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FINAL REPORT

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entitled:

Plant response studies to utility construction in the Mohave
Desert, California

to

Bureau of Land Management
1695 Spruce Street
Riverside, California 92507

by

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Plant response studies to utility construction
in the Mohave Desert, California.

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Utility construction involves major disturbance to soil and vegetation along the many utility pathways in the Mohave Desert. No qualitative or quantitative estimates of such disturbance were available prior to 1975 when three studies were made by Vasek et. al., (1975) on natural gas pipelines, Johnson et. al., (1975) on highways and Vasek et. al., (1975) on power transmission lines, all in the Mohave Desert. These studies contributed much to an understanding of the effects of utility construction on desert vegetation. This study enlarges the work of these researchers by reporting comparable studies in expanded utility corridors. Six pipelines, seven powerlines and two aqueducts were selected for study. The work was begun in May, 1978 followed by extensive field work during the summer months with soil and transect analyses taking the remainder of the time through February 1, 1979.

The overall purpose of this project was to study the relationship of perennial vegetation diversity, stability and productivity to utility construction and maintenance activities, mainly: clearing of land within right of ways; clearing and maintenance of access roads; soil disturbance and other physical damage due to construction activities. No attempt was made to study any deleterious consequences of power lines' electric and magnetic fields on vegetation, such as reported by Miller and Kaufman (1978) in which "leaf tip corona" may very rarely occur in plants with pointed leaves, where a field strength

of approximately 22.5 kV/m is needed for inception (Poznaniak and McKee, 1975).

We depended upon interpretation of existing patterns for the relationships, not attempting any cost prohibitive experimental manipulations at the ecosystem level.

METHODS

Sources of information regarding history and construction dates of utility corridors were obtained from various personnel and files of the Bureau of Land Management, from utility company managers and from utility workers encountered in the field.

The corridors selected for study occur over representative topography, soils and vegetation types of the Mohave Desert (Figs. 1 and 2, Tables 1-4). The powerline construction dates range from 1924 to 1977, pipelines from 1956 to 1973 and the two dates of the aqueducts are 1913 and 1970.

Study areas, ranging from two to fifteen, were selected at intervals along each utility corridor. Primary comparisons were made among transects at each study area. Secondary comparisons were made between corridors and study areas.

The size of the sample plots (transects) at each study area was 100x2M for a total of 200M². Comparisons within a study area consisted of uniform application of transects in control and disturbed sites for each corridor type. For all utility corridors the control transect A was placed in undisturbed vegetation 50M to one side of the utility right-of-way and parallel to it.

To test for disturbance, transects were placed within the utility corridor right-of-way in locations representative of construction disturbance.

For powerlines this consisted of: transect B, midway between the pylons and directly under the central transmission wire; transect C, directly under the pylons; transect D, at the edge of the access road. Since the pylons do not constitute a linear belt transect area, data from two or more consecutive pylons were pooled until a 200M² area equal to each belt transect was sampled. Disturbance to pipelines were tested by transects placed: transect B, along the pipeline right-of-way where trench soil had been piled and then scraped away to refill the trench; transect C, directly over the pipeline where trenching had produced the most severe disturbance; transect D, at the edge of the access road. The disturbance transects of the two Los Angeles aqueduct corridors were placed: transect B, within the utility right-of-way and parallel to the aqueduct; transect C, along the edge of the access road. No transects were placed in the region of the aqueduct equivalent to the trench of the pipelines because the construction methods precluded this. The aqueducts consist of a variety of sizes of pipes and box conduits depending on location and topography. Across major canyons and washes the aqueduct may consist of exposed pipes ranging in diameter from 1.95 to 2.2M for the 1970 aqueduct and from 2.28 to 3.04M for the 1913 aqueduct. Box conduits with an approximate dimension of 2.1 x 2.74M for the 1970 and 2.4 x 3.04M for the 1913 aqueducts were placed underground or through tunnels, depending the nature of the terrain. Our study sites were selected at representative areas along the corridors only where pipes were exposed and where conduits were buried just under the soil surface so as to be clearly visible. The soil mantle directly over the conduit was either lacking or too thin to support adequate vegetation at each study site, thus, no transects were placed here.

The four transects (three for the Los Angeles aqueducts) were read by measuring the height and diameter of each perennial plant. The diameter was measured across the densest part of the crown following the assumption that, on the average, plants cover a circular ground area (Brower and Zar, 1977). The ground cover was calculated from the radius and summed for each species. In the transects which contained extremely abundant small perennials, their number was counted for the full transect but height and diameters were measured on a percentage (10-15%) of individuals representative of appropriate size classes and extrapolated to their total density for determination of ground cover and volume.

Values of density, ground cover, volume and biomass were used for estimates of productivity. Ground cover (M^2) for each species in the $200m^2$ transect was summed for a total. Percent total ground cover was determined by: $\text{Total \% GC} = \text{GC}^{m^2} \div 200 \times 100$. Numerical density for perennials is the number of individuals (n) per $200m^2$. Perennial plant volume, determined from diameter and height measurements, is shown for each transect as: $\text{Volume}^{m^3} / 200m^2$. Biomass of perennial species was calculated by: $\text{Biomass } K_g / 200m^2 = \text{Volume}^{m^3} / 200m^2 \times \text{weight density value } K_g / M^3$. Biomass K_g / M^2 is obtained by dividing Biomass $K_g / 200m^2$ by 200. Weight density values, determined for each species by Dr. Hyrum B. Johnson and his Desert Plan Staff of the Bureau of Land Management, were made available for our calculations of biomass.

Productivity ratios (PR) were applied to estimates of change between disturbed and control transects (Vasek, et. al. 1975a). for density, cover, volume and biomass. $PR = \text{disturbed transect (test)} \div \text{control transect value}$. Percent change ($\Delta\%$) values ($\text{control} - \text{test} \div \text{control}$) were applied only to biomass in tables for estimates of productivity.

Equibility, in essence another measure of evenness, is given by Whittaker (1975) as

$$E_c = \frac{S}{(\log d_{\max} - \log d_{\min})}$$

Stability of perennials along the utility corridors was estimated primarily by determinations of relative biomass in relation to relative age span, by comparing similarity among transects and by an estimate of community quality.

Relative age span determinations into long-lived perennials (LL) and short-lived (SL) are based primarily on the categories assigned to many desert species by Vasek et. al., (1975a, 1975b) and Johnson et. al., (1975).

To estimate community quality, we are following the Community Quality Index (CQI) as proposed by Vasek et. al. and Johnson, et. al. This index integrates an estimate of productivity, in this case plant cover, and an estimate of relative community age, namely the percentage of ground covered by long-lived species,

$$CQI = \sqrt{\frac{\% \text{ Ground covered by long-lived perennials}}{\% \text{ Total perennial ground cover}}}$$

Transect similarity was compared by Jaccard's coefficient of community similarity (CCj) as proposed by Phillips (1959), Brower and Zar, (1977) and Vasek, et. al., (1975a). The formula is

$$CC_j = \frac{2C}{S_1 + S_2 - C}$$

where S_1 and S_2 = total biomass in communities 1 and 2 respectively and C = total biomass common to both communities.

In order to better interpret the significance of the several treatments, such as represented by the different classes of transects, different corridors, as well as variations from one study area to another, we exposed the data of the CQI tables to three-way analysis of variance (Sokal and Rolf, 1969). We followed a similar procedure for this as was reported in Vasek, et. al., (1975b).

A summary of the mean ($\bar{X}$) percent change ($\Delta\%$) of the biomass values of tables 8-22 was prepared to help illustrate possible changes brought about by utility construction activities. The formula:

$$\text{standard deviation} \div \sqrt{N}$$

was applied to the $\Delta\%$ means to give the standard error of mean.

Physical characteristics of the study areas are recorded in Table 4. Topographic location follows the "Tentative Land Form Classification for the California Desert" prepared by Zvi Brenner for the Bureau of Land Management, dated August 5, 1977. Community classification follows authors listed in table 6. Soil samples weighing >100 grams were collected at the 0-15 cm depth increment at the control transect at each study area. The soils were assessed for texture percent by the Bouyucos method (Black, et. al., 1965 and Lathrop, 1976). Sand was determined following forty seconds of the hygrometer run and silt was measured two hours later. The difference between the two runs was clay. Soil texture class was determined using the standard soil classification triangle for percent sand, clay and silt.

A recording soil penetrometer was used to measure soil compaction in right-of-way and control sites at a few study areas following winter

rains (Table 5, Figures 3-5). Topographical features of percent slope, exposure and elevation were determined from field use of the Speigel relaskop, Brunton compass and Taylor altimeter respectively (Table 4).

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Table 1: Characteristics of the natural gas and petroleum pipelines.

PIPELINES

Date	Location	Function	Ownership
1956	Topack to Quigly	Natural gas	Southern California Gas Co.
1960	Needles to Pispah	Natural gas	Southern California Gas Co.
1963	Topack to Los Angeles	Natural gas	Pacific Gas and Electric
1963	Needles to Sheep Hole Pass	Petroleum products	Four Corners Pipeline Co.
1970	Dagget to Colton	Petroleum products	Cal-Neva Co.
1973	Dagget to Roach Station, Nevada	Petroleum products	Cal-Neva Co.

Table 2: Characteristics of the power transmission lines.

KV's = Kilovolts per line.

POWER TRANSMISSION LINES

Date	Location	No. Lines	KV's	Ownership
1924	Victorville to Vincent	1	287	LA Dept. of Water and Power
1933	Lugo to Roach Station, Nevada	1	230	Southern California Edison
1944	Victorville to Roach Station, Nevada	3	287	LA Dept. of Water and Power
1952	Brown to Los Angeles	1	230	LA Dept. of Water and Power
1968	Lugo to Vincent	2	500	Southern California Edison
1969	Pisgah to Piute Valley	1	500	Southern California Edison
1977	Coolwater to Kramer Jct.	1	220	Southern California Edison

Table 3: Characteristics of the Los Angeles Aqueducts.

AQUEDUCTS

Date	Location	Volume Capacity CU/FT/SEC	Ownership
1913	Owens Valley to Los Angeles	490	LA Dept. of Water and Power
1970	Owens Valley to Los Angeles	290	LA Dept. of Water and Power

Fig. 1. The Mohave Desert region of Southern California showing the paths of the aqueducts ( ) and pipelines studied. The date of construction and number of study sites along each corridor are: ( ) 1913, 11; ( ) 1970, 15; ( ) 1956, 8; ( ) 1960, 6; ( ) 1963, 8; ( ) 1963, 2; ( ) 1970, 7; ( ) 1973, 6. Local highway numbers and other landmarks are indicated.

Fig. 2. The Mohave Desert region of Southern California showing the paths of power lines studied. The date of construction and number of study sites along each corridor are: (~~~~) 1924, 7; (---) 1933, 7; (.....) 1944, 10; (///) 1952, 8; (▨) 1968, 5; (▨▨▨▨▨▨▨▨▨▨) 1969, 7; (~~~~~) 1977, 6. Local highway numbers and other landmarks are indicated.

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Table 4: Physical characteristics of study areas along utility corridors in the Mohave Desert, California. Fan = alluvial fan; -year = date of construction.

Study Areas	Topographic Location	Exposure Slope %	Community	Soil Class	Soil Texture %			Elevation M
					Clay	Sand	Silt	
Natural gas pipeline - 1956								
1	Rocky Hill	E 12	Creosote bush scrub	Silty clay	75	25	561	
2	Fan	Level	Joshua tree woodland	Silty clay loam	40	10	50	945
3	Mountain	SE 23	Mountain scrub	Silty clay	60	40	1155	
4	Dissected fan	SW 7	Creosote bush scrub	Sandy clay loam	50	30	20	914
5	Hill	SW 14	Creosote bush scrub	Silty clay loam	30	10	60	1143
6	Pavement fan	S 7	Creosote bush scrub	Clay	80	20	765	
7	Desert wash	S 7	Cheese bush scrub	Loamy sand	90	10	765	
8	Sand covered fan	Level	Creosote bush scrub	Silty loam	20	20	60	510

Table 4 contd

Study Areas	Topographic Location	Exposure Slope %	Community	Soil Class	Soil Texture %			Elevation M
					Clay	Sand	Silt	
Natural gas piepline - 1960								
1	Rocky hill	E 5	Creosote bush scrub	Silty loam	20	10	70	442
2	Desert wash	NE 4	Cheesbush scrub	Loamy sand		80	20	427
3	Mountain	NW 23	Mountain scrub	Silty clay loam	30	10	60	1250
4	Fan	S 2	Creosote bush scrub	Sandy loam	5	60	35	646
5	Pavement fan	E 4	Mountain scrub	Silty clay	50		50	899
6	Fan	Level	Creosote bush scrub	Silty clay loam	40	10	50	808
Natural gas pipeline - 1963								
1	Alkali sink	Level	Salt bush scrub	Loamy sand		80	20	427
2	Dry playa	Level	Salt bush scrub	Loamy sand		80	20	427
3	Dry playa	Level	Shadscale scrub	Silty clay	40		60	427
4	Lava flow	Level	Shadscale scrub	Clay	75		25	427
5	Sand covered fan	W 7	Cheesebush scrub	Silty clay	30	10	60	1103

Table 4 contd

Study Areas	Topographic Location	Exposure Slope %	Community	Soil Class	Soil Texture %			Elevation M
					Clay	Sand	Silt	

Natural gas pipeline - 1963 contd

6	Pavement fan	S 6	Creosote bush scrub	Clay	70	30		518
7	Rocky hill	W 7	Creosote bush scrub	Silty clay loam	30	10	60	549
8	Desert wash	S 3	Cheesebush scrub	Sandy loam	10	60	30	328

Petroleum products pipeline - 1963

1	Dissected fan	Level	Creosote bush scrub	Silty clay loam	30	20	60	624
2	Pavement dis- sected fan	S 9	Creosote bush scrub	Silty loam	10	40	50	624

Petroleum products pipeline - 1970

1	Fan	Level	Creosote bush scrub	Silty clay loam	30	10	60	518
2	Rocky hill	Level	Creosote bush scrub	Silty clay	50	10	40	838
3	Sand dune	W 3	Desert dune sand plant	Loamy sand		75	25	657

Table 4 contd

Study Areas	Topographic Location	Exposure Slope %	Community	Soil Class	Soil Texture %			Elevation M
					Clay	Sand	Silt	
Petroleum products pipeline - 1970 contd								
4	Pavement dissected fan	W 9	Creosote bush scrub	Silty clay	40		60	670
5	Fan	Level	Salt bush scrub	Silty clay	60		40	521
6	Sand covered fan	Level	Creosote bush scrub	Silty clay loam	30	10	60	792
7	Rocky hill	N 18	Creosote bush scrub	Silty clay	50	5	45	792

Petroleum products pipeline - 1973

1	Pavement fan	S 6	Creosote bush scrub	sandy loam	5	55	40	677
2	Dissected fan	SW 7	Creosote bush scrub	Sandy clay loam	50	30	20	914
3	Desert wash	E 6	Creosote bush scrub	Sandy loam	60		40	610
4	Dry playa	Level	Salt bush scrub	Loam	10	50	40	350
5	Fan	SE 3	Creosote bush scrub	Sandy loam	5	75	20	427

Table 4 contd

Study Areas	Topographic Location	Exposure Slope %	Community	Soil Class	Soil Texture %			Elevation M
					Clay	Sand	Silt	
Petroleum products pipeline - 1973 contd								
6	Sand covered fan	Level	Creosote bush scrub	Loamy sand		70	30	206
Power transmission line - 1924								
1	Fan	Level	Joshua tree woodland	Silty clay loam	40	10	50	945
2	Rocky hill	E 11	Joshua tree woodland	Silt loam	20	20	60	823
3	Sand covered fan	N 4	Creosote bush scrub	Silty clay loam	40	15	45	1006
4	Riverwash	N 3	Salt bush scrub	Clay loam	35	30	35	1006
5	Desert wash	NW 2	Shadscale scrub	Silty clay	55	5	40	769
6	Fan	Level	Creosote bush scrub	Silty clay loam	35	20	45	823
7	Desert wash	Level	Cheesebush scrub	Loamy sand	10	75	15	1143
Power transmission line - 1933								
1	Rocky hill	N 19	Creosote bush scrub	Silty clay loam	30	20	30	286

Table 4 contd

Study Areas	Topographic Location	Exposure Slope %	Community	Soil Class	Soil Texture %			Elevation M
					Clay	Sand	Silt	
Power transmission line - 1933 contd								
2	Fan	Level	Salt bush scrub	Coarse sand		90	10	622
3	Desert wash	E 6	Cheesebush scrub	Silty clay	45	10	45	610
4	Playa	Level	Salt bush scrub	Silty clay	40	10	50	488
5	Desert wash	E 6	Salt bush scrub	Sandy loam		60	40	609
6	Dissected fan	SW 7	Creosote bush	Sandy clay	50	30	20	914
Power transmission line - 1944 contd								
1	Hill	Level	Creosote bush	Sandy loam		60	40	744
scrub								
2	Playa	N 1	Salt bush scrub	Silt loam	20	30	50	533
3	Alkali sink	Level	Salt bush scrub	Silty clay	60		40	530
4	Fan	Level	Salt bush scrub	Coarse sand		90	10	622
5	Fan	Level	Joshua tree	Clay loam	40	20	40	1158
woodland								
6	Sand covered fan	Level	Creosote bush	Sandy loam		60	40	768
scrub								
7	Pavements fan	Level	Creosote bush	Silt loam	20	30	50	762
scrub								

Table 4 contd

-

Study Areas	Topographic Location	Exposure Slope %	Community	Soil Class	Soil Texture %			Elevation M
					Clay	Sand	Silt	
Power transmission line - 1944 contd								
8	Fan	SW 5	Creosote bush scrub	Loam	40	10	50	561
9	Rocky hill	E 16	Creosote bush scrub	Loam	40	10	50	930
10	Dissected fan	SW 7	Creosote bush scrub	Sandy clay loam	50	30	20	914
Power transmission line - 1952								
1	Fan	Level	Joshua tree woodland	Silty clay loam	40	10	60	945
2	Sand covered fan	N 7	Creosote bush scrub	Silty clay	50	5	45	975
3	Dissected fan	E 9	Creosote bush scrub	Loam	20	50	30	853
4	Desert wash	E 4	Salt bush scrub	Silty clay loam	30	20	50	795
5	Desert wash	E 4	Cheesebush scrub	Sandy loam		60	40	832
6	Hill	E 28	Desert holly scrub	Silty clay	35	15	50	762

Table 4 contd

Study Areas	Topographic Location	Exposure Slope %	Community	Soil Class	Soil Texture %			Elevation M
					Clay	Sand	Silt	
Power transmission line - 1952 contd								
7	Rocky Hill	N 12	Creosote bush scrub	Loam	20	50	30	823
8	Desert wash	E 5	Salt bush scrub	Sandy loam	10	60	30	777
Power transmission line - 1968								
1	Fan	Level	Joshua tree woodland	Silty loam	20	20	60	990
2	Fan	Level	Joshua tree woodland	Clay	60	10	30	1219
3	Riverwash	N 3	Salt bush scrub	Clay loam	35	30	35	1006
4	Sand covered fan	N 4	Creosote bush scrub	Silty clay	40	15	45	1006
5	Desert wash	Level	Cheesebush scrub	Loamy sand	10	75	15	1143
Power transmission line - 1969								
1	Desert wash	E 4	Creosote bush scrub	Silt loam	20	10	70	441
2	Riverwash	NW 4	Creosote bush scrub	Loamy sand	80	20		426

