Supporting Information

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SI Text

Supporting Notes. ***Land use history.*** Zabriskie originally surveyed 22 locations from 0- to 2,560-m elevation. The two sites below 200 m were not protected and were developed through the expansion of the city of Palm Desert; we did not revisit these sites. The sites between 200 m and 1,000 m have been protected since the 1960s. These sites are within the Boyd Deep Canyon Reserve and access is strictly controlled. The sites above 1,000 m were publicly owned and had open access. Most of the area above 1,000 m was relatively inaccessible and received little use. The transects at 1,100, 1,220, 2,438, and 2,560 m were somewhat more accessible, although foot traffic and use was still light. The trends in plant cover at the more accessible sites were similar to those at the less accessible sites (Fig. 2).

Fire history. Two fires affected the Deep Canyon Transect in the past 100 years (1). Historical records indicate that all survey sites above 1,900 m burned in 1940. Charred pinyon pine trunks above 1,700 m indicate the sites at 1,707 m and 1,829 m likely also burned at that time. Records indicate the survey site at 2,560 m and half of the survey site at 2,438 m burned again in 1944. The forested vegetation above ≈2,000 m is thought to have historically been exposed to moderate ground fires every 10–30 years (2). The shrubland from ≈1,400 to 2,000 m is thought to have historically been exposed to severe crown fires approximately every 60 years. The open woodland, shrubland, and desert below ≈1,400 m is thought to have historically been exposed to fire every 500 years or longer.

Methods. Survey methods followed Zabriskie (3). Plant coverage was measured at 20 elevations (Fig. 1) along the north slope of the Santa Rosa Mountains. Mixed conifer, chaparral, and pinyon juniper sites were surveyed July–October 2006. Desert scrub sites were surveyed in March 2007, although they had received no rainfall in the 2007 rainfall year. These dates approximate the times of year of Zabriskie's survey.

Each of the 20 surveys extended 400 m linearly along an isocontour at 122-m elevation intervals. Surveys straddled north-facing ridgelines to minimize local hydrological and aspect variations. Zabriskie toured the transect at the beginning of our study to identify the earlier survey sites and explain his methodology. Based on discussion with Zabriskie regarding site selection and reference to Zabriskie's original survey maps, we estimate the vertical elevation errors are within ± 5 m. The relocation errors are random and would not be expected to influence the results. The vegetation within an elevation zone was broadly homogeneous, which diminished the effect of location error. The very long surveys would be expected to reduce errors associated with failure to resample the exact locations.

A 400-m tape was stretched along an isocontour at each site. Following Zabriskie, surveys deviated from the isocontours for only two reasons. To avoid areas of human disturbance, chiefly roadcuts, the survey lines circumvented these areas by a minimum of 10 m. Isocontours crossing impassible rocky barriers deviated by the minimum distance possible. Live perennial plants crossing the tape were recorded to the nearest centimeter, and each individual plant was recorded independently. Overlapping plants were counted separately; total vegetation coverage could theoretically be >100%.

Dormant plants were counted as living, determined by examination of twigs, stems, and/or roots. Recent plant mortality was indicated by direct observations of intact dead plants standing with dead leaves and needles still attached. Older mortality was indicated by large amounts of woody debris with bleached surfaces, patchy intact bark, and complete loss of leaves. Time series of Thematic Mapper and Enhanced Thematic Mapper Plus remote-sensing observations showed that the Normalized Difference Vegetation Index and tasseled-cap wetness at the upper sites dropped markedly toward the end of the 1999–2002 drought, a pattern that is consistent with vegetation senescence and mortality.

The mean normalized vegetation coverage in Fig. 3 was calculated as $C_e = [\Sigma(c_{i,e}/c_{i,max77})]/10$, where C_e is the mean normalized vegetation coverage of the ten most widespread species at elevation e. Elevation e was measured in meters difference from the elevation of the central survey of species i. Total meters coverage of species i on the survey e meters away from the central survey is $c_{i,e}$, and this is normalized by $c_{i,max77}$, the maximum absolute coverage of species i in 1977.

Confidence intervals in coverage (Fig. 2) were calculated using the size distribution of individual plants along each survey. Individual plant coverages in 1977 were not available, so confidence intervals on 1977 data cannot be calculated.

