of plots readable in a day. This year we eliminated one method (visual cover), simplified plot set up to one linear transect, and halved the number of points for point intercept (50 vs 100) and quadrats (10 vs 20). Our expectation was to save a significant amount of time while acquiring close to the same amount of information. These time savings should have allowed us to sample more transects at each site.

This year we discovered another factor limiting the number of plots that could be sampled in a day - diversity. Last year was a relatively dry year, and sites had far fewer species than they did this year. This year we averaged about 20 minutes for every 50m point intercept transect, about 45 percent more time than last year (Figure 8).

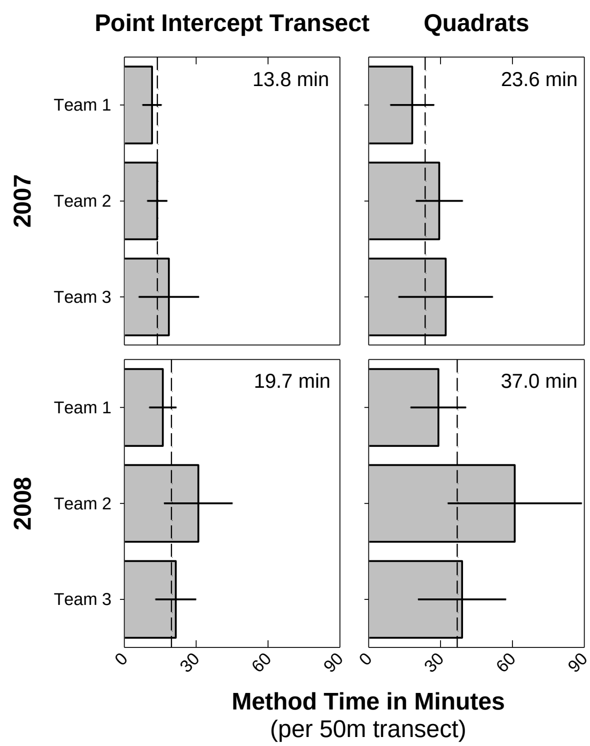

Figure 8: *Method times for primary teams compared. Team 1 had the same members in 2007 and 2008 and teams 2 and 3 had one returning member each from 2007.*

Quadrats were more affected by higher diversity going from about 24 minutes per 10 to 37 minutes per 10, a 56 percent difference (Figure 8). The increase in time for both methods, but especially quadrats probably has to do with the time it takes not only to call out and record more species, but to find them. Teams were very careful when searching quadrats, and attempted to catch all species, even if they made up less than one percent cover. This process took some time, and had the potential to increase observer fatigue substantially as a result.

Contrary to our expectations teams were only able to complete two to three plots per day, the same rate as last year. We were able to cover many more sites and plots by starting earlier in the season, and reducing the amount of double sampling across the sites.

Summary and Next Steps

This year we observed 218 species, up from 148 in 2007. Despite the increased time it took to sample each plot, we completed 70 plots in San Diego County. Overall herbaceous cover was up, although shrub cover either stayed the same or went down a small amount in unburned plots.

Post-fire, richness and cover data will be analyzed more thoroughly under funding from the TransNet Environmental Mitigation Program. Due to the fire and the loss of four of eight sites, our data analysis will challenging in terms of temporal changes and balance across vegetation communities. We will therefore perform three semi-independent analyses to answer as many questions as possible.

We will perform a reanalysis of spatial and methodological variance on 2008 data from all non-burned plots, using the same approach as 2007. This year's increased diversity and cover may reveal some changes in the magnitude of both spatial and methodological sources of variation. It is important to exclude burned sites as their diversity, composition, and cover have been radically altered and would obscure the pattern of change.

We will add time to the variance components analysis by comparing 2007 and 2008 data. This analysis will be run only on sentinel sites that did not burn in 2007, and will therefore be biased toward chaparral as fewer of our chaparral sites burned. This is unfortunate since chaparral likely changes less year to year than CSS as the vast majority of cover in that vegetation type is long lived, slow growing, native shrubs. Again, the radical changes caused by fire would bias the results from year to year and lead to misinterpretation of the results

It is important to recognize that the fire allows us other opportunities for data analysis which are important to monitoring programs in southern California. We will therefore explore our post-fire data using variance component analysis and other statistical techniques, to assess the efficacy of our methods in post-fire environments. If it appears that post fire systems require more or different monitoring we hope to make recommendations, and to implement and test them next year.

We anticipate that functional groups (native shrubs, non-native forbs, etc.) will continue to be easy to estimate, while diversity and the frequency and cover of individual uncommon species will pose more of a challenge. How those species affect data collection and analysis in an above average rainfall year may help us put upper limits on several factors, including team-to-team variability and method field time.

It is important that we to continue sampling for at least one (and preferably two). The conditions in 2007 and 2008 were radically different, demonstrating the extreme environmental variability inherent in southern California. The fires reduced the number of plots that can be compared across years. With more than 40 new plots established in 2008, we should be able to estimate the temporal variance component in 2009. We need to continue our efforts to gain a comprehensive understanding of the system, and to complete a toolbox of techniques for regional monitors and managers.