Table 4 contd

Study Areas	Topographic Location	Exposure Slope %	Community	Soil Class	Soil Texture %			Elevation M
					Clay	Sand	Silt	
Power transmission line - 1969 contd								
3	Fan	Level	Creosote bush scrub	Silty loam	10	60	30	441
4	Rocky hill	SW 6	Creosote bush scrub	Sandy loam		60	40	673
5	Sand covered fan	Level	Creosote bush scrub	Coarse sand		90	10	826
6	Fan	Level	Creosote bush scrub	Silty clay loam	40	10	50	808
7	Pavement dissected fan	E 4	Mountain scrub	Silty clay	50		50	899
Power transmisssion line - 1977								
1	Fan	Level	Creosote bush scrub	Silty loam	40	5	55	731
2	Fan	E 5	Joshua tree woodland	Clay	60	10	30	945
3	Sand covered fan	W 13	Creosote bush scrub	Silty clay loam	40	10	50	731
4	Desert wash	Level	Salt bush scrub	Silty clay	45	10	45	768

Table 4 contd

Study Areas	Topographic Location	Exposure Slope %	Community	Soil Class	Soil Texture %			Elevation M
					Clay	Sand	Silt	

Power transmission line - 1977 cntd

5	Dry playa	Level	Salt bush scrub	Silty loam	10	30	60	728
6	Fan, dissected pavement	Level	Creosote bush scrub	Silty loam	70		30	603

Los Angeles Aqueduct - 1913

1	Desert wash	E 2.5	Creosote bush scrub	Sandy loam	10	75	15	1037
2	Fan	Level	Creosote bush scrub	Silty loam	20	20	60	951
3	Hill	S 23.5	Creosote bush scrub	Clay	80		20	937
4	Fan	SE 8	Creosote bush scrub	Silty clay loam	30	20	50	1037
5	Sand covered fan	Level	Cheesebush scrub	Sandy loam	10	75	15	1037
6	Fan	Level	Creosote bush scrub	Loamy sand		80	20	991

Table 4 contd

Study Areas	Topographic Location	Exposure Slope %	Community	Soil Class	Soil Texture %			Elevation M
					Clay	Sand	Silt	
Los Angeles Aqueduct - 1913								
7	Fan	E 6	Cheesebush scrub	Silty loam	20	20	60	982
8	Desert wash	E 7	Cheesebush scrub	Silty loam	20	30	50	969
9	Desert wash	E 4	Cheesebush scrub	Silty loam		60	40	893
10	Hill	E 36	Creosote bush scrub	Loamy sand		80	20	965
11	Dissected fan	N 19	Creosote bush scrub	Sandy loam	10	75	15	1006
Los Angeles Aqueduct - 1970								
1	Desert wash	E 2.5	Creosote bush scrub	Sandy loam	10	75	15	1037
2	Rocky hill	E 13	Desert holly	Sandy loam		70	30	768
3	Dissected fan	E 13	Creosote bush scrub	Sandy loam		70	30	768

Table 4 contd

Study Areas	Topographic Location	Exposure Slope %	Community	Soil Class	Soil Texture %			Elevation M
					Clay	Sand	Silt	
Los Angeles Aqueduct - 1970								
4	Rocky hill	S 25	Creosote bush scrub	Loam	20	40	40	890
5	Hill	S 4	Creosote bush scrub	Silty loam	5	35	60	1018
6	Fan	SE 8	Creosote bush scrub	Silty clay loam	30	20	50	1037
7	Sand covered fan	Level	Cheesebush scrub	Sandy loam	10	75	15	1037
8	Fan	Level	Joshua tree woodland	Loamy sand		80	20	991
9	Fan	E 6	Cheesebush scrub	Silty loam	20	20	60	991
10	Desert wash	E 3	Cheesebush scrub	Sandy clay loam	30	50	20	973
11	Desert wash	E 7	Creosote bush scrub	Silty loam	20	30	50	969

Table 4 contd

Study Areas	Topographic Location	Exposure Slope %	Community	Soil Class	Soil Texture %			Elevation M
					Clay	Sand	Silt	
Los Angeles Aqueduct - 1970 contd								
12	Desert wash	E 4	Cheesebush scrub	Sandy loam		60	40	838
13	Hill	E 10	Creosote bush scrub	Silty clay	30	15	55	793
14	Hill	NE 18	Creosote bush scrub	Loamy sand		80	20	768
15	Dissected fan	N 19	Creosote bush scrub	Sandy loam	10	75	15	1006

Table 5: Summary of mean soil penetrometer readings from control and right-of-way sites as a measure of soil compaction due to utility construction.

N = number of soil probes; decreasing N and/or high compaction figures at shallow depths in disturbed sites indicates possible soil compaction.

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Utility	Construction date	Depth cm	N	Sites		
				Control Pressure Kg/cm ²	Right-of-way Pressure Kg/cm ²	
Pipeline	1956					
		5	7	11.14	22	13.55
		10	7	29.00	22	30.77
		15	6	38.50	12	35.58
		20	6	38.33	8	30.50
		25	5	34.40	5	26.20
		30	4	31.25	4	26.25
		35	4	36.75	3	25.33
		40	3	36.00	3	30.00
		45	3	37.00	3	35.33
		50	3	48.33	2	24.50
		55	1		2	25.50
		60	1		2	25.50
		65	1		1	
		70	1		1	
		75	1		1	
		80	1		1	
					1	

Table 5 contd

Utility	Construction date	Depth cm	N	Sites		
				Control Pressure K_g/cm^2	Right-of-way Pressure K_g/cm^2	
Powerline	1924	5	13	8.46	31	23.77
		10	13	21.62	22	38.55
		15	13	24.38	2	37.50
		20	13	28.69		
		25	9	37.11		
		30	4	29.50		
		35	4	30.75		
		40	4	36.75		
		45	3	30.33		
		50	3	36.00		
		55	3	42.00		
		60	2	33.00		
		65	2	37.00		
		70	2	67.50		
Powerline	1933	5	11	5.73	13	7.85
		10	11	12.91	13	15.77
		15	9	39.33	13	21.08
		20	6	21.33	11	17.82
		25	5	18.40	10	15.40
		30	5	15.00	10	20.00
		35	5	13.60	9	15.78
		40	5	14.00	9	22.33
		45	4	11.25	9	16.89
		50	4	16.00	9	17.22

Table 5 contd

Utility	Construction date	Depth cm	N	Sites		
				Control Pressure K_g/cm^2	Right-of-way Pressure K_g/cm^2	N
Powerline	1933 contd					
		55	4	18.00	7	24.29
		60	4	18.50	5	22.20
		65	4	22.50	4	22.50
		70	4	31.25	4	24.00
		75	3	30.00	2	30.00
		80	2	37.50	2	30.00
		85	1	28.00	2	31.00
		90	1	32.00	2	29.00
Powerline	1944					
		5	11	10.73	29	21.90
		10	11	25.36	16	34.94
		15	10	35.30	6	31.33
		20	6	32.67	4	44.00
		25	6	42.00		
		30	3	39.33		
		35	3	40.67		
		40	2	51.00		
Powerline	1977a					
		5	76	3.67	86	12.23
		10	76	8.57	77	21.47
		15	65	13.36	46	27.01

Table 5 contd

Utility	Construction date	Depth cm	N	Sites		
				Control Pressure Kg/cm ²	Right-of-way Pressure Kg/cm ²	

Powerline 1977a contd

20	58	13.68	33	35.46
25	38	30.63	14	30.79
30	31	24.78	8	28.63
35	24	29.88	7	28.43
40	23	26.17	7	30.14
45	20	29.37	6	28.66
50	13	30.50	6	35.17
55	8	42.13	4	44.00
60	5	54.00	4	28.75
65	2	45.00		
70	1	50.00		

Powerline 1977b

5	25	11.32	5	23.35
10	16	28.44	10	31.88
15	3	33.33	15	28.33
20	2	33.50	20	45.00
25	1	27.00		
30	1	40.00		

Fig. 3: Line graph of soil penetrometer reading from
table 5. Upper = 1924 powerline, Nov. 29, 1978;
Lower = 1933 powerline, Nov. 29, 1978; right-of-way
(~~1924 powerline~~); control (~~wavy line~~).

Fig. 4: Line graph of soil penetrometer readings from table 5. Upper graph 1944 powerline, Nov. 29, 1978; Lower graph = 1977 powerline, Aug. 22, 1978; right-of-way (-----); control (~~~~~).

Fig. 5: Line graph of soil penetrometer readings of table
5. Upper graph = 1977 powerline, Nov. 29, 1978;
Lower graph = 1956 pipeline Aug. 22, 1978; right-
of-way (---); control (~~~~).

Table 6: Author reference for community classification
of the Mohave Desert, California.

Community	Reference
Cheesebush scrub	Johnson, 1976
Creosote bush scrub	Thorne, 1976
Desert holly scrub	Johnson, 1976
Dune sand plant	Thorne, 1976
Joshua tree woodland	Vasek, 1977
Salt bush scrub	Vasek, 1977
Semi-stem succulent	Thorne, 1976
(mixed mountain scrub-other authors)	
Shadscale scrub	Vasek, 1977

1900

1901

1902

1903

1904

1905

1906

1907

1908

1909

1910

1911

1912

1913

1914

1915

1916

1917

1918

1919

1920

Table 7: Perennial plant species classified by density values and relative age span for the project reference transects. LL = long lived species; SL = short lived species.

Family/Species	Density Value K_g/m^3	Relative Age
Asteraceae		
<u>Acamptopappus sphaerocephalus</u> (Harv. & Gray) Gray	3	SL
<u>Ambrosia dumosa</u> (Gray) Payne	4	LL
<u>Baileya pauciradiata</u> Harv. & Gray	2	SL
<u>Bebbia juncea</u> (Benth) Greene	2	SL
<u>Brickellia arguta</u> Rob.	2	SL
<u>Chrysothamnus nauseosus</u> (Pall.) Britton Ssp.		
<u>mohavensis</u> (Greene) Hall & Clem.	3	LL
<u>Chrysothamnus paniculatus</u> (Gray) Hall	3	LL
<u>Dyssodia cooperi</u> Gray	3	SL
<u>Dyssodia thurberi</u> (Gray) Nels.	3	SL
<u>Encelia farinosa</u> Gray ex Torr.	2	LL
<u>Encelia virginensis</u> A. Nels.	2	LL
<u>Gutierrezia microcephala</u> (DC.) Gray	3	SL
<u>Haplopappus acradenius</u> (Greene) Blake	3	SL
<u>Haplopappus cuneatus</u> Gray	3	SL
<u>Haplopappus cooperi</u> (Gray) Hall	3	SL
<u>Hymenoclea salsola</u> T. & G.	2	SL
<u>Lepidospartum squamatum</u> (Gray) Gray	3	SL
<u>Machaeranthera tortifolia</u> (Gray) Cronq. & Keck.	3	SL
<u>Senecio douglasii</u> DC.	3	SL
<u>Stephanomeria pauciflora</u> (Torr.) Nutt.	2	SL
<u>Tetradymia comosa</u> Gray	4	LL
<u>Tetradymia spinosa</u> H & A	4	LL

Table 7 contd

Family/Species	Density Value K_g/m^3	Relative Age
<u>Tetradymia stenolepis</u> Greene	4	LL
Agavaceae		
<u>Yucca brevifolia</u> Engelm.	13	LL
<u>Yucca schidigera</u> Roege ex Ortigies	13	LL
Bignoniaceae		
<u>Chilopsis linearis</u> (Cav.) Sweet	1	LL
Brassicaceae		
<u>Leplidium fremontii</u> Wats	3	SL
Cactaceae		
<u>Echinocactus polycephalus</u> Engelm & Bigel	⁹³ 692	LL
<u>Ferocactus ^{acanthoides} acantnes</u> (Lem.) Britton & Rose	⁹³ 692	LL
<u>Mammillaria tetrancistra</u> Engelm		LL
<u>Opuntia basilaris</u> Engelm & Bigel	78	LL
<u>Opuntia echinocarpa</u> Engelm & Bigel	9	LL
<u>Opuntia ramossima</u> Engelm	9	LL
Capparaceae		
<u>Isomeris arborea</u> Nutt.	6	LL
Chenopodiaceae		
<u>Atriplex canescens</u> (Pursh) Nutt.	5	LL
<u>Atriplex confertifolia</u> (Torr. & Frem.) Wats	8	LL

Table 7 contd

Family/Species	Density Value Kg/m ³	Relative Age
<u>Atriplex hymenelytra</u> (Torr.) Wats.	8	LL
<u>Atriplex ploycarpa</u> (Torr.) Wats.	5	LL
<u>Atriplex spinefera</u> Macbr.	5	LL
<u>Ceratoides lanatum</u> (Pursh) T. Howell	5	LL
<u>Grayia spinosa</u> (Hook) Mog.	6	LL
<u>Sueda torreyana</u> Wats.	1	LL
Ephedraceae		
<u>Ephedra californicus</u> Muell-Arg.	6	LL
<u>Ephedra nevadensis</u> Wats.	6	LL
<u>Ephedra viridis</u> Cov.	6	LL
Euphorbiaceae		
<u>Croton californicus</u> Muell-Arg.	1	SL
<u>Stillingia linearifolia</u> Wats.	1	SL
Fabaceae		
<u>Acaccia greggii</u> Gray	1	LL
<u>Cassia armata</u> Wats.	4	LL
<u>Cercidium floridum</u> (Benth) Wats. Benth.	1	LL
<u>Dalea arborescens</u> Torr. ex Gray	6	LL
<u>Dalea californica</u> Wats.	6	LL
<u>Dalea emoryi</u> Gray	6	LL
<u>Dalea spinosa</u> Gray	6	LL
<u>Prosopis glandulosa</u> Torr. var <u>torreyana</u> (L. Benson)		
M.C. Jtn.	1	LL

Table 7 contd

Family/Species	Density Value K_g/m^3	Relative Age
Hydrophyllaceae		
<u>Eriodyction trichocalyx</u> Heller Ssp. <u>lanatum</u> (Brand) Munz.	3	SL
Krameriaceae		
<u>Krameria parvifolia</u> Benth, Var. <u>imparata</u> Macbr.	2	LL
Lamiaceae		
<u>Salvia dorii</u> (Kell.) Abrams	3	LL
<u>Salazaria mexicana</u> Torr.	4	LL
Loasaceae		
<u>Petalonyx thurberi</u> G.	3	SL
Poaceae		
<u>Aristida fendleriana</u> Steude	2.5	SL
<u>Hilaria jamesii</u> (Thurb.) Benth. ex Scribn.	2.5	SL
<u>Hilaria rigida</u> (Thurb.) Benth. ex Scribn.	3.7	LL
<u>Muhlenbergia potteri</u> Scribn.	2.5	SL
<u>Oryzopsis hymenoides</u> (R. & S.) Ricker	2.5	SL
<u>Panicum urvilleanum</u> Kunth.	2.5	SL
<u>Stipa speciosa</u> Trin. & Rupr.	2.5	SL
Polemoniaceae		
<u>Gilia densifolium</u> (Benth.) Mason Ssp. <u>mohavensis</u> (Craig) Mason	1	SL

Table 7 contd

Family/Species	Density Value K _g /m ³	Relative Age
Polygonaceae		
<u>Eriogonum fasciculatum</u> Benth	3	SL
<u>Eriogonum heerimannii</u> Dur. & Hilg.	3	SL
<u>Eriogonum inflatum</u> Torr. & Frem.	.5	SL
Rosaceae		
<u>Coleogyne ramosissima</u> Torr.	7	LL
<u>Fallugia paradaxa</u> (D. Don) Endl.	7	LL
<u>Prunus fasciculata</u> (Torr.) Gray	5	LL
<u>Purshia glandulosa</u> Curran	7	LL
Rutaceae		
<u>Thamnosma montana</u> Torr. & Frem.	7	LL
Solanaceae		
<u>Lycium andersoni</u>	22	LL
<u>Lycium cooperi</u> Gray	22	LL
Zygophyllaceae		
<u>Larrea tridentata</u> (Sesse & Moc ex DC.) Cov.	2.5	LL

Table 8: Analysis of perennial vegetation along a natural gas pipeline constructed in 1956. Tr = transect; A = control; B = berm; C = trench; D = roadedge; PR = productivity ratio ($\text{Test} \div \text{Control}$); % change ($\text{Control} - \text{Test} \div \text{control}$) is computed for biomass values only.

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 1										
A	3	1.00		25		.6296		.0092		
B	3	1.60	1.60	25	1.00	1.1104	1.76	.0147	1.60	60
C	3	.88	.88	18	.72	.4703	.75	.0070	.76	24
D	2	.59	.59	6	.64	.5061	.80	.0056	.72	28
Study area 2										
A	11	7.32		39		4.4873		.0855		
B	6	2.48	1.34	314	8.05	3.0009	.67	.0513	.60	40
C	4	.94	.13	168	4.31	1.7028	.38	.0064	.07	92
D	2	1.76	.24	246	6.31	2.345	.52	.0485	.56	43
Study area 3										
A	16	5.32		176		5.3308		.0837		
B	10	1.61	.30	43	.24	1.2810	.24	.0185	.22	78
C	12	4.04	.76	79	.45	3.0944	.58	.0470	.56	44
D	9	5.31	1.00	101	.57	3.6785	.69	.0655	.78	22

Table 8 contd

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 4										
A	7	4.90		107		3.2959		.0642		
B	6	2.88	.58	78	.72	2.1871	.66	.0296	.46	54
C	7	4.06	.82	109	1.02	2.0899	.63	.0235	.37	63
D	6	2.26	.46	71	.66	2.5836	.78	.0359	.56	44
Study area 5										
A	5	5.32		135		3.7723		.0785		
B	9	4.05	.76	145	1.07	3.2151	.85	.0684	.85	13
C	7	3.65	.68	134	.99	2.3230	.62	.0460	.59	41
D	8	8.02	1.51	106	.78	7.6596	2.03	.1180	1.50	50
Study area 6										
A	4	4.91		81		4.2845		.0641		
B	7	3.69	.75	94	1.16	2.8970	.67	.0475	.74	26
C	6	3.90	.79	90	1.11	1.559	.36	.0283	.44	56
D	5	5.40	1.10	99	1.22	3.9612	.92	.0586	.91	09

Table 8 cond't

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 7										
A	10	4.21		53		4,3287		.0667		
B	10	3.14	.75	63	1.19	2,6764	.62	.0371	.56	44
C	6	1.30	.31	21	.40	1.2345	.28	.0139	.21	79
D	7	2.15	.51	56	1.06	2,1459	.50	.0315	.47	53
Study area 8										
A	5	3.37		178		2,3271		.0428		
B	3	2.94	.87	188	1.06	2,892	1.24	.0543	1.27	27
C	3	1.23	.36	163	.92	1,349	.58	.0280	.65	35
D	5	2.34	.69	186	1.04	1,2634	.54	.0266	.62	38

Table 9: Analysis of perennial vegetation along a natural gas pipeline constructed in 1960. Headings as in table 8.