Weather data were analyzed from seven weather stations that were selected for proximity to the center of the Deep Canyon Transect and the continuity and length of the data record (4) (Table S2). All of the stations were within 75 km of Deep Canyon and represent the range of elevations and climate zones within the transect.

1. Stephenson JR, Calcarone GM (1999) "Southern California mountains and foothills assessment: Habitat and species conservation issues" Gen Tech Rep GTR-PSW-172 (Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, Albany, CA).
2. Desert Research Institute, Western Regional Climate Center (2005) California Climate Tracker, www.wrcc.dri.edu/monitor/cal-mon/frames_version.html. Accessed May 20, 2007.
3. Zabriskie JG (1979) *Plants of Deep Canyon and the Central Coachella Valley, California* (University of California Press, Riverside, CA).
4. National Climatic Data Center, *Monthly Surface Data,* cdo.ncdc.noaa.gov/CDO/cdo (2007). Accessed May 28, 2007.

Table S1. Relationship between climate and elevation in inland Southern California

	Slope of relationship	Units	R^2 of relationship
Precip., cm	18.9	m/cm	0.80
Precip c_v (σ/μ)	−5106	m/c_v	0.77
Snow/rain ratio	5146	m/ratio	0.97
Maximum T, °C	−126	m/°C	0.96
Minimum T, °C	−133	m/°C	0.71
Mean T, °C	−137	m/°C	0.89

Table S2. Summary of climate data for six weather stations near the Deep Canyon Transect that represent the range of climate zones within the transect

Site	Elevation, m	Latitude, °N	Longitude, °W	Distance to center of transect, km	Precipitation, cm			c_v Precip			Snow/Precip				Maximum temperature, °C			Minimum temperature, °C			Mean temperature, °C		
					1947–76	1977–06	Change	1947–76	1977–06	Change	1947–76	1977–06	Change		1947–76	1977–06	Change	1947–76	1977–06	Change	1947–76	1977–06	Change
Indio	−6.4	33.73	116.25	21.5	6.4	9	2.6	0.596	0.831	0.235	0	0	0		31.7	31.8	0.13	14	15.5	1.54	22.8	23.7	0.83
Idyllwild	1639.8	33.75	116.72	32.6	59.8	70.2	10.4	0.342	0.478	0.136	0.241	0.147	−0.094		19.8	19.8	−0.05	2.4	3.8	1.46	11.1	11.8	0.71
Mecca	−54.9	33.56	116.05	34.5	6	10	4.1	0.695	0.676	−0.019	0	0	0		31.2	32.4	1.23	13.2	13.3	0.1	22.2	22.9	0.66
Palomar	1691.6	33.35	116.86	49.4	65.4	76.1	10.7	0.48	0.581	0.101	0.186	0.106	−0.08		19.5	18.6	−0.86	7.2	8	0.77	13.3	13.3	−0.04
Henshaw	823	33.23	116.77	52.4	55.1	69.5	14.4	0.372	0.53	0.158	0.009	0.004	−0.005		23.3	24.1	0.75	4.3	4	−0.32	13.8	14	0.21
Cuyamaca	1414.3	32.98	116.58	70.4	80.4	84	3.6	0.32	0.541	0.221	0.122	0.105	−0.017		19.1	18.9	−0.17	3.8	4.6	0.8	11.5	11.8	0.31
Hayfield	417.6	33.7	115.633	74.0	6.7	12	5.3	0.552	0.65	0.098	0.004	0	−0.004		29.1	29.4	0.3	12.8	12.9	0.04	20.9	21.1	0.17
				Average (all)	40	47.3	7.3	0.48	0.612	0.133	0.063	0.035	−0.064	Average (all)	24.8	25	0.19	8.24	8.9	0.63	16.5	16.9	0.41
				σ			4.5			0.086			0.041	σ			0.67			0.72			0.33
				95% CI			3.3			0.063			0.046	95% CI			0.5			0.53			0.24
				Average (Indio and Idyllwild)			6.5			0.185			−0.094	Average (Indio and Idyllwild)			0.04			1.5			0.77