.

Literature Cited

CNPS, V. C. (2004) "California Native Plant Society Releve Protocol." CNPS Volume, DOI:

Deutschman, D. H., L.A. Hierl, J. Franklin, and H.M. Regan (2007). Vegetation Community Monitoring Recommendations for the San Diego Multiple Species Conservation Program, California Department of Fish and Game.

Franklin, J., L.A. Hierl, D.H. Deutschman, H.M. Regan (2006). Grouping and Prioritizing Natural Communities for the San Diego Multiple Species Conservation Program, California Department of Fish and Game.

Hierl, L. A., D. H. Deutschman, et al. (2007). Developing Conceptual Models to Improve the Biological Monitoring Plan for San Diego's Multiple Species Conservation Program, California Department of Fish and Game.

Hierl, L. A., H.M. Regan, J. Franklin and D.H. Deutschman (2005). Assessment of the Biological Monitoring Plan for San Diego's Multiple Species Conservation Program. California Department of Fish and Game.

Keeley, J. and C. Fotheringham (2005). "Plot shape effects on plant species diversity measurements." Journal of Vegetation Science 16: 249-256.

McEachern, K., B. M. Pavlik, et al. (2007). San Diego Multiple Species Conservation Program (MSCP) Rare Plant Monitoring Review and Revision. San Diego, California.

Ogden, E. a. E. S. (1996). Biological Monitoring Plan for the Multiple Species Conservation Program. San Diego, California.

Ogden, E. a. E. S. (1998). Final Multiple Species Conservation Program. San Diego, California.

Regan, H. M., L.A. Hierl, J.Franklin, D.H. Deutschman (2006). San Diego Multiple Species Conservation Program Covered Species Prioritization. California Department of Fish and Game.

Appendix A: plot coordinates

County	Site	Habitat	Plot	New Name	Old Name	N	W	Altitude
SD	BC	CHAP	1	BC_CHAP_1	Bc1A	33.09172	116.89569	759 ft
SD	BC	CHAP	2	BC_CHAP_2	Bc2A	33.09017	116.89611	814 ft
SD	BC	CHAP	3	BC_CHAP_3	Bc3A	33.08739	116.90147	857 ft
SD	BS	CSS	1	BS_CSS_1	Bs1A	33.01721	117.005	723 ft
SD	BS	CSS	2	BS_CSS_2	Bs2A	33.01749	117.00575	724 ft
SD	BS	CSS	3	BS_CSS_3	Bs3A	33.01475	117.00927	727 ft
SD	CM	CHAP	2	CM_CHAP_2	Cm Sentinal 2A	32.93153	117.21656	421 ft
SD	CM	CHAP	3	CM_CHAP_3	CM 1 Begin	32.92993	117.2182	418 ft
SD	CM	CHAP	4	CM_CHAP_4	CM 2 Begin	32.92841	117.21903	405 ft
SD	CM	CHAP	5	CM_CHAP_5	CM 4 Begin	32.93091	117.21804	436 ft
SD	CM	CHAP	6	CM_CHAP_6	CM 5 Begin	32.93136	117.21594	372 ft
SD	CR	CHAP	1	CR_CHAP_1	Cr Sentinal 1A	32.8238	116.88672	1150 ft
SD	CR	CHAP	2	CR_CHAP_2	Cr Sentinal 2A	32.82056	116.8771	1336 ft
SD	CR	CHAP	3	CR_CHAP_3	CR Sentinal 3A	32.82744	116.87146	1480 ft
SD	CR	CHAP	4	CR_CHAP_4	CR 1 Begin	32.8278	116.865	429 ft
SD	CR	CHAP	5	CR_CHAP_5	CR 2 Begin	32.8241	116.877	1808 ft
SD	CR	CHAP	6	CR_CHAP_6	CR 4 Begin	32.8248	116.886	363 ft
SD	LH	CSS	1	LH_CSS_1	LH 1A Sentinal	33.05178	117.08072	394 ft
SD	LH	CSS	2	LH_CSS_2	LH 2A Sentinal	33.05041	117.07923	368 ft
SD	LH	CSS	3	LH_CSS_3	LH 3A Sentinal	33.0531	117.07887	422 ft
SD	LM	CHAP	1	LM_CHAP_1	Lm 1A sentinal	32.72471	116.89515	794 ft
SD	LM	CHAP	2	LM_CHAP_2	Lm 2A sentinal	32.7225	116.895	906 ft
SD	LM	CHAP	3	LM_CHAP_3	Lm 3A sentinal	32.72608	116.8955	768 ft
SD	LM	CHAP	4	LM_CHAP_4	LM 1 begin	33.727	116.899	
SD	LM	CHAP	5	LM_CHAP_5	LM 2 Begin	32.7243	116.989	