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
----	----------------------	-------------------	----	--------------------------------	----	---	----	---	----	-----------------

Study area 1

A	3	2.40		33		2.4919		.0319		
B	2	.37	.15	32	.97	.1792	.07	.0024	.07	92
C	4	1.07	.44	37	1.12	.789	.32	.0054	.17	83
D	3	1.19	.50	24	.73	.8144	.33	.0096	.30	70

Study area 2

A	3	4.47		28		4.8303		.0818		
B	3	.54	.12	23	.82	.2942	.06	.0041	.05	94
C	3	1.84	.41	54	1.93	1.2554	.26	.0162	.20	80
D	3	.51	.11	13	.46	.6244	.13	.0070	.08	91

Study area 3

A	16	4.68		81		3.1688		.0631		
B	9	1.85	.39	32	.39	1.2336	.39	.0158	.25	75
C	9	4.44	.95	116	1.43	2.9177	.92	.0388	.61	38
D	5	1.43	.30	47	.58	.8923	.28	.0146	.23	77

Table 9 condit

Tr	Number of species	Ground cover %	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 4									
A	6	2.96	94		1.999		.0668		
B	3	2.01	.68	.84	1.4521	.73	.0201	.30	70
C	3	3.30	1.11	.80	2.2775	1.14	.0368	.55	45
D	3	2.74	.93	.46	2.3475	1.174	.0249	.37	53
Study area 5									
A	14	4.83	168		3.2757		.2442		
B	8	2.61	.54	.89	1.8560	.57	.0342	.14	86
C	6	1.61	.33	.42	.9000	.27	.0184	.07	92
D	5	1.36	.28	.75	.7813	.24	.0117	.05	95
Study area 6									
A	6	4.40	94		4.3951		.0433		
B	3	4.46	1.01	1.77	2.134	.48	.0329	.76	24
C	3	1.78	.40	1.51	.7531	.17	.0169	.39	61
D	4	4.72	1.07	1.02	2.6948	.61	.0436	1.01	.7

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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Table 10: Analysis of perennial vegetation along a natural gas pipeline constructed in 1963. Headings as in table 8.

T = trace amount.

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
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Study area 1

A	3	.17		256		.1660		.0120		
B	2	.04	.23	31	.12	.1525	.92	.0004	.03	97
C	2	T		8	.03	.0061	.04	.0001	.01	99
D	3	.27	1.59	468	1.83	.3464	2.09	.0019	.16	81

Study area 2

A	3	1.08		211		1.2488		.0125		
B	3	2.79	2.58	172	.81	2.4876	1.99	.0359	2.87	187
C	3	2.10	1.94	129	.61	2.2446	1.80	.0320	2.56	156
D	3	1.51	1.40	150	.71	1.7310	1.39	.0088	.70	30

Study area 3

A	3	4.47		86		2.5512		.0516		
B	4	3.08	.69	80	.96	4.6247	1.81	.0325	.63	37
C	3	1.54	.34	95	1.10	1.4194	.57	.0225	.44	56
D	3	5.91	1.32	162	1.88	3.8926	1.53	.0829	1.61	61

Table 10econdt

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
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Study area 4

A	3	4.66		68		4.9082		.1177		
B	4	5.99	1.28	54	.79	6.2218	1.27	.1585	1.35	34
C	4	2.19	.47	23	.34	.9746	.20	.0228	.19	81
D	2	1.29	.28	28	.41	1.5814	.32	.0320	.27	73

Study area 5

A	7	5.90		156		4.3978		.0561		
B	8	6.30	1.07	262	1.68	4.3575	.99	.0556	.99	01
C	5	3.29	.56	190	1.22	2.4483	.56	.0271	.48	52
D	6	6.14	1.04	215	1.38	4.2489	.97	.0503	.90	10

Study area 6

A	2	2.39		52		2.1668		.0287		
B	2	2.14	.89	95	1.83	.6933	.32	.0138	.64	52
C	3	1.23	.51	68	1.31	.7595	.35	.0125	.43	56
D	2	2.67	1.12	54	1.04	1.8256	.84	.0325	1.18	13

 

Tr	Number of species	Ground cover %	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 7									
A	5	2.30	28		1.6654		.0202		
B	4	1.37	8	.60	.29	.54	.0081	.40	60
C	3	1.65	5	.72	.18	1.14	.0227	1.19	12
D	6	2.20	11	.96	.39	1.64	.0209	1.08	3
Study area 8									
A	5	4.59	23		3.1095		.0347		
B	3	3.10	27	.69	1.17	.82	.0255	.73	26
C	4	3.43	28	.75	1.22	.87	.0257	.74	30
D	5	2.08	36	.45	1.56	.36	.0104	.30	70

Table 11: Analysis of perennial vegetation along a petroleum products pipeline constructed in 1963. Headings as table 8.

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 1										
A	6	4.65		39		1,5064		.0698		
B	3	3.10	.66	28	.72	2,3750	1.58	.0302	.43	57
C	5	4.15	.89	31	.79	3,6200	2,40	.0442	.63	37
D	3	1.12	.24	14	.36	1,2570	.83	.0160	.23	77
Study area 2										
A	5	5.08		119		3,4496		.0601		
B	4	2.91	.57	85	.71	1,4156	.41	.0183	.30	70
C	5	3.28	.64	195	1.64	1,4295	.41	.0268	.45	55
D	4	2.59	.51	44	.37	1,440	.42	.0196	.33	67

Table 12: Analysis of perannial vegetation along a petroleum products
pipeline constructed in 1970. Headings as in table 8.

Tr	Number of species	Ground cover %	Density #/200m ²	Volume m ³ /200m ²	Biomass K _g /m ²	% change + ..
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Study area 1

A	6	3.40	21	3.7717	.0551	
B	3	.78	30	.4014	.0052	.09 91
C	4	1.79	50	1.1403	.0129	.23 77
D	2	.48	12	.3063	.0031	.06 94

Study area 2

A	5	3.05	48	3.063	.0590	
B	2	.14	26	.0685	.0010	.02 98
C	2	.12	28	.1551	.0010	.02 98
D	2	.14	16	.0707	.0010	.02 98

Study area 3

A	4	4.53	125	3.0826	.0396	
B	1	.13	68	.0544	.0013	.03 97
C	1	.09	70	.042	.0010	.02 97
D	1	.39	211	1.688	.0422	1.07 9

Table 12 condit

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 4										
A	4	2.40		66		2.5300		.0354		
B	4	.77	.32	33	.50	.4068	.16	.0053	.15	85
C	4	.82	.34	42	.64	.4620	.18	.0063	.18	82
D	5	1.26	.53	51	.32	.6701	.26	.0095	.26	73
Study area 5										
A	4	2.82		48		2.2837		.0478		
B	3	1.90	.67	86	1.79	.8431	.37	.0209	.44	56
C	3	1.56	.55	32	.66	.8708	.38	.0217	.45	56
D	3	2.62	.93	95	1.98	2.7216	1.19	.0621	1.30	30
Study area 6										
A	6	5.44		127		4.3851		.0722		
B	2	.37	.07	18	.14	.2011	.05	.0048	.07	93
C	2	.17	.03	10	.08	.1180	.03	.0029	.04	96
D	3	1.93	.35	68	.54	1.7043	.39	.0291	.40	60

Table 12.condt

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change	
										+	-
Study area 7											
A	2	2.23		24		2.1654		.0318			
B	1	.09	.04	4	.17	.0356	.02	.0004	.01		99
C	4	.13	.06	9	.38	.0889	.04	.0012	.04		96
D	4	1.12	.50	32	1.33	.7681	.35	.0096	.30		70

Table 13: Analysis of perennial vegetation along a petroleum products pipeline constructed in 1973. Headings as in table 8.

T = trace amount.

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
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Study area 1

A	2	1.54		38		1.6568		.0232		
B	2	.42	.27	78	2.05	.5484	.33	.0081	.35	65
C	1	T		2	.05	.0024	.001	.0001	.004	100
D	3	.87	.56	37	.97	.7519	.45	.0113	.49	51

Study area 2

A	3	2.97		62		2.1689		.0346		
B	4	.82	.28	52	.84	.5983	.28	.0082	.24	76
C	7	1.35	.45	140	2.26	.7497	.35	.0116	.34	66
D	6	1.09	.37	33	.53	.5471	.25	.0092	.27	73

Study area 3

A	7	3.98		47		3.5398		.0381		
B	5	1.49	.37	34	.72	.9275	.26	.0156	.41	59
C	6	1.36	.34	33	.70	.8172	.23	.0122	.32	70
D	7	2.73	.56	68	1.45	1.8999	.54	.0242	.63	36

Table 13coondt

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 4										
A	2	2.29		17		2.5588		.0623		
B	1	.74	.32	8	.47	.5728	.22	.0143	.23	77
C	2	1.13	.49	31	1.82	.6466	.25	.0060	.10	90
D	3	3.69	1.61	41	2.41	2.1060	.82	.0432	.69	31
Study area 5										
A	2	2.95		37		1.3387		.0198		
B	4	1.26	.43	70	1.89	1.2459	.93	.0193	.97	2
C	5	2.12	.72	107	2.89	.8503	.63	.0131	.66	34
D	3	3.85	1.30	86	2.32	2.4005	1.79	.0428	2.16	116
Study area 6										
A	3	3.28		53		2.4063		.3348		
B	3	.19	.06	8	.15	.0927	.04	.0026	.01	99
C	6	.58	.18	21	.40	.2174	.09	.0056	.02	98
D	2	.44	.13	15	.28	.1835	.08	.0083	.02	97

Table 14: Analysis of perennial vegetation along a power transmission line constructed in 1924. Tr = transect; A = control; B = wire; C = pylon; D = roadedge; PR = productivity ratio ($\text{test} \div \text{control}$); % change ($\text{control} - \text{test} \div \text{control}$) is computed for biomass values only.

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
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Study area 1

A	5	4.73		125		2.2687		.0462		
B	4	3.77	.80	125	.99	1.987	.87	.0389	.84	16
C	7	5.42	1.15	175	1.39	3.1207	1.37	.0563	1.22	22
D	4	7.46	1.58	171	1.36	4.3415	1.91	.0771	1.67	67

Study area 2

A	7	7.05		268		5.8735		.1068		
B	12	10.60	1.50	191	.71	8.944	1.52	.0905	.84	15
C	10	5.65	.80	390	1.45	5.2307	.89	.1128	1.06	6
D	8	11.66	1.65	159	.59	7.9741	1.36	.1181	1.11	11

Study area 3

A	13	6.19		107		4.2515		.0800		
B	11	6.54	1.06	117	1.09	4.0233	.95	.0617	.77	23
C	13	3.33	.54	98	.92	2.4335	.57	.0448	.56	44
D	10	2.09	.34	59	.55	1.3984	.33	.0258	.32	68

Table 14. condit

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 4										
A	6	5.84		48		6.9869		.1542		
B	4	1.21	.21	40	.83	2.3208	.33	.0425	.28	72
C	7	5.09	.87	44	.92	4.2476	.61	.0653	.42	58
D	4	3.06	.52	34	.71	3.4368	.49	.0699	.45	55
Study area 5										
A	13	3.54		58		3.9015		.0656		
B	7	1.81	.51	49	.84	.9233	.24	.0283	.43	57
C	2	1.77	.50	47	.81	.0712	.02	.0120	.20	80
D	2	2.88	.81	46	.79	.0654	.02	.0192	.29	71
Study area 6										
A	4	2.15		32		2.4602		.0237		
B	3	1.48	.69	96	.30	.8005	.32	.0289	1.21	22
C	4	3.10	1.81	39	1.22	2.3381	.95	.0110	.46	54
D	3	2.24	1.04	39	1.22	1.5805	.64	.0187	.79	21

Table 14condt

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change ÷
Study area 7										
A	6	3.84		38		3.3843		.0470		
B	5	2.65	.69	48	1.26	1.8545	.55	.0243	.52	48
C	6	6.83	1.78	98	2.58	5.4553	1.61	.0644	1.37	37
D	6	2.67	.69	32	.84	2.1945	.65	.0320	.68	32

Table 15: Analysis of perennial vegetation along a power transmission
line constructed in 1933. Headings as in table 14.

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 1										
A	4	2.52		78		2.4229		.0352		
B	5	1.36	.54	87	1.11	1.6398	.68	.0283	.80	20
C	4	3.25	1.29	147	1.88	2.5530	1.05	.0457	1.30	30
D	5	2.60	1.03	117	1.50	2.1570	.89	.0335	.95	5
Study area 2										
A	4	7.65		106		8.0825		.1433		
B	4	3.37	.44	57	.54	2.3182	.29	.0442	.31	68
C	5	5.31	.69	85	.80	3.0142	.37	.0507	.35	65
D	4	4.81	.62	115	1.08	2.8340	.35	.0579	.40	60
Study area 3										
A	7	3.98		47		3.5398		.0381		
B	7	5.08	1.27	50	1.06	4.2641	1.20	.0635	1.67	66
C										
D	5	2.00	.50	25	.53	1.5562	.44	.0241	.63	37

Table 15: condit

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
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Study area 4

A	3	2.96		62		2.1682		.0346		
B	2	2.08	.70	35	.56	1.5821	.73	.0249	.72	28
C	2	2.19	.73	32	.52	1.7450	.80	.0245	.71	29
D	3	2.36	.79	54	.87	1.5469	.71	.0240	.69	31

Study area 5

A	3	1.56		55		.9275		.0190		
B	3	1.68	1.08	75	1.36	1.0078	1.09	.01871	1.98	1
C	3	1.98	1.27	113	2.05	1.1969	1.29	.0223	1.17	17
D	3	2.18	1.40	58	1.05	1.2642	1.36	.0289	1.52	52

Study area 6

A	6	4.25		55		3.7283		.0599		
B	8	7.61	1.79	76	1.38	7.0668	1.89	.0984	1.64	64
C	7	2.48	.58	106	1.93	2.4866	.67	.0443	.74	26
D	9	4.23	.99	59	1.07	3.5052	.94	.0528	.88	19

Table 15: condit

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change +
Study area 7										
A	2	2.29		17		2.5589		.0623		
B	1	1.78	.78	162	9.53	.5670	.22	.0142	.23	77
C	1	1.26	.55	106	6.23	.3710	.14	.0093	.15	85
D	1	2.21	.97	200	11.76	.7000	.27	.0175	.28	72

Table 16: Analysis of perennial vegetation along a power transmission
line constructed in 1944. Headings as in table 14.

Tr	Number of species	Ground cover %	Density #/200m ²	Volume m ³ /200m ²	Biomass K _g /m ²	PR	% change + -
Study area 1							
A	8	4.16	59	3.1655	.0778		
B	5	3.25	127	3.0380	.0463	.59	40
C	6	4.10	56	2.7136	.0463	.59	40
D	5	1.35	68	.9924	.0276	.35	64
Study area 2							
A	3	1.35	19	.8469	.0200		
B	3	1.71	25	.9509	.0223	1.11	12
C	3	1.37	37	.7144	.0170	.85	15
D	2	1.78	14	1.1457	.0286	1.43	19
Study area 3							
A	6	2.63	66	1.9649	.0446		
B	2	5.14	46	4.7510	.0832	1.86	86
C	2	10.02	69	8.3163	.1914	4.29	329
D	4	5.91	87	3.6807	.0753	1.69	69

Table 16.condt

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 4										
A	4	5.65		106		8.0825		.1433		
B	4	4.06	.72	58	.55	2.9872	.37	.0513	.36	64
C	5	2.86	.51	34	.32	2.9547	.36	.0497	.34	65
D	5	6.34	1.12	204	1.92	3.8827	.48	.0450	.31	69
Study area 5										
A	9	4.50		174		3.8462		.0700		
B	10	8.97	1.99	205	1.18	7.0434	1.83	.0917	1.31	31
C	5	4.31	.96	124	.71	4.5149	1.17	.0653	.93	7
D	7	9.08	2.02	117	.67	10.6430	2.77	.1611	2.30	130
Study area 6										
A	4	3.15		78		2.4630		.1199		
B	4	3.30	1.05	105	1.35	2.7668	1.12	.0903	.75	25
C	6	3.49	1.11	136	1.74	2.6112	1.06	.0738	.61	38
D	5	2.70	.86	60	.77	2.7812	1.13	.0786	.65	34

Table 16~condt

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
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Study area 7

A	4	2.30		41		1.6453		.0270		
B	4	2.62	1.14	79	1.93	2.1530	1.31	.0391	1.45	45
C	2	2.74	1.19	59	1.44	1.4116	.86	.0346	1.28	28
D	4	2.79	1.21	95	2.32	3.1153	1.89	.0604	2.24	124

Study area 8

A	2	2.06		50		1.0344		.0145		
B	3	1.70	.82	199	3.98	1.4367	1.39	.0271	1.87	87
C	2	2.09	1.01	130	2.60	2.1786	2.11	.0387	2.67	166
D	5	3.47	1.68	247	4.94	3.8712	3.74	.0733	5.05	405

Study area 9

A	4	2.48		38		2.2359		.0610		
B	2	1.85	.75	37	.97	1.6126	.73	.0208	.34	66
C	3	1.80	.72	48	1.26	1.5265	.68	.0201	.32	66
D	2	3.41	1.37	26	.70	4.7661	2.13	.0606	.99	1

Table 16 condit

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change +
Study area 10										
A	9	6.57		134		5.1809		.0987		
B	8	5.45	.83	139	1.19	4.1405	.80	.0698	.71	29
C	9	3.36	.51	112	.84	2.7809	.54	.0532	.53	46
D	7	3.28	.50	66	.49	2.5662	.49	.0377	.39	62

Table 17: Analysis of perennial vegetation along a power transmission
line constructed in 1952. Headings as in table 14.

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
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Study area 1

A	8	10.28		59		7.9003		.1127		
B	7	9.12	.89	96	1.63	6.3673	.81	.0914	.81	19
C	9	7.09	.69	67	1.13	4.9415	.62	.0816	.72	28
D	9	3.75	.36	60	1.02	2.2005	.28	.0484	.43	57

Study area 2

A	9	4.85		298		3.4575		.0474		
B	9	5.08	1.05	243	.81	2.2026	.63	.0408	.86	57
C	8	4.35	.90	173	.58	1.7695	.51	.0287	.60	39
D	8	3.78	.78	131	.44	2.5081	.72	.0370	.78	30

Study area 3

A	6	6.79		105		6.6897		.1154		
B	3	3.87	.60	103	.98	3.3543	.50	.0487	.42	58
C	6	3.38	.50	89	.85	3.0231	.45	.0416	.36	64
D	5	4.59	.68	158	1.50	3.8436	.57	.0612	.53	50

Table 17 condit

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 4										
A	5	5.60		85		5.1423		.1080		
B	6	7.71	1.38	76	.89	7.5382	1.46	.1415	1.31	31
C	6	3.23	.58	63	.74	3.0004	.58	.1415	1.31	31
D	5	2.57	.46	45	.53	2.2340	.43	.0434	.40	60
Study area 5										
A	4	5.59		75		4.6750		.0657		
B	6	5.16	.92	73	.97	3.8128	.81	.0593	.90	10
C	6	3.94	.70	55	.73	4.2593	.91	.0620	.94	6
D	6	3.13	.56	68	.91	1.6653	.36	.0230	.35	64
Study area 6										
A	6	5.27		150		1.8327		.0741		
B	3	4.35	.82	166	1.11	2.8530	1.56	.0799	1.08	8
C	4	1.38	.26	50	.33	.5681	.31	.0200	.27	73
D	3	3.66	.69	200	1.33	1.7750	.97	.0516	.70	30

Table 17 condit

Tr	Number of species	Ground cover %	Density #/200m ²	Volume m ³ /200m ²	Biomass K _g /m ²	% change + -
Study area 7						
A	6	4.91	132	4.0880	.0743	
B	5	5.63	87	3.2373	.0510	.69 31
C	3	2.70	90	2.7999	.0430	.58 42
D	3	5.87	143	3.7796	.0564	.76 24
Study area 8						
A	2	6.64	63	7.1829	.1685	
B	2	6.15	61	8.9136	.1476	.88 12
C	2	4.03	40	3.4417	.0850	.50 50
D	2	4.59	39	3.9350	.0961	.57 43

Table 18: Analysis of perennial vegetation along a power transmission

line constructed in 1968. Headings as in table 14.

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 1										
A	11	7.30		37		3.8708		.0852		
B	11	3.92	.54	60	1.62	2.7854	.72	.1139	1.34	34
C	7	5.20	.71	82	2.22	3.7207	.96	.0594	.70	30
D	8	5.65	.77	123	3.32	3.6965	.95	.1292	1.52	52
Study area 2										
A	8	3.81		115		2.7990		.0491		
B	8	3.43	.90	104	.90	2.1354	.76	.0540	1.10	10
C	5	2.25	.59	73	.63	.8958	.32	.0178	.36	64
D	9	4.60	1.21	152	1.32	2.1630	.77	.0397	.81	19
Study area 3										
A	6	5.84		66		6.9935		.1542		
B	10	4.69	.80	60	.91	4.6296	.66	.1016	.66	34
C	6	11.14	1.91	88	1.33	8.994	1.29	.1888	1.22	22
D	4	3.06	.52	34	.51	3.4201	.49	.0699	.45	55

Table 18 condit

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 4										
A	13	6.19		107		4.5724		.0800		
B	9	6.20	1.002	117	1.09	4.6796	1.02	.0727	.91	9
C	8	4.85	.78	91	.85	2.7936	.61	.0460	.58	42
D	10	2.09	.34	59	.55	1.3984	.31	.0258	.32	68
Study area 5										
A	10	4.21		53		4.3587		.0667		
B	7	3.87	.92	70	1.32	3.4775	.80	.0573	.86	14
C	6	1.98	.47	35	.66	1.9956	.46	.0437	.65	34
D	7	2.15	.51	56	1.06	2.1459	.49	.0315	.47	53

Table 19: Analysis of perennial vegetation along a power transmission
line constructed in 1969. Headings as in table 14.

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 1										
A	3	4.52		33		4.6708		.0582		
B	4	1.64	.36	29	.88	1.7852	.38	.0228	.39	61
C	4	2.24	.50	123	3.73	2.4025	.51	.0262	.45	55
D	3	1.19	.26	24	.73	.8144	.17	.0095	.16	84
Study area 2										
A	3	4.47		28		4.8303		.0590		
B	3	2.01	.50	32	1.14	1.8696	.39	.0246	.42	58
C	4	1.44	.10	136	4.86	.7299	.15	.0209	.35	65
D	3	.51	.11	13	.46	.3634	.07	.0060	.10	90
Study area 3										
A	4	8.29		115		8.3595		.1072		
B	3	7.49	.90	166	1.44	6.7904	.81	.0909	.85	15
C	2	10.62	1.28	259	2.25	4.3145	.52	.0752	.70	30
D	4	9.43	1.14	129	1.12	4.2036	.50	.0674	.63	33

Table 19 condit

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 4										
A	3	1.86		98		2.4847		.0325		
B	3	1.66	.89	144	1.47	2.8132	1.13	.0368	1.13	13
C	3	2.72	1.46	122	1.24	2.1677	.87	.0281	.86	14
D	3	2.27	1.22	213	2.17	3.1828	1.28	.0499	1.53	53
Study area 5										
A	8	4.60		124		2.7722		.0642		
B	5	4.19	.91	154	1.24	2.946	1.06	.1363	2.12	112
C	4	4.93	1.07	148	1.19	3.3672	1.21	.1233	1.92	92
D	5	6.43	1.40	187	1.51	5.8704	2.12	.1617	2.51	143
Study area 6										
A	6	4.40		94		4.3952		.0681		
B	4	2.25	.51	69	.73	2.0528	.47	.0301	.44	56
C	3	2.69	.61	67	.71	2.4327	.55	.0344	.50	49
D	4	4.72	1.07	96	1.02	2.7148	.62	.0436	.64	36

Table 19 condit

Tr	Number of species	Ground cover %	PR	Density	PR	Volume	PR	Biomass	PR	% change	
				#/200m ²		m ³ /200m ²		K _g /m ²		+ -	
Study area 7											
A	14	4.83		168		3.2757		.2442			
B	16	5.46	1.13	171	1.02	4.3050	1.31	.2812	1.15	15	
C	5	1.13	.23	65	.39	.6564	.20	.0085	.03		96
D	5	1.36	.28	126	.75	.7813	.23	.0117	.05		95

Table 20: Analysis of perennial vegetation along a power transmission
line constructed in 1977. Headings as in table 14.

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 1										
A	3	2.81		43		2.483		.0578		
B	5	1.50	.53	104	2.42	1.3981	.56	.0414	.72	16
C	6	1.25	.44	28	.65	1.0112	.41	.0207	.36	64
D	6	2.80	1.00	66	1.53	1.6911	.68	.0447	.77	23
Study area 2										
A	5	3.44		109		3.2159		.0423		
B	5	4.01	1.16	236	2.17	3.6301	1.13	.0558	1.32	32
C	5	1.48	.43	69	.63	.8594	.27	.0119	.28	72
D	6	6.89	2.00	275	2.52	8.6169	2.68	.1251	2.96	196
Study area 3										
A	7	4.94		129		4.1131		.1041		
B	7	1.47	.30	119	.92	1.2101	.29	.0796	.76	23
C	4	.56	.11	26	.20	.3914	.09	.0315	.30	70
D	6	2.99	.60	89	.69	2.7205	.66	.0634	.61	39

Table 20 condit

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 4										
A	9	4.62		48		5.1857		.0839		
B	9	3.98	.86	76	1.58	3.4404	.66	.0720	.86	14
C	6	.90	.19	52	1.08	.5676	.11	.0131	.16	84
D	9	4.34	.94	59	1.23	2.1779	.61	.0698	.83	17
Study area 5										
A	4	5.53		65		3.8261		.0759		
B	3	3.87	.70	62	.95	2.1382	.56	.0480	.63	37
C	9	2.40	.43	48	.74	1.3257	.35	.0327	.43	57
D	5	4.40	.80	101	1.55	2.4966	.65	.0578	.76	24
Study area 6										
A	1	2.10		25		2.1925		.0274		
B	1	1.40	.67	27	1.08	1.0476	.48	.0131	.48	52
C	2	2.59	1.23	92	3.68	1.5000	.68	.0195	.71	29
D	1	1.03	.49	31	1.24	.5239	.24	.0065	.24	76

Table 21: Analysis of perennial vegetation along the Los Angeles aqueduct constructed in 1913. tr = transect; A = control; B = right of way; C = roadedge; PR = productivity ratio $(\text{test} \div \text{control})$; % change $(\text{control} - \text{test} \div \text{control})$ is computed for biomass values only.

Tr	Number of species	Ground cover %	PR	Density #/200m ²	Volume m ³ /200m ²	Pr	Biomass K _g /m ²	Pr	% change + -
Study area 1									
A	6	7.85		163	6.1041		.0950		
B	6	3.53	.45	167	2.4810	.41	.0372	.39	61
C	5	2.93	.37	51	2.4251	.40	.0425	.45	55
Study area 2									
A	7	6.21		242	5.3360		.0776		
B	4	8.24	1.33	172	5.3192	1.00	.0795	1.02	4
C	3	3.72	.60	202	1.8023	.34	.0527	.68	32
Study area 3									
A	8	8.07		297	6.3866		.0825		
B	7	3.18	.39	119	2.2537	.35	.0339	.41	59
C	8	2.74	.34	288	1.2641	.20	.0246	.30	70
Study area 4									
A	10	13.16		89	6.9609		.0973		
B	4	10.86	.83	170	7.9450	1.14	.0116	.12	88
C	3	12.56	.95	135	10.8809	1.56	.1632	1.68	68

Table 21 contd

Tr	Number of species	Ground cover %	Density #/200m ²	PR	Volume m ³ /200m ²	Biomass K _g /m ²	PR	% change + -
Study area 5								
A	10	5.87	539		4,0619	.0735		
B	6	9.56	512	1.63	6,6702	.1000	1.36	36
C	5	18.94	250	3.23	12,5851	.1905	2,59	159
Study area 6								
A	9	9.91	110		8,1120	.1423		
B	8	16.02	108	1.62	9,1944	.0117	.08	92
C	4	6.03	66	.61	5,4334	.67	.56	44
Study area 7								
A	6	5.29	206		3,0756	.0338		
B	7	11.09	154	2.10	8,9803	.1270	3,76	276
C	4	6.63	280	1.25	.4323	.14	1.12	12

Table 21 contd

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 8										
A	11	5.80		169		3.4115		.0645		
B	9	4.09	.71	141	.83	3.3881	.99	.0421	.65	35
C	10	4.99	.86	159	.94	4.1070	1.20	.0578	.90	10
Study area 9										
A	12	5.30		141		3.1880		.0524		
B	5	6.75	1.27	111	.79	5.7954	1.82	.1085	2.07	107
C	6	8.97	1.69	169	1.20	7.1783	2.25	.1348	2.57	157
Study area 10										
A	15	6.90		150		4.8180		.0789		
B	10	1.79	.26	103	.69	.8624	.18	.0106	.13	87
C	14	2.61	.38	78	.52	1.8593	.39	.0280	.35	65

. Table 21 contd

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change	
										+	-
Study area 11											
A	12	3.01		135		1.7182		.0207			
B	11	3.49	1.16	174	1.29	1.8503	1.08	.0230	1.11	11	
C	10	5.82	1.93	104	.77	4.3358	2.52	.0550	2.66	166	

Table 22: Analysis of vegetation along the Los Angeles aqueduct
constructed in 1970. Headings as in table 21.

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 1										
A	5	3.59		96		4.1080		.0607		
B	5	3.71	1.03	112	1.17	2.1659	.53	.0326	.54	46
C	4	1.63	.45	37	.39	1.0965	.27	.0147	.24	76
Study area 2										
A	6	5.27		150		2.4332		.0741		
B	3	1.83	.35	111	.74	.6986	.29	.0273	.37	63
C	3	3.72	.71	202	1.35	1.8023	.74	.0527	.71	29
Study area 3										
A	5	5.97		61		6.7640		.0896		
B	8	3.35	.56	111	1.82	2.1138	.31	.0369	.41	59
C	3	3.72	.62	202	3.31	1.8023	7	.0527	.59	41

Table 22 contd

Tr	Number of species	Ground cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 4										
A	7	4.52		129		2.7358		.0515		
B	9	1.16	.26	41	.32	.9215	.34	.0106	.21	79
C	6	1.31	.29	40	.31	.6735	.25	.0084	.16	84
Study area 5										
A	8	4.91		245		3.3236		.0525		
B	3	1.26	.26	34	.14	.8035	.24	.0083	.16	84
C	1	.18	.04	9	.04	.1116	.03	.0011	.02	98
Study area 6										
A	10	13.16		89		6.9609		.0973		
B	1	4.61	.35	63	.71	2.5515	.37	.0383	.39	61
C	2	4.93	.37	161	1.81	2.4920	.36	.0374	.38	62

Table 22 contd

Tr	Number of species	Ground cover %	Density #200/m ²	Volume m ³ /200m ²	Biomass K _g /m ²	PR	% change + -
Study area 7							
A	10	5.87	539	4.0619	.0735		
B	8	6.65	147	5.6203	.0845	1.15	15
C	4	3.00	112	1.6477	.0244	.33	67
Study area 8							
A	9	9.91	110	8.1120	.1423		
B	6	4.33	39	3.6981	.0496	.35	65
C	4	9.80	97	8.0714	.1185	.83	17
Study area 9							
A	6	5.29	206	3.0756	.0338		
B	3	1.33	64	.7077	.0082	.24	76
C	2	.45	8	.3431	.0039	.12	88

Table 22 contd

Tr	Number of species	Ground cover %	PR	Density #/200m ²	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 10									
A	12	4.16		78	3.1304		.0714		
B	4	3.68	.88	87	3.0322	1.12	.0453	.97	.63 37
C	4	2.05	.49	45	1.2358	.58	.0181	.39	.25 75
Study area 11									
A	11	5.80		169	3.4115		.0645		
B	8	2.84	.49	116	1.6407	.69	.0208	.48	.32 68
C	5	5.23	.90	59	4.2839	.35	.0629	1.26	.98 02
Study area 12									
A	9	4.57		98	3.0714		.0498		
B	5	4.09	.89	80	3.7367	.82	.0556	1.22	1.12 12
C	6	3.24	.71	138	2.1063	1.41	.0295	.69	.59 41

Table 22 contd

Tr	Number of species	Ground Cover %	PR	Density #/200m ²	PR	Volume m ³ /200m ²	PR	Biomass K _g /m ²	PR	% change + -
Study area 13										
A	4	5.51		74		4.6389		.0653		
B	6	1.98	.36	103	1.39	1.0300	.22	.0121	.19	81
C	6	2.03	.37	103	1.39	.9463	.20	.0124	.19	81
Study area 14										
A	5	5.48		103		3.5295		.0549		
B	2	.89	.16	5	.05	1.0306	.29	.0103	.19	81
C	2	.35	.06	3	.03	.3319	.09	.0034	.06	94
Study area 15										
A	12	3.01		135		1.7182		.0267		
B	6	1.01	.34	39	.29	.5311	.31	.0071	.27	73
C	7	1.06	.35	30	.22	.8630	.50	.0122	.46	119

Table 23: Diversity measures computed from above ground plant biomass for pipelines by year of construction, transects, and study area. R = richness; (no. of species); Ec = equibility; V = evenness; DI = diversity index. Values omitted are due to either very low figures for richness or excessive dominance of one species in the transect, making calculations unreliable.

TRANSECTS

Study Area	Control				Berm				Trench				Roadedge			
	R	Ec	V	DI	R	Ec	V	DI	R	Ec	V	DI	R	Ec	V	DI

Natural Gas Pipeline - 1956

1	3	4.19	.63	.55	3	4.19	.46	.7	3	5.29	.81	.51	2	8.43		.12
2	11	25.29	.2	5.92	6	3.8	.17	1.19	4	2.66	.32	.22	2	1.08	.49	1.42
3	16	16.91	.82	10.48	10	19.36	.68	1.97	12	16.95	.83	5.76	9	9.71	.52	4.02
4	7	6.7	.53	4.58	6	6.22	.76	2.75	7	6.65	.43	1.42	6	6.52	.36	1.86
5	13	23.9	.38	5.25	7	9.89	.35	1.68	2	1.69		.75	2	1.38	.07	.12
6	4	5.47	.24	.9	3	3.24	.96	.9	4	3.32	.87	2.53	3	3.26	.88	1.42
7	5	9.21	.74	4.42	5	6.12	.69	1.98	6	5.65	.52	4.26	6	10.37	.71	2.97
8	5	3.58	.74	3.57	3	1.9	.02	.22	3	1.96	.32	.8	5	3.50	.49	1.51

Natural Gas Pipeline - 1960

1	3	3.57	.01	.41	2	2.37		.14	4	5.14		.54	3	4.29	.42	.43
2	3	3.89	.31	2.94	3	6.45	.89	.32	3	2.84	.86	1.2	3	7.	.7	.48
3	16	26.37	.83	8.26	9	21.09	.67	1.68	9	9.17	.38	2.32	5	6.16	.42	.82
4	6	5.73	.69	5.69	3	2.44	.72	1.25	3	2.52		3.23	3	3.12	.44	1.05
5	14	14.34	.71	26.5	8	7.02	.13	.87	6	6.51	.32	.88	5	3.94	.56	.76

Table 23 contd

TRANSECTS

Study Area	Control				Berm				Trench				Roadedge			
	R	Ec	V	DI	R	Ec	V	DI	R	Ec	V	DI	R	Ec	V	DI

Natural Gas Pipeline - 1960 contd

6	6	5.73	.36	2.15	3	1.95	.68	1.91	3	2.06	.72	1.04	4	3.31	.81	3.57
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Natural Gas Pipeline - 1963

1	3	1.77		.07	2				2				3	1.58		.01
2	3	1.74	.74	.79	3	1.9	.47	1.48	3	2.09	.93	2.54	3	1.91	.07	.07
3	3	2.38	.87	1.68	4	3.53	.72	2.42	3	2.26	.35	1.68	3	1.94	.42	3.04
4	3	2.59	.21	2.63	4	4.19	.41	7.52	4	6.81	.53	1.49	2	2.2	.36	.82
5	7	5.78	.51	3.79	8	.58	.64	4.73	5	2.89	.21	1.32	6	4.25	.59	3.59
6	2	1.69	.44	.8	2	1.4		.03	2	2.54	.6	.66	2	1.67	.58	1.16
7	5	8.52	.37	1.2	4		.85	.78	3			.22	6			1.88
8	5	9.97	.39	2.23	3	3.98	.58	1.41	4	5.96	.6	1.76	5	7.12	.77	.95

Petroleum Products Pipeline - 1963

1	6	9.03	.65	5.97	3	3.88	.36	1.19	5	7.9		.54	3	6.42		.19
2	5	4.1	.75	5.10	4	3.48	.76	1.43	5	3.49	.73	2.21	4	4.65	.78	1.59

. Table 23 contd

TRANSECTS

Study Area	Control				Berm				Trench				Roadedge			
	R	Ec	V	DI	R	Ec	V	DI	R	Ec	V	DI	R	Ec	V	DI

Petroleum Products Pipeline - 1970

1	6	15.19	.08	2.96	3	3.76	.7	.33	4	4.28	.48	.7	2	3.6		.02
2	5	6.08	.59	4.27	2	2.57		.06	2	2.57		.02	2	2.57		.07
3	4	3.03	.63	2.55	1				1				1			
4	4	3.83	.69	1.9	4	4.87	.53	.32	4	3.67	.49	.59	5	5.92	.57	.65
5	4	4.44	.69	3.47	3	1.7	.04	.32	3	3.61	.25	.31	3	2.3	.69	3.69
6	6	5.1	.71	6.19	2	2.67		.01	2	4.42		.001	3	2.59	.82	2.05
7	2	2.38	.39	.89	1				4	22.72	.50	.10	4	5.5	.36	.46

Petroleum Products Pipeline - 1973

1	2	1.9	.77	1.08	2	1.45		.47	1				3	3.34	.7	.7
2	3	2.67	.67	2.03	4	4.37	.76	.65	7	6.04	.48	.74	6	10.23	.41	.61
3	7	10.16	.23	1.82	5	7.49	.97	1.68	6	10.17	.78	1.2	7	8.27	.78	2.45
4	2	2.86		.48	1				2	2.12		.34	3	3.19	.10	.75
5	2	1.95			4	3.79	.47	.99	5	4.32	.26	.45	3	2.39	.37	1.46
6	3	2.85	.18	2.53	3	13.13	.22	.15	6	15.46	.03	.28	2	2.08	.89	.45

Table 24: Diversity measures computed from above ground plant biomass for power transmission lines by year of construction, transect, and study area. R = richness (no. of species); Ec = equibility; V = evenness; DI = diversity index. Values omitted are due to either very low figures for richness or excessive dominance of one species in the transect, making calculations unreliable.