County	Site	Habitat	Plot	New Name	Old Name	N	W	Altitude
SD	LM	CHAP	6	LM_CHAP_6	LM 3 Begin	32.7236	116.899	
SD	LM	CHAP	7	LM_CHAP_7	LM 5 begin	32.7217	116.894	929 ft
SD	LM	CSS	1	LM_CSS_1	LM CSS 1 Begin	32.737	116.897	824 ft
SD	LM	CSS	2	LM_CSS_2	Lm css 2 Begin	32.7288	116.889	138 ft
SD	LM	CSS	3	LM_CSS_3	LM CSS 3 Begin	32.73406	116.89996	869 ft
SD	LM	CSS	4	LM_CSS_4	LM CSS 4 Begin	32.73	116.889	
SD	LM	CSS	5	LM_CSS_5	Lm css 5 begin	32.7276	116.887	73 ft
SD	LM	CSS	6	LM_CSS_6	Lm CSS 6 Begin	32.7339	116.898	1069 ft
SD	LP	CHAP	1	LP_CHAP_1	LP 1 Begin	32.951	117.171	419 ft
SD	LP	CHAP	2	LP_CHAP_2	LP 2 Begin	32.95	117.163	470 ft
SD	LP	CHAP	3	LP_CHAP_3	LP 3 Begin	32.94421	117.16497	437 ft
SD	LP	CHAP	4	LP_CHAP_4	LP 5	32.9423	117.174	
SD	MV	CSS	1	MV_CSS_1	MV 1A Sentinal	32.57424	116.75396	574 ft
SD	MV	CSS	3	MV_CSS_3	MV 3A Sentinal	32.57304	116.75921	565 ft
SD	MV	CSS	5	MV_CSS_5	MV 2 Begin	32.5729	116.768	604 ft
SD	MV	CSS	6	MV_CSS_6	MV 3 Begin	32.5706	116.757	
SD	MV	CSS	7	MV_CSS_7	MV 4 Begin	32.5693	116.772	
SD	RJ	CSS	1	RJ_CSS_1	RJ 1 Begin	32.6586	116.874	481 ft
SD	RJ	CSS	2	RJ_CSS_2	Rj 2 begin	32.6668	116.855	473 ft
SD	RJ	CSS	3	RJ_CSS_3	RJ 3 Begin	32.6758	116.848	511 ft
SD	RJ	CSS	4	RJ_CSS_4	Rj 4 Begin	32.6531	116.87	480 ft
SD	RJ	CSS	5	RJ_CSS_5	RJ 5 begin	32.6668	116.859	
SD	RJ	CSS	6	RJ_CSS_6	Rj 6 Begin	32.6751	116.85711	954 ft
SD	SDNWR	CSS	1	SDNWR_CSS_1	Sdnwr 1A Seeded	32.6943	116.96616	630 ft
SD	SDNWR	CSS	2	SDNWR_CSS_2	Sdnwr 2A seeded	32.69328	116.96714	738 ft
SD	SDNWR	CSS	3	SDNWR_CSS_3	Sdnwr 3A seeded	32.69388	116.97021	605 ft
SD	SDNWR	CSS	4	SDNWR_CSS_4	Sdnwr 4A seeded	32.69289	116.96998	617 ft
SD	SDNWR	CSS	5	SDNWR_CSS_5	Sdnwr 5A seeded	32.68451	116.9819	470 ft
SD	SDNWR	CSS	6	SDNWR_CSS_6	Sdnwr 6A seeded	32.68328	116.98384	362 ft

County	Site	Habitat	Plot	New Name	Old Name	N	W	Altitude
SD	SE	CSS	1	SE_CSS_1	SE 1 Begin	33.00847	117.24771	44 ft
SD	SE	CSS	2	SE_CSS_2	SE 2 Begin	33.0095	117.246	48 ft
SD	SE	CSS	3	SE_CSS_3	SE 3 Begin	33.0093	117.248	324 ft
SD	SE	CSS	4	SE_CSS_4	SE 4 Begin	33.008	117.251	
SD	SE	CSS	5	SE_CSS_5	SE 5 Begin	33.0087	117.252	
SD	SE	CSS	7	SE_CSS_7	SE 7 Begin	33.008	117.25193	
SD	TJ	CSS	1	TJ_CSS_1	Tj 1A sentinal	32.5442	117.07583	97 ft
SD	TJ	CSS	1	TJ_CSS_1	Tj 1B sentinal	32.54463	117.07555	76 ft
SD	TJ	CSS	2	TJ_CSS_2	Tj 2A sentinal	32.54221	117.10162	242 ft
SD	TJ	CSS	2	TJ_CSS_2	Tj 2B sentinal	32.54264	117.1016	237 ft
SD	TJ	CSS	3	TJ_CSS_3	TJ 3B sentinal	32.54337	117.09858	309 ft
SD	TJ	CSS	4	TJ_CSS_4	TJ 1 begin	32.5436	117.076	-59 ft
SD	TJ	CSS	5	TJ_CSS_5	Tj 5 begin	32.53918	117.08193	385 ft
SD	TJ	CSS	6	TJ_CSS_6	Tj 6 begin	32.5414	117.10199	287 ft