TRANSECTS

Study Area	Control			Wire			Pylons			Roadedge		
	R	Ec	V	DI	R	Ec	V	DI	R	Ec	V	DI

Power Transmission Line - 1924

1	5	4.01	.72	3.76	4	3.05	.62	2.47	7	5.58	.76	5.39	4	2.75	.82	6.41
2	7	4.85	.52	7.09	12	10.98	.49	6.89	10	6.79	.69	10.79	8	6.85	.55	8.89
3	13	16.09	.87	10.33	11	12.03	.7	6.34	13	16.88	.75	5.13	10	15.41	.73	2.79
4	6	7.95	.54	11.33	4	4.86	.49	2.42	7	10.62	.67	6.04	4	5.3	.79	5.79
5	5	3.95	.82	7.24	9	8.3	.56	5.44	7	6.11	.69	4.10	8	8.58	.76	12.08
6	4	3.52	.59	3.96	7	7.1	.58	3.69	6	5.8	.55	1.98	5	4.39	.59	4.04
7	10	17.9	.63	6.66	10	14.71	.89	4.64	6	15.18	.42	1.22	7	9.2	.18	1.25

Power Transmission Line - 1933

1	4	3.59	.55	2.06	5	4.63	.43	1.5	4	2.9	.75	3.48	5	4.14	.57	2.2
2	4	3.21	.83	11.99	4	4.11	.87	3.9	5	4.68	.89	5.07	4	3.11	.96	5.57
3	7	10.16	.23	1.82	7	9.78	.74	6.27	0				5	9.26	.72	2.13
4	3	2.67	.67	2.03	2	1.96		1.44	2	1.65		1.14	3	2.85	.66	1.4
5	3	2.84	.45	.8	3	2.5	.62	1.02	3	2.18	.8	1.52	3	2.76	.2	.64
6	6	7.38	.58	4.58	8	9.44	.18	3.79	7	6.72	.67	3.87	9	13.	.41	3.83

Table 24 contd

TRANSECTS

Study Area	Control				Wire				Pylons				Roadedge			
	R	Ec	V	DI	R	Ec	V	DI	R	Ec	V	DI	R	Ec	V	DI

Power Transmission Line - 1933 contd

7	2	2.86		.48	1				1				1			
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Power Transmission Line - 1944

1	8	10.88	.85	8.85	5	4.01	.47	2.56	6	7.31	.68	3.98	5	5.17	.73	2.31
2	3	4.96		.42	3	4.17	.29	.80	3	3.33	.17	.39	2	3.28		.04
3	6	6.74	.5	2.96	2	1.77		1.67	2	1.53		.82	4	3.45	.04	.83
4	4	3.21	.83	11.99	4	4.06	.93	4.8	5	7.45	.59	3.73	4	2.61	.87	7.42
5	9	7.73	.79	7.48	10	8.4	.86	10.93	5	4.05	.55	4.13	7	6.46	.19	5.12
6	4	3.59	.4	5.33	4	3.23	.59	5.51	6	4.96	.7	6.31	5	5.45	.72	6.57
7	4	4.82	.77	2.18	4	3.59	.89	3.53	2	1.63	.21	.53	4	3.33	.63	3.94
8	2	1.74	.77	.67	3	1.81	.2	.49	2	1.27	.62	1.42	5	3.27	.07	.82
9	4	4.98	.84	5.27	2	1.91	.2	.33	3	3.	.33	.68	2	2.28	.01	.51
10	9	8.59	.82	11.02	8	7.21	.8	7.39	9	9.27	.61	4.63	7	8.4	.81	3.94

Table 24 contd

TRANSECTS

Study Area	Control			Wire			Pylons			Roadedge		
	R	Ec	V	DI	R	Ec	V	DI	R	Ec	V	DI

Power Transmission Line - 1952

1	8	10.86	.25	5.64	7	7.01	.55	6.81	9	12.05	.72	8.36	9	12.88	.7	4.89
2	9	5.62	.5	5.16	9	6.9	.62	3.5	8	6.62	.64	2.45	8	7.35	.51	2.62
3	6	5.48	.53	7.75	3	2.25	.13	.54	6	5.88	.44	2.44	5	3.73	.63	4.35
4	5	4.68	.2	3.19	6	6.29	.6	10.77	6	6.89	.7	4.36	5	6.29	.3	1.98
5	4	3.66	.51	3.59	6	6.4	.59	4.45	6	7.38	.31	3.03	6	6.63	.36	1.21
6	6	4.79	.39	3.74	3	1.93	.64	4.4	4	4.34	.2	.59	3	1.83	.62	2.76
7	6	5.02	.69	6.23	5	4.64	.83	4.74	3	2.34	.74	2.72	3	2.03	.69	3.32
8	2	1.57	.16	2.	2	1.59		.04	2	1.88		.09	2	1.89		.43

Power Transmission Line - 1968

1	11	26.71	.17	5.86	11	17.7	.23	6.58	7	7.53	.82	6.22	8	7.58	.47	8.68
2	8	7.81	.62	4.19	8	8.89	.55	4.49	5	4.93	.81	1.63	9	8.18	.84	4.51
3	6	6.73	.56	11.32	10	15.18	.76	11.30	6	5.9	.52	12.74	4	5.3	.79	5.76
4	13	16.09	.87	10.32	9	9.08	.91	8.89	8	8.66	.79	4.85	10	15.41	.73	2.79
5	10	16.56	.64	6.66	7	8.12	.44	3.68	6	9.73	.49	3.18	7	9.8	.2	1.24

Table 24 contd

TRANSECTS

Study Area	Control			Wire			Pylons			Roadedge		
	R	Ec	V	DI	R	Ec	V	DI	R	Ec	V	DI

Power Transmission Line - 1969

1	3	3.54		.41	4	5.83		.26	4	3.07	.89	2.34	3	4.29	.42	.43
2	3	3.88	.55	3.13	3	3.63	.68	1.51	4	2.93	.56	1.20	3	6.63	.39	.31
3	4	3.12	.14	2.01	3	1.94	.47	3.7	2	1.07	.71	3.12	4	2.99	.58	4.02
4	3	2.27	.23	.73	3	2.01	.24	.81	3	2.11	.19	.52	3	1.8	.76	3.22
5	8	7.53	.72	6.15	5	3.77	.46	7.25	4	2.87	.6	7.6	5	3.54	.7	12.72
6	6	5.72	.54	4.65	4	3.76	.56	1.8	3	2.63	.75	2.24	4	3.31	.81	3.57
7	14	14.34	.71	26.51	16	16.27	.51	23.27	5	5.14	.83	.8	5	3.94	.56	.76

Power Transmission Line - 1977

1	3	2.28	.34	4.18	5	3.07	.23	3.34	6	11.54	.84	2.17	6	6.73	.68	3.84
2	5	4.24	.21	1.22	5	3.31	.69	4.33	5	5.13	.59	.84	6	3.96	.47	7.14
3	7	6.22	.49	6.80	7	6.41	.13	1.97	4	6.3		.61	6	5.86	.55	4.46
4	9	14.96	.55	7.39	9	11.21	.59	6.31	6	7.57	.72	1.18	9	13.	.18	3.26
5	4	3.86	.38	3.29	3	2.69	.40	1.82	9	14.95	.98	4.29	5	4.37	.31	2.29
6	1				1				1				2	1.37		.4

Table 25: Diversity measures computed from above ground plant biomass for the Los Angeles aqueducts by year of construction, transect and study area. R = richness (no. of species); Ec = equibility; V = evenness; DI = diversity index. Values omitted are due to either very low figures for richness or excessive dominance of one species in the transect, making calculations unreliable.

TRANSECTS

Study Area	Control				Right-of-way				Roadedge			
	R	Ec	V	DI	R	Ec	V	DI	R	Ec	V	DI
Los Angeles Aqueduct - 1913												
1	6	4.66	.73	8.41	6	4.61	.78	3.48	5	5.92	.51	2.71
2	7	4.98	.72	7.08	4	2.75	.08	.80	3	1.82	.61	2.76
3	8	5.57	.45	5.06	7	6.4	.89	3.80	8	5.63	.45	1.48
4	10	12.06	.46	7.17	4	2.76	.33	4.06	3	2.06		.04
5	10	6.24	.82	8.24	6	3.39	.003	.23	5	3.25	.02	.96
6	9	9.35	.59	12.06	8	8.02	.74	11.65	4	3.83	.47	4.10
7	6	4.30	.28	1.24	7	5.82	.69	11.16	4	2.39	.28	1.22
8	11	10.24	.76	7.03	9	8.42	.65	3.75	10	9.22	.82	6.57
9	13	13.98	.50	4.20	5	4.21	.67	8.25	6	4.62	.74	12.03
10	15	16.64	.76	9.30	10	11.29	.66	1.03	14	21.69	.78	3.41
11	12	12.82	.88	3.40	11	10.08	.73	2.41	10	11.12	.74	5.81

Los Agneles Aqueduct - 1970

1	5	4.47	.62	4.36	5	4.18	.56	2.13	4	5.08	.80	1.22
2	6	4.8	.39	3.74	3	2.2	.01	.11	3	1.8	.61	2.76

Table 25 contd

TRANSECTS

Study Area	Control				Right-of-way				Roadedge			
	R	Ec	V	DI	R	Ec	V	DI	R	Ec	V	DI
Los Angeles Aqueduct - 1970 contd												
3	5	5.41	.08	1.85	8	7.95	.72	3.57	3	1.82	.61	2.76
4	7	6.22	.76	5.01	9	16.78	.68	1.09	6	8.85	.67	.74
5	8	5.9	.94	6.41	3	3.55	.05	.13	1			
6	10	12.06	.46	7.17	1				2	1.22		.03
7	10	6.23	.82	8.23	8	7.05		.60	4	3.14	.06	.27
8	9	9.35	.61	12.06	6	9.02	.42	3.20	4	3.3	.48	6.11
9	6	4.3	.28	1.24	3	2.63	.66	.47	2			
10	12	17.05	.60	6.91	4	3.43		.11	4	4.56		.24
11	11	10.33	.78	7.03	8	7.75	.53	1.54	5	5.48	.30	2.66
12	9	9.85	.57	4.12	5	4.24	.03	.83	6	4.45	.15	.87
13	4	3.67	.51	3.58	6	5.56	.42	.67	6	5.51	.74	1.12
14	5	4.35	.65	4.07	2				2			.03
15	12	12.82	.88	3.40	6	8.97	.36	.42	7	14.24	.33	.83

Table 26: Analysis of above ground plant biomass by
transect in terms of species longevity along
a natural gas pipeline constructed in 1956.
LL = long lived species; SL = short lived
species.

Study Area	Total biomass Kg/m ²	% of biomass provided by					
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea	Total SL
Transect A (Control)							
1	.0092	42.20			98.11		1.88
2	.0355	55.28	1.26		98.38	.66	1.62
3	.0831				37.26	.51	62.74
4	.0642	59.00	25.25		92.85	5.51	7.15
5	.0656	57.25	1.81		95.51	1.01	4.49
6	.0237	79.34	15.51		99.94	.06	.06
7	.0470	35.12	21.98		68.74	30.96	31.26
8	.0428	22.76	46.51		71.99	1.23	28.01
Transect B (Berm)							
1	.0147	73.07	20.18		100.0		
2	.0513	3.55	88.27		91.82	3.58	8.18
3	.0185	14.23	.15		33.14	.15	66.86
4	.0296	40.97	9.12		71.81	28.19	28.19
5	.0283	4.79			29.25	58.64	70.75
6	.0110	38.01	39.91		77.92	22.08	22.08
7	.0243		30.80		31.44	44.82	68.56
8	.0280	.20	84.15		100.00		

Table 26 contd

Study Area	Total biomass Kg/m ²	% of biomass provided by					
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea	Total SL
Transect C (Trench)							
1	.0070	28.16	54.29		100.0		
2	.0064		75.51		75.51		24.49
3	.0470			6.22	35.10	2.83	64.88
4	.0235	23.66	4.58		31.08	65.44	68.91
5	.0130					51.49	100.00
6	.0289	39.84	22.28		62.12	32.38	37.88
7	.0644		8.55		9.83	58.95	90.17
8	.0280	.20	84.15		84.35		15.65
Transect D (Roadedge)							
1	.0066	90.22	9.78		100.00		
2	.0485		83.76		83.76		16.24
3	.0655	59.59			76.29	8.61	23.71
4	.0359	73.41	3.07		82.74	9.12	17.26
5	.0192	3.00			3.00	97.00	97.00
6	.0187	32.95	17.65		50.60	49.40	49.40
7	.0320		15.31		43.11	40.74	56.89
8	.0543		97.92		97.92	1.11	2.08

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Table 27: Analysis of above ground plant biomass by
transect in terms of species longevity along a
natural gas pipeline constructed in 1960.
Headings as in table 26.

Study Area	Total biomass Kg/m ²	% of biomass provided by					
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea	Total SL
Transect A (Control)							
1	.0319	93.33	6.59		99.92	.08	.08
2	.0818	3.80	80.34		84.11	15.89	15.89
3	.0631				54.78	.64	45.22
4	.0668	16.43	20.53		49.63		50.37
5	.2442	3.91	6.89		86.20		13.80
6	.0432	72.76	18.38		98.19	1.81	1.81
Transect B (Berm)							
1	.0024		50.91		50.91	49.08	49.08
2	.0041	44.39	39.56		83.95	16.05	16.05
3	.0158				33.26	12.47	66.74
4	.0201	61.03	31.18		92.22	7.78	7.78
5	.0342	.97	87.02		88.54	4.42	11.46
6	.0329	10.23	66.19		76.42	23.58	23.58
Transect C (Trench)							
1	.0054	27.90	20.84		77.07	22.93	22.93
2	.0162	13.42	39.72		53.14	46.86	46.86
3	.0388				65.32	1.44	34.68
4	.0368	42.12	35.40		77.52	10.54	10.54
5	.0184	9.72	74.70		84.42	.78	15.58
6	.0169	28.34	62.59		90.94	9.06	9.06

Table 27 contd

Study Area	Total biomass Kg/m ²	% of biomass provided by					
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea	Total SL
Transect D (Roadedge)							
1	.0096	.01	27.77		27.78	72.22	72.22
2	.0070	22.80	58.82		81.61	18.39	18.39
3	.0146				33.52		66.48
4	.0249	19.54	4.01		23.55	76.45	76.45
5	.0117	8.05	63.48		71.53	21.04	28.47
6	.0436	32.35	46.14		95.84	4.16	4.16

Table 28: Analysis of above ground biomass by transect
in terms of species longevity along a natural
gas pipeline constructed in 1963. Headings
as in table 26.

Study Area	Total biomass Kg/m ²	% of biomass provided by					
		Larrea	Ambrosia	Atriplex	Total LL	Hymenoclea	Total SL
Transect A (Control)							
1	.0120			33.44	33.44		66.56
2	.0125			63.29	63.29		36.71
3	.0516			88.61	88.61		11.39
4	.1177			90.46	90.46		9.54
5	.0561				.27	60.09	99.73
6	.0287	84.71	15.29		100.00		
7	.0202	66.60	12.05		97.93		2.07
8	.0347	62.28			64.25	24.71	35.75
Transect B (Berm)							
1	.0004			14.28	14.28		85.72
2	.0359			77.14	77.14		22.86
3	.0325			62.09	62.09		37.91
4	.1585			93.60	93.60		6.40
5	.0556				14.51	41.49	98.55
6	.0138	1.31	98.69		100.00		
7	.0081	15.13	25.40		73.63		26.37
8	.0255		.53		.53	61.70	99.47

 

Table 28 contd

Study Area	Total biomass Kg/m ²	% of biomass provided by				
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea Total SL

Transect C (Trench)

1	.0001			46.15	46.15	53.85
2	.0320			76.72	76.72	23.28
3	.0225			80.69	80.69	19.31
4	.0228			92.13	92.13	7.87
5	.0271				72.49	100.00
6	.0125	35.15	64.64		99.79	.21
7	.0227	95.09	1.46		96.55	3.45
8	.0257			8.10		52.35

Transect D (Roadedge)

1	.0019			13.40	13.40	86.60
2	.0088			4.01	4.01	95.99
3	.0829			88.11	88.11	11.89
4	.0320			86.04	86.04	13.96
5	.0503					57.43
6	.0325	20.48	79.52		100.00	
7	.0209	35.66	2.89		49.37	10.23
8	.0104	22.03	1.47		56.22	43.58

Table 29: Analysis of above ground biomass by transect
in terms of species longevity along a petroleum
products pipeline constructed in 1963. Headings
as in table 26.

Study Area	Total biomass Kg/m ²	% of biomass provided by				
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea Total SL

Transect A (Control)

1	.0698	50.20	18.85		91.04	8.96
2	.0601	42.21	23.30		98.44	1.56 1.56

Transect B (Berm)

1	.0302	78.86	10.99		100.00	
2	.0183	10.82	31.67		49.43	50.51 50.51

Transect C (Trench)

1	.0442	93.84	.13		98.16	1.84 1.84
2	.0268	51.64	14.60		79.88	20.12 20.12

Transect D (Roadedge)

1	.0160	93.85	5.29		100.00	
2	.0196		35.06		53.87	46.13 46.13

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PHYSICS DEPARTMENT

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LECTURE 1

LECTURE 2

Table 30: Analysis of above ground biomass by transect
in terms of species longevity along a petroleum
products pipeline constructed in 1970.
Headings as in table 26.

Study Area	Total biomass Kg/m ²	% of biomass provided by				
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea Total SL

Transect A (Control)

1	.0551	71.73	8.86		97.84	2.16	2.16
2	.0590	56.83	1.63		100.00		
3	.0396	64.35			88.72		11.28
4	.0354	69.11	22.75		100.00		
5	.0478	19.72	1.41	78.86	100.00		
6	.0722	47.46	16.70		72.50		27.50
7	.0318	84.56			100.00		

Transect B (Berm)

1	.0052		43.04		43.04	52.92	56.96
2	.0010	51.84	48.16		100.00		
3	.0013						100.00
4	.0053	66.26	19.90		89.58	10.04	10.42
5	.0209		3.54	96.46	100.00		
6	.0048		.93		.93		99.07
7	.0004	100.00			100.00		

Table 30 contd

Study Area	Total biomass Kg/m ²	% of biomass provided by				
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea Total SL

Transect C (Trench)

1	.0129	9.84	10.55		28.16	71.04	71.04
2	.0010	92.01	7.99		100.00		
3	.0010						100.00
4	.0063	15.49	48.35		63.85	25.67	36.15
5	.0217		1.72	98.28	100.00		
6	.0029		.33		.33		99.67
7	.2346	38.36	6.82		45.18		54.82

Transect D (Roadedge)

1	.0031		2.45		2.45	97.55	97.45
2	.001	53.07	46.93		100.00		
3	.0422						100.00
4	.0095	56.46	32.69		92.75	5.31	7.25
5	.0621	9.62		90.38	100.00		
6	.0291	50.23	10.21		100.00		
7	.0096	74.26	8.29	2.33	84.89		15.11

Table 31: Analysis of above ground biomass by transect
in terms of species longevity along a petroleum
products pipeline constructed in 1973.
Headings as in table 26.

Study Area	Total biomass K _g /m ²	% of biomass provided by					
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea	Total SL
Transect A (Control)							
1	.0232	70.92	29.08		100.00		
2	.0346	43.57	55.53		100.00		
3	.0381	6.12	8.92	2.50	17.54	75.11	82.46
4	.0023			96.10	96.10		3.90
5	.0198	58.82	41.18		100.00		
6	.3348		3.42		3.42		96.58
Transect B (Berm)							
1	.0081	56.94	43.06		100.00		
2	.0082	7.27	52.03		59.30	29.28	40.70
3	.0156	1.06	30.30		31.36	36.67	68.64
4	.0143			100.00	100.00		
5	.0193	.53	70.79		71.32	20.85	28.68
6	.0026		64.18		64.18		35.82
Transect C (Trench)							
1	.0001	100.00			100.00		
2	.0116	4.92	65.86	12.66		10.07	
3	.0122	1.91	40.72	16.36	58.99	20.39	41.01
4	.0060			58.19	58.19		41.81
5	.0131	4.48	82.23		93.79	.83	6.21
6	.0056	1.00	71.56		73.98		26.02

Table 31 contd

Study Area	Total biomass K _g /m ²	% of biomass provided by					
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea	Total SL
Transect D (Roadedge)							
1	.0113	57.36	38.07	4.57	100.00		
2	.0092	32.74	57.07		91.82	7.39	8.18
3	.0242	10.72	33.45	4.12	48.29	19.42	51.71
4	.0432			91.00	91.00		9.00
5	.0428	17.91	80.64		98.55		1.45
6	.0083	37.42			37.42		62.58

Table 32: Analysis of above ground biomass by transect
in terms of species longevity along a power
transmission line constructed in 1924. LL =
long lived species; SL = short lived species.

Study Area	Total biomass Kg/m ²	% of biomass provided by					
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea	Total SL
Transect A (Control)							
1	.0462	14.92	54.62	7.89	87.06		12.94
2	.1068	23.08	61.77	10.38	97.37		2.63
3	.0800	4.70	1.97		27.81	7.90	72.19
4	.1542			81.72	81.72	.13	18.28
5	.0785			87.93	92.83		7.17
6	.0641	59.04	35.56		100.00		
7	.0667			9.58	29.54	6.12	70.46
Transect B (Wire)							
1	.0389	11.59	64.50		81.68		18.32
2	.0905	57.82	2.65	19.25	85.22	.29	14.78
3	.0617	25.40	31.90		61.62	5.98	38.38
4	.0425			68.01	72.93	6.55	27.07
5	.0684		.65	87.06	90.14	.72	9.86
6	.0475	36.71	48.26		89.40		10.60
7	.0371	17.61			34.26	22.75	65.74

Table 32 contd

Study Area	Total biomass Kg/m ²	% of biomass provided by					
		Larrea	Ambrosia	Atriplex	Total LL	Hymenoclea	Total SL
Transect C (Pylon)							
1	.0563	21.10	31.36		58.44	2.52	41.56
2	.1128	13.56	27.19	12.52	58.55	.22	41.44
3	.0448	8.23	28.26		36.93	.72	63.07
4	.0653					1.14	100.00
5	.0460	3.55	1.72	49.90	56.37	8.92	43.63
6	.0283	18.20	61.25		83.96		16.04
7	.0139	42.80	6.09		61.03	4.59	38.97
Transect D (Roadedge)							
1	.0771	28.62	48.21	13.31	90.15		9.85
2	.1181	55.48	27.58		89.25	1.80	10.75
3	.0258	8.39	33.12		58.14		41.86
4	.0699			65.34	65.34		34.66
5	.1180	9.08		70.62	80.00	3.75	20.00
6	.0586	54.32	36.14		90.46		9.54
7	.3150		.07		1.04	3.15	98.96

Table 33: Analysis of above ground biomass by transect
in terms of species longevity along a power
transmission line constructed in 1933.
Headings as in table 32.

Study Area	Total biomass Kg/m ²	% of biomass provided by					Total SL
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea	
Transect A (Control)							
1	.0352	66.09	23.10		89.21		10.79
2	.1433	39.46	6.26	54.28	100.00		
3	.0381	6.01	8.92	2.50	17.43	75.11	82.57
4	.0346	43.55	55.55		100.00		
5	.0190	21.61	2.48	75.91	100.00		
6	.0599	54.63	5.71		98.48	1.04	1.52
7	.0623				96.10		3.90
Transect B (Wire)							
1	.0283	28.52	67.77		99.45		.55
2	.0442	28.25	11.66	60.09	100.00		
3	.0635	2.99	40.74	19.85	63.58	17.93	36.42
4	.0249	45.25	54.75		100.00		
5	.0187	34.27	1.47	64.26	100.00		
6	.0984	80.06	4.11		98.89		1.11
7	.0142			100.00	100.00		

Table 33 contd

Study Area	Total biomass Kg/m ²	% of biomass provided by				
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea Total SL

Transect C (Pylon)

1	.0457	52.13	25.23		78.20	21.80
2	.0507	32.41	16.46	48.13	93.00	3.00
3						
4	.0245	70.97	29.03		100.00	
5	.0223	30.91	12.03	57.06	100.00	
6	.0443	33.87	39.25		99.72	.28 .28
7	.0093			100.00	100.00	

Transect D (Roadedge)

1	.0335	48.55	46.12	.27	99.34	.66
2	.0579	17.36	20.06	62.58	100.00	
3	.0241	5.32	49.15	16.29	71.22	15.32 28.78
4	.0240	48.03	51.88		99.90	.10
5	.0289	8.66	2.85	88.49	100.00	
6	.0528	61.11	1.67		96.64	1.49 3.63
7	.0175			100.00	100.00	

Table 34: Analysis of above ground biomass by transect
in terms of species longevity along a power
transmission line constructed in 1944.
Headings as in table 32.

Study Area	Total biomass K _g /m ²	% of biomass provided by				
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea Total SL

Transect A (Control)

1	.0778	24.59	13.95		75.93	24.07
2	.0200	3.92	7.03	89.05	100.00	
3	.0446	.78	.57	39.00	95.40	4.60
4	.1433	39.46	6.26	54.20	100.00	
5	.0700				73.84	26.16
6	.1199	10.80	12.40		23.21	76.79
7	.0270	43.35	37.38	16.60	100.00	
8	.0145	71.39	28.61		100.00	
9	.0610	29.19	24.35		100.00	
10	.1034	32.95	12.54		90.11	7.92 9.89

Transect B (Wire)

1	.0463	16.53	69.59		96.91	3.09
2	.0223	1.92	17.92	80.15	100.00	
3	.0832			89.30	89.30	10.70
4	.0513	40.42	20.63	38.95	100.00	
5	.0917				67.40	32.60
6	.0903	24.25	10.10		34.35	65.65
7	.0391	31.19	38.03	23.15	100.00	
8	.0271	9.21	90.49		99.70	.30 .30
9	.0208	91.79	8.21		100.00	
10	.0698	32.97	25.15		91.30	8.08 8.70

Table 34 contd

Study Area	Total biomass Kg/m ²	% of biomass provided by					Total SL
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea	

Transect C (Pylon)

1	.0463	33.47	42.74	6.53	99.13		..87
2	.0170	3.06	9.02	87.92	100.00		
3	.1914			97.84	97.84		2.16
4	.0497	46.47	5.15	47.73	99.35	.65	..65
5	.0653				82.31		17.69
6	.0738	3.18	36.44	12.86	52.48	3.94	47.52
7	.0346	8.02		91.98	100.00		
8	.0387	21.13	78.87		100.00		
9	.0201	81.55	15.86		97.41	2.59	2.59
10	.0532	9.97	23.93		88.08	5.66	11.92

Transect D (Roadedge)

1	.0276	24.66	23.88		53.02		46.98
2	.0286		.76	99.24	100.00		
3	.0753	.02		94.33	94.35	.14	5.65
4	.0450	10.40	15.38	74.22	100.00		
5	.1611				95.29		4.71
6	.0786	23.38	1.71	30.97	56.06		43.94
7	.0604	13.70	61.63	23.62	100.00		
8	.0733	.10	94.32		94.42	1.23	5.59
9	.0606	95.65	4.35		100.00		
10	.0377	33.44	16.75		81.65	18.10	18.35

Table 35: Analysis of above ground biomass by transect
in terms of species longevity along a power
transmission line constructed in 1952.
Headings as in table 32.

Study Area	Total biomass Kg/m ²	% of biomass provided by				
		Larrea	Ambrosia	Atriplex	Total LL	Hymenoclea Total SL

Transect A (Control)

1	.1127	73.79	6.87		93.61	6.39
2	.0474	13.04	31.64		66.96	4.51 33.04
3	.1154	49.99	6.45		99.73	.27
4	.1080	.06	.87	84.50	89.73	10.27 10.27
5	.0457	67.47	.82		94.68	5.32
6	.0741	4.41	19.10	75.73	99.90	.10
7	.0743	58.01	33.39		93.87	6.13
8	.1685	6.15		93.85	100.00	

Transect B (Wire)

1	.0914	58.37	20.25		84.55	15.44
2	.0408	2.78	52.92		63.62	6.15 36.38
3	.0487	70.76	17.67		100.00	
4	.1415	23.31	7.21	56.46	96.49	3.51 3.51
5	.0593	44.66	5.17		92.74	.90 7.26
6	.0799	9.27	22.47	68.26	100.00	
7	.0510	37.88	25.71		89.71	1.39 10.29
8	.1476	.13		99.87	100.00	

Table 35 contd

Study Area	Total biomass K _g /m ²	% of biomass provided by				
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea Total SL

Transect C (Pylon)

1	.0816	35.09	2.45		40.46	59.54
2	.0287	5.36	52.15		58.22	10.22 41.78
3	.0416	67.01	20.61		96.67	3.33
4	.0496	3.70	17.99	44.46	71.27	28.73 8.73
5	.0620	73.58	.70		90.21	2.21 9.79
6	.0200		11.18	84.50	100.00	
7	.0430	45.52	48.12		96.64	3.36
8	.0850	.54		99.46	100.00	

Transect D (Roadedge)

1	.0484	25.48	8.43		49.09	50.91
2	.0370		59.40		64.06	24.40 35.94
3	.0612	56.62	16.60		99.67	.33 .33
4	.0434	9.81	4.50	75.88	90.23	9.77 9.77
5	.0230	71.42	6.39		95.20	4.80
6	.0516	4.45	27.90	67.65	100.00	
7	.0743	58.01	33.39		93.87	6.13
8	.0961	2.28		97.72	100.00	

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Table 36: Analysis of above ground biomass by transect
in terms of species longevity along a power
transmission line constructed in 1968.

Headings as in table 32.

Study Area	Total biomass Kg/m ²	% of biomass provided by					
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea	Total SL
Transect A (Control)							
1	.0852	55.50	1.26	1.02	95.63	.66	4.37
2	.0491				66.72		33.28
3	.1542			81.72	81.72	1.30	18.29
4	.0800	4.70	1.97		42.12	7.90	57.88
5	.0667			9.58	29.54	16.12	70.45
Transect B (Wire)							
1	.1139	6.92	13.63	1.94	96.85	.02	3.15
2	.0540				69.11		30.89
3	.1016			34.17	76.94	1.11	23.06
4	.0727	11.37	13.32		41.07	17.34	58.93
5	.0573	.03			25.26	5.09	74.74
Transect C (Pylon)							
1	.0594	29.39		11.57	69.13	20.63	30.87
2	.0178				18.74		81.26
3	.1888			70.26	94.29	.45	5.71
4	.0460	10.95	26.10		40.07	1.10	59.93
5	.0437				36.51	.43	63.49

Table 36 contd

Study Area	Total biomass K_g/m^2	% of biomass provided by					Total SL
		Larrea	Ambrosia	Atriplex	Total LL	Hymen- oclea	

Transect D (Roadedge)

1	.1292	12.49	2.60	11.27	96.23	2.12	3.77
2	.0397				56.15		43.85
3	.0699			65.34	99.59		.41
4	.0258	.0839	33.12		83.32		16.68
5	.0315		.07		1.04	3.15	98.96

Table 37: Analysis of above ground biomass by transect
in terms of species longevity along a power
transmission line constructed in 1969.

Headings as in table 32.

Study Area	Total biomass Kg/m ²	% of biomass provided by					
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea	Total SL
Transect A (Control)							
1	.0582	96.34	3.62		99.96	.04	.04
2	.0590	69.60	8.40		78.02	21.98	21.98
3	.0829	90.28	7.93		98.22		1.78
4	.0325	88.47	7.26		100.00		
5	.0642	31.80	25.23		67.50		32.50
6	.0681	46.25	46.73		98.85	1.15	1.15
7	.2442	3.91	6.89		86.20		13.80
Transect B (Wire)							
1	.0228	94.05	5.50		99.56	.29	.44
2	.0246	64.22	22.21		86.43	13.57	13.57
3	.0909	77.08	19.84		100.00		
4	.0368	88.46	10.26		100.00		
5	.1363	6.67	22.22		30.16		69.84
6	.0301	56.90	40.92		98.86	1.14	1.14
7	.2812	.57	2.35		85.33		14.67

Table 37 contd

Study Area	Total biomass Kg/m ²	% of biomass provided by				
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea Total SL

Transect C (Pylon)

1	.0262	34.77	31.63		66.40	28.75 33.60
2	.0209	26.58	68.59		95.17	4.83 4.83
3	.0752	24.68	75.32		100.00	
4	.0281	90.41	2.90		100.00	
5	.1233	13.04	15.48		28.53	5.57 71.47
6	.0344	56.52	36.17		92.70	1.48 7.30
7	.0085		33.89		45.07	31.88 54.93

Transect D (Roadedge)

1	.0095	.01	27.77		27.78	72.22 72.22
2	.0060	40.72	58.41		99.13	.53 .87
3	.0674	38.82	58.39		98.08	1.92
4	.0499	46.11	49.39		100.00	
5	.1617	26.05	22.16		49.43	.45 50.57
6	.0436	32.35	46.14		95.84	4.16 4.16
7	.0117	8.05	63.48		71.53	21.04 28.47

Table 38: Analysis of above ground biomass by transect
in terms of species longevity along a power
transmission line constructed in 1977.

Headings as in table 32.

Study Area	Total biomass Kg/m ²	% of biomass provided by					
		Larrea	Ambrosia	Atriplex	Total LL	Hymenoclea	Total SL
Transect A (Control)							
1	.0578	53.73	15.70		100.00		
2	.0423	85.05	7.10		100.00		
3	.1041	40.27	1.91		42.18		57.82
4	.0839	44.37	3.24	32.52	91.96	4.77	8.04
5	.0759	25.84	.18	73.95	99.72		.28
6	.0274	100.00			100.00		
Transect B (Wire)							
1	.0414	23.66	14.86	9.34	100.00		
2	.0558	50.86	32.09		98.93	1.07	1.07
3	.0796	8.77	.11		8.88		91.12
4	.0720	10.20	3.82	51.35	90.40	4.64	9.60
5	.0480	8.53	11.71	79.76	100.00		
6	.0131	100.00			100.00		
Transect C (Pylon)							
1	.0207	22.24	32.25	20.52	98.79		1.21
2	.0119	58.35	25.45		89.18	10.82	10.82
3	.0315	8.78	.25		9.03		90.97
4	.0131	14.68	45.51		86.32		13.68
5	.0327	.58	29.89	41.89	96.29	20.72	3.71
6	.0065	100.00			100.00		

Table 38 contd

Study Area	Total biomass K _g /m ²	% of biomass provided by				
		Larrea	Ambrosia	Atriplex	Total LL	Hymen-oclea Total SL

Transect D (Roadedge)

1	.0447	28.75	14.27	7.22	98.82	1.18	1.18
2	.1251	63.81	31.91		99.35	.01	.65
3	.0634	44.27	4.01		48.28		51.72
4	.0692		50.01	76.00	92.88	4.94	7.12
5	.0578		13.05	78.87	91.92	.14	8.08
6	.0195	89.19	10.81		100.00		

Table 39: Analysis of above ground biomass by transect in terms of species longevity along the Los Angeles aqueduct constructed in 1913. LL = long lived species; SL = short lived species.

Study Area	Total biomass Kg/m ²	% of biomass provided by					Total SL	
		Larrea	Ambrosia	Atriplex	Chryso- thamnus	Total LL		Hymen- oclea
Transect A (Control)								
1	.0950	34.89	.08	39.39		74.59	10.23	25.41
2	.0776	47.54	12.02			69.77	10.99	30.23
3	.0825	67.26	6.55			79.72	5.29	20.28
4	.0973	59.48	13.07			81.03		18.97
5	.0735					17.21	9.83	82.99
6	.1423		10.36			90.15	3.96	9.85
7	.0338					4.13	81.11	95.87
8	.0645	.09	12.58			77.49	11.96	22.51
9	.0524	2.10	.22	51.91	3.88	65.75	28.94	34.25
10	.0789		4.44			69.29	15.81	30.71
11	.0267	3.19	9.77		13.22	63.20	5.69	36.80

Table 39 contd

Study Area	Total biomass Kg/m ²	% of biomass provided by					Total SL	
		Larrea	Ambrosia	Atriplex	Chryso- thamnus	Total LL		Hymen- oclea
Transect B (Right of Way)								
1	.0372		2.42	28.31		37.68	26.74	62.32
2	.0795		.09		94.84	94.93	.73	5.07
3	.0339	12.17	29.37			64.67		35.33
4	.0116	17.19			81.82	99.01		.99
5	.1000				98.83	98.83	.38	1.17
6	.0117	29.77	7.16		4.52	53.78	37.52	46.22
7	.1270				76.97	76.97	8.47	23.03
8	.0421	7.75	14.50			24.44	47.47	75.56
9	.1085			50.65	34.58	92.23	4.61	7.77
10	.0106		5.59		11.60	29.21	3.81	70.79
11	.0230	.28	19.36		23.87	81.42	13.42	18.58

Table 39 contd

Table 40: Analysis of above ground biomass by transect in terms
of species longevity along the Los Angeles aqueduct
constructed in 1970. Headings as in table 39.

Study Area	Total biomass Kg/m ²	% of biomass provided by					Hymen-oclea	Total SL
		Larrea	Ambrosia	Atriplex	Chryso-thamnus	Total LL		
Transect A (Control)								
1	.0607	56.74	22.82			98.77	1.23	1.23
2	.0741	4.41	19.10	72.73		99.91		.09
3	.0896	89.34	6.86			99.75	.25	.25
4	.0515	15.95	34.22			83.43		16.57
5	.0525	8.90	9.65			40.12	12.62	59.88
6	.0973	59.48	13.07			81.03	.98	18.93
7	.0735					17.21	9.83	82.79
8	.1423	48.28	10.36			90.14	3.96	9.86
9	.0338					4.13	81.11	95.87
10	.0714	1.44	3.01	42.70		75.30	11.59	24.70
11	.0645	.09	12.58			77.49	11.96	22.51
12	.0498		1.02			63.10	34.32	36.90
13	.0653	67.25	.82			94.64		5.36
14	.0549	16.86	57.90			75.87	16.20	24.13
15	.0267	3.19	9.77		13.22	63.10	5.69	36.90

Table 40 contd

Study Area	Total biomass Kg/m ²	% of biomass provided by					Hymen-oclea	Total SL
		Larrea	Ambrosia	Atriplex	Chryso-thamnus	Total LL		
Transect B (Right of Way)								
1	.0326	2.14	3.61	54.30		60.05	39.51	39.95
2	.0273	.37	1.67	97.96		100.00		
3	.0369	7.72	20.16	43.98		71.86	24.32	28.14
4	.0106		33.50		25.68	62.79	12.18	37.21
5	.0083						91.55	100.00
6	.0383				100.00	100.00		
7	.0845						.22	100.00
8	.0496	49.81			45.76	95.74	3.94	4.26
9	.0082				39.74	39.74	59.35	60.26
10	.0453						.10	100.00
11	.0208		1.46		7.71	11.46	39.31	88.54
12	.0556		.37			5.67	1.77	94.33
13	.0121	.52	16.45			28.51	69.49	71.49
14	.0103		.16			.16	99.84	99.84
15	.0071				74.37	74.37	17.22	25.63

Table 40 contd

Study Area	Total biomass Kg/m ²	% of biomass provided by					Total SL	
		Larrea	Ambrosia	Atriplex	Chryso- thamnus	Total LL		Hymen- oclea
Transect C (Roadedge)								
1	.0147		1.53	29.59		31.12	24.93	68.88
2	.0527	4.35	27.21	68.43		100.00		
3	.0527	4.35	27.21	68.43		100.00		
4	.0084		9.29		43.05	56.11	6.47	43.89
5	.0011						100.00	100.00
6	.0374	.40			96.60	100.00		
7	.0244				94.33	94.33	2.58	5.67
8	.1185	7.14			70.99	78.13	1.40	21.87
9	.0039						63.89	100.00
10	.0181				1.94	1.94	4.60	98.06
11	.0629		.59		17.89	18.48	4.69	81.52
12	.0295		1.04		.32	2.84	12.95	97.16
13	.0124	8.99	17.10			49.88	46.56	50.12
14	.0034		3.61			3.61	96.39	96.39
15	.0122		2.04			84.20	11.90	15.80

Table 41: Jaccard's Coefficient of Similarity for Pairs of transects (CCj) along pipelines constructed in 1956 and 1973. A = control; B = berm; C = trench; D = roadedge.

PIPELINES

Area	1956			Area	1973		
	Transects compared				Transects compared		
	A/B	A/C	A/D		A/B	A/C	A/D
1	.324	.248	.492	1	.520	.002	.623
2	.075	.028	.016	2	.228	.366	.376
3	.195	.308	.122	3	.414	.341	.351
4	.441	.247	.659	4	.373	.103	.791
5	.084	.025	.030	5	.422	.532	.505
6	.454	.578	.447	6	.015	.032	.048
7	.520	.365	.458				
8	.432	.688	.756				
Mean	.316	.311	.372		.329	.229	.449
Standard deviation	.176	.235	.284		.181	.214	.255

Table 42: Jaccards Coefficient of Similarity for Paris
of transects along pipelines constructed in
1960 and 1963. A = control; B = berm; C =
trench; D = roadedge.

PIPELINES

Area	1960			Area	1963		
	Transects compared				Transects compared		
	A/B	A/C	A/D		A/B	A/C	A/D
1	.073	.143	.103	1	.549	.629	.373
2	.096	.331	.158	2	.254	.515	.238
3	.082	.195	.253				
4	.397	.463	.128				
5	.138	.139	.066				
6	.318	.450	.526				
Mean	.184	.287	.206		.401	.572	.306
Standard deviation	.138	.149	.169		.209	.081	.095

Table 43: Jaccard's Coefficient of similarity for Pairs of transects along pipelines constructed in 1963 and 1970. A = control; B = berm; C = trench; D = roadedge.

PIPELINES

Area	1963			Area	1970		
	Transects compared				Transects compared		
	A/B	A/C	A/D		A/B	A/C	A/D
1	.0535	.078	.617	1	.114	.145	.043
2	.502	.562	.464	2	.035	.034	.036
3	.0538	.608	.631	3	.052	.066	.109
4	.826	.241	.461	4	.224	.194	.392
5	.559	.044	.527	5	.607	.624	.794
6	.215	.426	.361	6	.126	.077	.400
7	.530	.658	.522	7	.003	.027	.346
8	.412	.421	.411				
Mean	.394	.379	.499		.166	.167	.303
Standard deviation	.269	.236	.094		.208	.210	.270

Table 44: Jaccard's Coefficient of Similarity for Pairs of transects along power transmission lines constructed in 1924 and 1977. A = control; B = wire; C = pylon; D = roadedge.

POWERLINES

Area	1924			Area	1977		
	Transects compared				Transects compared		
	A/B	A/C	A/D		A/B	A/C	A/D
1	.781	.671	.677	1	.678	.326	.720
2	.425	.541	.538	2	.708	.370	.476
3	.282	.292	.261	3	.720	.464	.750
4	.357	.101	.443	4	.678	.108	.547
5	.670	.378	.491	5	.691	.259	.684
6	.753	.487	.864	6	.647	.386	.742
7	.473	.176	.576				
Mean	.534	.378	.550		.687	.319	.653
Standard deviation	.199	.204	.189		.026	.123	.114

Table 45: Jaccard's Coefficient of Similarity for Pairs of transects along power transmission lines constructed in 1924 and 1968. Areas 3, 4 and 7 of the 1924 line are side by side areas 3, 4 and 5 respectively of the 1968 line. A = control; B = wire; C = pylon; D = roadedge.

POWERLINES

Area	1924			Area	1968		
	Transects compared				Transects compared		
	A/B	A/C	A/D		A/B	A/C	A/D
				1	.421	.672	.458
				2	.715	.459	.646
4	.357	.101	.443	3	.519	.389	.445
3	.282	.292	.261	4	.509	.505	.288
7	.473	.176	.576	5	.603	.459	.576
Mean	.371	.180	.427		.553	.497	.482
Standard deviation	.096	.096	.158		.111	.106	.137

Table 46: Jaccard's Coefficient of Similarity for Pairs of transects along power transmission lines constructed in 1933 and 1969. A = control; B = wire; C = pylon; D = roadedge.

POWERLINES

Area	1933			Area	1969		
	Transect compared				Transect compared		
	A/B	A/C	A/D		A/B	A/C	A/D
1	.515	.777	.710	1	.561	.266	.063
2	.471	.507	.549	2	.576	.340	.185
3	.403		.320	3	.812	.297	.404
4	.836	.751	.817	4	.911	.912	.649
5	.870	.838	.793	5	.471	.565	.517
6	.626	.544	.785	6	.613	.638	.627
7	.370	.259	.438	7	.693	.023	.066
Mean	.584	.613	.630		.662	.434	.359
Standard deviation	.201	.218	.196		.154	.292	.254

Table 47: Jaccard's Coefficient of Similarity for Pairs of transects along power transmission lines constructed in 1944 and 1952. A = control; B = wire; C = pylon; D = roadedge.

POWERLINES

Area	1944			Area	1952		
	Transects compared				Transects compared		
	A/B	A/C	A/D		A/B	A/C	A/D
1	.309	.551	.524	1	.629	.345	.244
2	.929	.910	.743	2	.677	.679	.539
3	.294	.159	.314	3	.578	.500	.658
4	.511	.511	.571	4	.726	.433	.504
5	.597	.481	.263	5	.766	.868	.480
6	.771	.507	.492	6	.919	.407	.817
7	.817	.236	.537	7	.577	.733	.856
8	.319	.463	.096	8	.934	.674	.727
9	.477	.484	.336				
10	.657	.319	.507				
Mean	.568	.462	.438		.726	.580	.603
Standard deviation	.226	.205	.185		.140	.184	.202

Table 48: Jaccard's Coefficient of Similarity for Pairs of transects along the Los Angeles aqueducts constructed in 1913 and 1970. A = control; B = right-of-way; C = roadedge.

AQUEDUCTS

Area	1913		Area	1970	
	Transects compared			Transects compared	
	A/B	A/C		A/B	A/C
1	.511	.495	1	.056	.026
2	.052	.178	2	.538	.828
3	.247	.130	3	.146	.119
4	.187	.001	4	.152	.070
5	.012	.020	5	.241	.042
6	.389	.109	6	.000	.002
7	.178	.895	7	.030	.027
8	.275	.295	8	.279	
9	.456	.399	9	.164	.207
10	.075	.059	10	.147	.206
11	.404	.286	11	.200	.052
			12	.024	.107
			13	.050	.114
			14	.273	.116
			15	.107	.232
Mean	.253	.261		.160	.148
Standard deviation	.170	.263		.138	.201

Table 49: Community Quality Indices for perennial vegetation
along two pipelines constructed in 1956 and 1973.
A = control; B = berm; C = trench; D = roadedge.

POWERLINES

Area	1956				Area	1973			
	Transect					Transect			
	A	B	C	D		A	B	C	D
1	.94	1.60	.88	.59	1	1.54	.42	.002	.87
2	7.09	1.98	.87	1.48	2	2.97	.58	1.13	1.11
3	3.35	.88	1.84	2.76	3	1.52	.68	.94	1.63
4	4.29	1.78	2.00	1.99	4	2.21	.74	.60	3.36
5	3.28	1.03	1.77	.81	5	2.95	1.09	2.03	3.80
6	2.15	1.24	2.61	1.61	6	3.20	.18	.56	.44
7	2.78	1.35	2.03	1.42					
8	2.92	2.57	1.08	2.01					
Mean	3.50	1.55	1.63	1.58		2.40	.61	.88	1.87
Standard deviation	1.80	.55	.63	.69		.75	.31	.68	1.39

Table 50: Community Quality Indices for perennial vegetation
along two pipelines constructed in 1960 and 1963.
A = control; B = berm; C = trench; D = roadedge.

POWERLINES

Area	1960				Area	1963			
	Transect					Transect			
	A	B	C	D		A	B	C	D
1	.24	.30	.09	.06	1	4.63	3.10	4.08	1.12
2	.36	.05	.13	.50	2	4.85	1.54	2.49	1.52
3	2.87	1.05	2.51	.75					
4	2.79	1.92	2.94	1.16					
5	4.24	2.21	1.91	.89					
6	4.36	3.82	1.59	4.54					
Mean	2.48	1.56	1.53	1.32		4.74	2.32	3.28	1.32
Standard deviation	1.81	1.40	1.19	1.62		.16	1.10	1.12	.28

Table 51: Community Quality Indices for perennial vegetation
along two pipelines constructed in 1963 and 1970.
A = control; B = berm; C = trench; D = roadedge.

POWERLINES

1963					1970				
Area	Transect				Area	Transect			
	A	B	C	D		A	B	C	D
1	.17	.04	.005	.05	1	3.34	.45	.80	.09
2	1.08	2.79	2.10	1.51	2	3.05	.14	.12	.14
3	4.47	3.08	2.54	5.91	3	4.36	.00	.00	.00
4	4.66	5.99	2.19	1.29	4	2.40	.69	.62	1.18
5	.26	.55	1.81	2.48	5	2.82	1.90	1.56	2.62
6	2.39	2.14	1.22	2.67	6	4.74	.08	.03	1.93
7	4.67	1.29	2.47	1.94	7	2.23	.09	.22	1.08
8	3.00	.25	1.27	2.31					
Mean	2.59	2.02	1.70	2.27		3.28	.48	.48	1.01
Standard deviation	1.92	1.97	.84	1.69		.95	.67	.56	1.01

Table 52: Community Quality Indices for perennial vegetation along two power transmission lines constructed in 1924 and 1977. A = control; B = wire; C = pylon; D = roadedge.

POWERLINES

Area	1924				Area	1977			
	Transect					Transect			
	A	B	C	D		A	B	C	D
1	4.59	3.62	4.53	7.26	1	2.81	1.50	1.20	2.77
2	6.93	8.36	4.56	11.06	2	3.44	3.97	1.36	6.83
3	4.27	4.85	2.12	1.94	3	4.54	1.07	.55	2.82
4	4.91	1.08	3.27	3.04	4	4.18	3.53	.85	4.04
5	4.63	3.62	3.22	6.21	5	5.52	3.87	2.31	4.19
6	4.91	3.86	3.70	5.17	6	2.10	1.40	1.03	2.59
7	1.55	1.41	1.01	.15					
Mean	4.54	3.83	3.20	4.98		3.77	2.56	1.22	3.87
Standard deviation	1.58	2.42	1.28	3.65		1.24	1.37	.60	1.60

Table 53: Community Quality Indices for perennial vegetation along two power transmission lines constructed in 1924 and 1968. Study areas 4, 3 and 7, 1924 occur beside areas 3, 4 and 5 respectively of the 1968 line. A = control; B = wire; C = pylon; D = road edge.

POWERLINES

Area	1924					1968			
	Transect					Transect			
	A	B	C	D		A	B	C	D
					1	7.08	3.61	3.90	5.14
					2	2.46	2.34	.66	2.04
4	4.91	1.08	3.27	3.04	3	4.91	3.49	10.89	3.04
3	4.27	4.85	2.12	1.94	4	4.72	4.28	4.26	1.94
7	1.15	1.41	1.01	.15	5	1.55	1.31	.45	.15
Mean	3.56	2.45	2.13	1.71		4.14	3.01	4.03	2.46
Standard deviation	1.81	2.09	1.13	1.46		2.18	1.18	4.22	1.82

POWERLINES

Area	1933				Area	1969			
	Transect					Transect			
	A	B	C	D		A	B	C	D
1	2.46	1.36	3.25	2.60	1	4.51	1.63	1.35	.59
2	7.65	3.37	5.31	4.81	2	3.64	1.74	1.40	.48
3	1.52	.00	3.73	1.43	3	8.28	7.49	10.62	13.28
4	2.96	2.08	2.19	2.35	4	1.86	1.66	2.72	2.27
5	1.56	1.68	1.98	2.18	5	4.59	4.17	4.45	6.38
6	4.13	7.53	2.44	4.06	6	4.36	2.22	2.43	4.55
7	2.21	1.78	1.26	2.21	7	4.41	5.09	.56	.89
Mean	3.21	2.97	2.88	2.81		4.52	3.47	3.37	4.06
Standard deviation	2.15	2.34	1.35	1.19		1.92	2.34	3.44	4.63

Table 55: Community Quality Indices for perennial vegetation
along two powerlines constructed in 1944 and 1952.
A= control; B = wire; C = pylon; D = roadedge.

POWERLINES

Area	1944				Area	1952			
	Transect					Transect			
	A	B	C	D		A	B	C	D
1	4.05	2.76	4.01	1.35	1	9.89	8.20	5.94	3.19
2	1.35	1.71	1.37	1.78	2	3.67	3.93	3.15	2.93
3	2.63	5.14	10.02	5.90	3	6.76	3.89	3.29	4.56
4	7.65	4.06	2.84	6.34	4	4.55	7.20	2.14	2.14
5	2.94	3.86	3.21	8.26	5	5.41	4.94	3.67	3.09
6	2.98	3.10	2.10	2.63	6	5.26	4.35	1.38	3.66
7	2.30	2.62	2.74	2.79	7	4.68	5.30	2.80	5.79
8	2.06	1.69	2.09	3.08	8	6.64	6.15	4.03	4.59
9	2.48	1.85	1.75	3.41					
10	5.42	4.89	3.30	2.81					
Mean	3.39	3.17	3.34	3.83		5.86	5.49	3.30	3.74
Standard deviation	1.87	1.28	2.48	2.23		1.93	1.57	1.36	1.17

Table 56: Community Quality Indices for perennial vegetation along the two Los Angeles aqueducts constructed in 1913 and 1970. A = control; B = right-of-way; C = roadedge.

AQUEDUCTS

1913				1970			
Area	Transect			Area	Transect		
	A	B	C		A	B	C
1	5.92	1.57	1.63	1	3.52	1.89	.80
2	4.53	7.96	3.72	2	5.26	1.83	3.72
3	7.01	2.77	2.57	3	5.93	2.43	3.72
4	12.24	10.82	3.54	4	3.93	.66	.52
5	2.04	9.50	18.80	5	2.51	.00	.00
6	9.14	12.93	5.26	6	12.24	4.61	4.93
7	.62	8.75	.83	7	2.04	6.53	2.89
8	4.67	1.91	2.39	8	9.14	4.09	9.06
9	3.03	6.11	8.04	9	.62	.60	.00
10	4.90	.90	1.91	10	2.75	.00	.32
11	2.06	3.01	5.28	11	4.67	.89	2.16
				12	2.39	1.08	.62
				13	5.33	.95	1.24
				14	4.57	.05	.07
				15	2.05	.81	.84
Mean	5.10	6.02	4.91		4.46	1.76	2.06
Standard deviation	3.39	4.20	5.04		2.98	1.91	2.49

Table 57: Three-way Analysis of Variance for CQI Values for study areas 1-6 of table 49. SS = sum of squares; df = degrees of freedom; MS = mean square; F = variance ratio; Sig. = relative significance; NS = not significant; .05, .01, .001 = levels of probability listed in order of increasing significance. * = corrected value of F for A variation.

Source of Variation	Pipelines 1956, 1973 Six Sample Areas				
	SS	df	MS	F	Sig.
Main effects					
A - pipelines	4.25	1	4.25	*2.15	NS
B - transects	26.74	3	8.91	10.10	<.001
C - study areas	10.27	5	2.05	2.32	NS
First order interaction					
AB	3.61	3	1.20	1.36	NS
AC	5.60	5	1.12	1.27	NS
BC	14.50	15	.97	1.10	NS
Second order interaction					
ABC	13.23	15	.88		
*Variation among areas within corridors					
AC + C	15.87	8	1.98		

Table 58: Three-way Analysis of Variance for CQI Values for
study areas 1-6 of table 51. Headings as in table
57.

Source of Variation	Pipelines 1963, 1970 Six Sample Areas				
	SS	df	MS	F	Sig.
Main effects					
A - pipelines	7.57	1	7.57	*1.59	NS
B - transects	15.21	3	5.07	3.96	<.05
C - study areas	28.60	5	5.72	4.47	<.05
First order interaction					
AB	12.99	3	4.33	3.38	<.05
AC	18.99	5	3.80	2.97	<.05
BC	13.41	15	.89	.70	NS
Second order interaction					
ABC	19.15	15	1.28		
*Variation among areas within corridors					
AC + C	47.59	10	4.76		

Table 59: Three-way Analysis of Variance for CQI Values for study areas 1-6 of table 52. Headings as in table 57.

Source of Variation	Powerlines 1924-1977 Six Sample Sites				
	SS	df	MS	F	Sig.
Main effects					
A - powerlines	38.95	1	38.95	*5.23	<.05
B - transects	42.69	3	14.23	12.80	<.001
C - study areas	50.3	5	10.06	9.05	<.001
First order interaction					
AB	1.83	3	.61	.05	NS
AC	24.05	5	4.81	4.33	<.05
BC	30.6	15	2.04	1.84	NS
Second order interaction					
ABC	16.65	15	1.11		
*Variation among study sites within corridors					
AC + C	74.	10	7.44		

Table 60: Three-way Analysis of Variance for CQI Values of table 53. Study areas 3, 4 and 7 of the 1924 powerline occur beside areas 4, 3 and 5 of the 1968 line respectively. Headings as in table 57.

Source of Variation	<u>Powerlines 1924, 1968 - Three Sample Areas</u>				
	SS	df	MS	F	Sig.
Main effects					
A - powerlines	5.45	1	5.45	2.71	NS
B - transects	15.46	3	5.15	2.56	NS
C - study areas	50.34	2	25.17	12.52	<.01
First order interaction					
AB	9.20	3	3.07	1.53	NS
AC	7.00	2	3.50	1.74	NS
BC	23.69	6	3.95	1.97	NS
Second order interaction					
ABC	12.08	6	2.01		

Table 61: Three-way Analysis of Variance for CQI Values for study
1-6 of table 54. Headings as in table 57.

Source of Variation	Powerlines 1933-1969 Six Sample Areas				
	SS	df	MS	F	Sig.
Main effects					
A - powerlines	6.	1	.6	*.08	NS
B - transects	10.7	3	3.36	1.88	NS
C - study areas	24.07	5	4.81	2.69	NS
First order interaction					
AB	1.7	3	.59	.33	NS
AC	46.96	5	9.39	5.25	<.01
BC	26.46	15	1.76	.98	NS
Second order interaction					
ABC	26.90	15	1.79		
*Variation among areas within corridors					
AC + C	71.03	10	7.1		

Table 62: Three-way Analysis of Variance for CQI Values for
study areas 1-6 of table 55. Headings as in table
57.

Source of Variation	Powerlines 1944, 1952 - Six Sample Areas				
	SS	df	MS	F	Size
Main effects					
A - powerlines	4.78	1	4.78	*.55	NS
B - transects	10.45	3	3.48	1.19	NS
C - study areas	46.85	5	9.37	3.20	<.05
First order interaction					
AB	28.22	3	9.41	3.21	NS
AC	38.84	5	7.77	2.65	NS
BC	46.09	15	3.07	1.05	NS
Second order interaction					
ABC	43.92	15	2.93		
*Variation among areas within corridors					
AC + C	85.7	10	8.75		

Table 63: Analysis of Variance for CQI Values of table 56.

Study areas 1, 4, 5, 7, 8, 9 and 11 of the 1913 aqueduct occur beside areas 1, 6, 7, 9, 11, 12 and 15 of the 1970 aqueduct respectively. Headings as in table 57.

Source of Variation	Aqueducts 1913-1970 Seven Sample Areas				
	SS	df	MS	F	Sig.
Main effects					
A - aqueducts	72.22	1	76.22	9.16	<.05
B - transects	1.36	2	.68	.08	NS
C - study areas	217.38	6	36.23	4.36	<.05
First order interaction					
AB	27.12	2	13.56	1.63	NS
AC	38.1	6	6.35	.76	NS
BC	197.04	12	16.42	1.97	NS
Second order interaction					
ABC	99.84	12	8.32		

Table 64. Three-way Analysis of Variance for CQI Values of table 56. Study areas 2, 3, 9 and 10 of the 1913 aqueduct are compared with areas 2, 3, 4 and 5 of the 1970 aqueduct respectively. Headings as in table 57.

Source of Variation	Aqueducts 1913, 1970 - Four Sample Areas				
	SS	df	MS	F	Sig.
Main effects					
A - aqueducts	12.53	1	12.53	* .58	NS
B - transects	36.94	2	18.47	4.38	NS
C - study areas	87.59	3	29.20	6.92	<.05
First order interaction					
AB	24.49	2	12.25	2.90	NS
AC	42.18	3	14.06	3.33	NS
BC	22.58	6	3.76	.89	NS
Second order interaction					
ABC	25.33	6	4.22		
*Variation among areas within corridors					
AC + C	129.77	6	21.63		

Table 65: Summary analysis of mean ($\bar{X}$) percent change ($\Delta\%$) values for biomass columns of tables 8-22. Neg, Pos = negative and positive change respectively. N = number of means sampled.

$\Delta\%$ biomass

Total Pipelines		Transects				
Values	Berm		Trench		Roadedge	
	Pos	Neg	Pos	Neg	Pos	Neg
N	3	32	2	34	8	28
$\bar{X}$	93.66	63.42	84.0	68.35	35.34	60.21
Standard error of $\bar{X}$	47.32	5.12	71.63	4.01	13.9	4.96

Total powerlines

	Wire		Pylons		Roadedge	
	Pos	Neg	Pos	Neg	Pos	Neg
N	17	33	11	39	12	38
$\bar{X}$	40.88	36.36	70.91	48.97	110.08	46.38
Standard error of $\bar{X}$	7.57	3.88	29.33	3.54	31.14	3.80

Total aqueducts

	Right-of-way		Roadedge	
	Pos	Neg	Pos	Neg
N	7	19	5	21
$\bar{X}$	65.86	68.16	112.4	58.09
Standard error of $\bar{X}$	37.58	3.80	30.83	6.70

Table 65 contd

Total corridors - Transect summed

	Pos		Neg	
	Corridors	Transects	Corridors	Transects
N	14	65	15	229
$\bar{X}$	53.33		54.34	
Standard				
error of $\bar{X}$	11.28		3.55	

Fig. 6: Bar graph of summary mean ($\bar{X}$) percent change ($\Delta\%$) values for biomass of total pipelines from table 55. See table 65 for N and standard error of $\bar{X}$.

Fig. 7: Bar graph of summary mean percent change values for biomass of total powerlines from table 65.

Fig. 8: Bar graph of summary mean percent change values
for biomass of total aqueducts and total corridors
and transects summed from table 65.

RESULTS AND CONCLUSIONS

Criteria for determining plant response to utility construction, as indicated in the introduction, is to be primarily a comparison of productivity, diversity and stability in disturbed and control transects. Thus it is to these features that we should look first.

These parameters have been measured and are outlined in a variety of tables. However, it is also necessary to look at occasional unmeasured observations to help attempt to explain some things not brought out in measurements.

Four measures of perennial plant productivity are given in tables 8-22; ground cover; density; volume; biomass. Diversity is estimated from measures of richness, evenness, equibility and application of diversity index incorporating the previous three measures (Tables 23-25). Stability of the vegetation is estimated from values of relative biomass and relative age (Tables 26-40), transect similarity coefficients (Tables 41-48) and by community quality indices (Tables 49-56). To help ascertain the significance of the variables studied, namely, utility corridors (year of construction), transects and study areas, the data for the Community Quality Indices was analyzed by eight three-way analysis of variance tests (Tables 57-68). Lastly, a summary analysis of mean percent change values for plant biomass of tables 8-22 is shown in table 65 and figures 7, 8 and 9. Observations of these tables will help to evaluate the impact of utility construction on the perennial vegetation. Primary comparisons should be among the classes of transects at each study site, secondary comparisons should be among study areas within corridors, and lastly between corridors.

Tables 8-22 may be used for estimating productivity by comparing the parameters of ground cover, density, volume, biomass and percent change. Control and disturbed transects study areas and corridors may be compared.

Diversity measures are listed in tables 23-25. Four measures of diversity, explained in the methods section, are used: richness; equibality (values range from $0 + \infty$); evenness (values range from $0 - 1\%$); diversity index (values range from $0 - + \infty$). Transects study areas and corridors, likewise may be compared.

Stability among transects, study areas and corridors may be estimated by observing tables 26-40 for relative biomass and relative age values, tables 41-48 for coefficient of similarity for transects and tables 49-56 for community quality indices. Values for coefficient of similarity range from $0 - 1$. Values of the community quality index range from $0 - + \infty$.

Data of the community quality index (CQI) was treated to three-way analysis of variance tests. Corridors (year of construction) A, transects B and study areas C were compared. The results are shown, mainly in the form of significance values, in tables 57-64. Significance levels range from NS = not significant to $P < .05$, $P < .01$, and $P < .001$, in order of increasing significance. Two corridors of different ages of construction were compared in each of eight tests. As a direct source of variation among CQI values (tables 49-56), only the 1924-1977 powerlines and the 1913-1970 aqueducts reached significance at the 5 percent ($P < .05$) probability level for paired corridors (A). All other corridor pairs were not significant (NS). The direct effects attributable to the different

transects (B) were significant at the 0.1, 0.5 and 0.1 percent probability level for the 1956-1973 and 1963-1970 pipelines and for the 1924-1977 powerline respectively. The remaining eight corridor pairs were NS for transects. The main effects due to differences in the several study areas (C) were significant for the corridors: 1963 -1970 ($P<0.05$); 1924-1977 ($P<0.001$); 1924-1968 ($P<0.01$) 1944-1952 ($P<0.05$); 1913-1970 (both sets) ($P<0.05$).

The first order interaction between the AB paired variation source was significant only for the 1963-1970 ($P<0.05$) pipeline. The interaction between AC paired variation source was significant for the 1963-1970 pipeline ($P<0.05$) and for the 1924-1977 and 1933-1969 powerlines, ($P<0.05$ and $P<0.01$ respectively). The BC interaction was NS for all corridor combinations.

There are many categories of NS among the sources of variation in the eight sets of paired corridors. Perhaps most of these are truly not significant but I feel that if there was a better way to incorporate quality factors into the data used for analysis the picture might look different. Disturbance brought about by construction of the utilities may enhance the vegetation as far as cover, density, and even biomass goes, and these parameters are easily measured and quantified. However, when invader species and other less desirable species, such as Chrysothamnus sp. fill in the spaces previously taken by dominants of the control transects, differences in transect quality is much harder to document. Observing percentage composition comparisons with an eye for ecological significance of the species should supplement most of the quantitative data.

 

The variation between study areas was significant for at least one of the levels of probability in six of the eight corridor pairs. This is particularly significant for corridor pairs 1924-1968 and 1913-1970. The study areas (3 in the former and 7 in the latter corridor pairs) were side by side where the corridors ran together. We interpret this to mean that the differences in the year of corridor construction is having its effect on the vegetation of the side by side study areas, perhaps contributing to the differences which are significant.

It is also of interest to note that Vasek, et. al., (1975b) reported NS for A (comparing 1937-1970 powerlines) in their three-way analysis of variance test. All of our main effects of source variation A (corridor years) showed NS also for time spans within the range reported by Vasek et. al.

However, both our 1924-1977 powerline and the 1913-1970 aqueduct corridor pairs were significant ($P < 0.05$) for the main effect of source variation A. We interpret this to indicate that given enough time span, significant differences will show up in the vegetation of the two corridors. Perhaps the vegetation of the disturbed transects of the older corridor has revegetated sufficiently to provide a greater contrast to the vegetation of the more recently disturbed transects of the younger live.

First order interactions were less significant than the main effects but three of the tests for AC were significant ($P < 0.05$, 1963-1970; $P < 0.05$, 1924-1977; $P < 0.01$, 1933-1969) and only one for AB ($P < 0.05$, 1963-1970).

Visual scanning of the several other tables will allow for evaluation of differences due to construction in the various transects, corridors and study areas. Perennial plant ground cover values of tables 8-22 are highly variable, ranging from >1 to 19 percent for all transects (N = 425) with a mean of 3.67 percent and a standard deviation of 2.60. This percent cover is low compared to Vasek et. al., (1975a and 1975b) where mean ground covers of 6.40 and 19.05 percent respectively are reported. The mean value of 6.40% (N=40) had a standard deviation of 5.60. The 19.05% mean (N=54) had a standard deviation of 10.74.

The differences in mean percent ground cover perhaps can be explained by the nature of the vegetation of the N transects. The N = 40 of Vasek et. al. were all in Creosote bush scrub through Lucerne Valley where vegetation cover is generally greater than in the desert at large. The N = 54 were likewise sampled primarily in Creosote bush but included some Salt bush scrub and Joshua tree woodland. Our N = 425, sampled a wide variety of plant communities and land forms where sparse dry playas, rocky pavement hills, riverwashes, etc., perhaps function to cut down the average ground cover.

These differences in ground cover, however, do not affect the relative values which are sought in an evaluation of disturbance due to construction practices.

In comparing our overall results with those of Vasek et. al., (1975a, 1975b) and Johnson et. al., (1975), their conclusions regarding relative enhancement of vegetation due to construction in some transects and drastic disturbance in others, seem to compare favorably with our findings.

In assessing productivity ratios (PR) of tables 8-22, negative PR values (<1) of some transects are often balanced out by positive PR values (>1) in other transects of the same study site. Likewise different study areas may balance each other out in the same manner as do the side by side transects. Corridors with different dates of construction and geographic location also tend to balance out in some cases.

This trend seems to be apparent throughout all the parameters of the productivity, stability and diversity tables. Table 65 and figure 6 seem to bear out this point. Here the total corridors (N=15) and total BCD transects (N=294) are analyzed for $\Delta\%$ of the biomass values of tables 8-22. The mean positive change of plant biomass due to construction practices in the B, C and D transects (N=65) for all corridors (N=14) was 53.33 percent. The mean negative change of plant biomass in the same B, C and D transects (N=229) for all corridors (N=15) was 54.34 percent.

Before one might be tempted to say the perennial vegetation of the Mohave Desert is holding its' own against utility construction, the quality of the vegetation change must be looked at closely.

Is the drastic disturbance encountered in some transects, such as under pylons and over trenches, really balanced out, ecologically speaking, by relative enhancement under wires and along road edges? Is it more important to look at "what" is there more so than just "how much" is there? Relative biomass and relative age tables (tables 26-40) are valuable for this purpose because they show the percent of biomass for several of the dominant long-lived perennials and the total percent of long-lived and short-lived perennials. Based on the assumption that the long-lived perennials are the ones which are dominant in the natural

undisturbed community, their ranges of tolerance to the environmental factors perhaps make them best suited for the community. Invader species, often short-lived, are generally transient in the community and do not necessarily lend themselves to a high quality community. Many of the short-lived species, however, are not invader species but are sub-dominants in the undisturbed community. Larrea tridentata, Ambrosia dumosa and Atriplex sp. are characteristic long-lived species generally thought of as good quality dominants in many desert communities. (Vasek, et. al., 1975a, 1975b, Johnson, et. al., 1975). Hymenoclea salsola is often a dominant species in desert washes and its presence is enhanced in other disturbed situations as well. Percent composition of these species are shown in tables 26-40. The full list of species encountered in the various transects sampled are shown by their relative age in table 7. Chrysothamnus paniculatus is also considered to be a long-lived perennial (Vasek, et. al., 1975b). However, presence of Chrysothamnus sp. in many of our disturbed transects, particularly along corridors on Baldy Mesa and above Dove Springs, encourages me to consider it as a long-lived invader. Presence of this species in a transect would enhance the community quality via use of the Community Quality Index. Thus it is important to consider percentage composition and to have a feeling for the worth of a particular species in the community.

In summary, in general analysis of field observations and transect data tables there appears to be highly variable impacts on perennial vegetation in relation to utility construction in the Mohave Desert.

Disturbance tends to generate new and fresh plant growth which shows up as cover and biomass in transect computations which rely heavily

on these quantitative values. This enhancement of vegetation in disturbed transects often balances out the cover and biomass destroyed by the original disturbance.

There are many study areas where sharp differences show up in comparing control and disturbed transects as well as difference attributable to different age spans of construction dates. There are also many disturbed and control transects which, due to stimulation by disturbance may be near equal as far as density, cover and even biomass goes. Situations of this type may appear to be a balance between enhancement and drastic disturbance when comparing many areas overall. However, the qualitative implications are harder to ascertain. It is apparent that percentage composition, at least of the dominant long-lived perennials, is a good measure to supplement other comparisons. Other qualitative tests are valuable as well, i.e., C C_j and CQI tables.

In overall and long-term effects of utility corridor construction, there is variable effects of enhancement of vegetation along roadedges, slight enhancement under wires of powerlines and over trenches of pipelines. Under pylons of powerlines seem to receive the greatest damage and also the most variable of vegetation recovery. Significant differences between years of construction are noticeable where the time span has allowed for considerable regrowth of the older corridor.

Depending on soil type, land form and other physical features of disturbed sites, vegetation recovery progresses at variable rates and stages. Drastic disturbance in one area or transect site may impede vegetation recovery, whereas slight disturbance might enhance vegetation in another, tending to offset the effect of the drastic disturbance (table 65, figure 8). Apparent similarities of vegetation cover and density of disturbed and control situations, however, often are

not similar when looking at qualitative aspects, such as porportion of long-lived species and presence of characteristic dominants of undisturbed communities.

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Appendix A

Fig. 1. Linear regression analysis for pylon transects ($n=50$) of power transmission corridors ($n=7$) in the Mohave Desert, California.
 $r = +.6138$ for transect means ($n=11$); decision point = .602.

Fig. 2. Linear regression analysis for roadedge transects ($n=50$) of power transmission corridors ($n=7$) in the Mohave Desert, California.
 $r = -.6535$ for transect means ($n=12$); decision point = .576.

Fig. 9: View looking south across a desert wash of Creosote bush scrub showing the right-of-way of the 1970 Los Angeles aqueduct near the entrance to Jawbone Canyon. Photograph taken July 17, 1978.

Fig. 10: The 1970 Los Angeles aqueduct at the entrance to Dove Springs showing Creosote bush scrub on a gentle north facing fan. Photograph, taken August 24, 1978, shows a high density of Chrysothamnus sp. and Lepidospartum sp. in the right-of-way in mid picture.

Fig. 11: South facing slope of a rocky hill supporting a sparse cover of Creosote bush scrub along the 1970 Los Angeles aqueduct in Jawbone Canyon. Photographed July 17, 1978.

Fig. 12: Right of way through Joshua tree woodland along the 1970 Los Angeles aqueduct. The cleared lane to the left is the cement roof of the aqueduct conduit. The utility access road is shown in the center. Photographed August 24, 1978, 7.2km west of Mohave, California.

Fig. 13: Steep east facing slope of Creosote bush scrub showing the 1913 Los Angeles aqueduct (center), right-of-way (left) and access road to the right. Photographed September 19, 1978 approximately 12km NW of Inyokern, California in Grapevine Canyon.

Fig. 14: Southeast facing fan with Creosote bush scrub showing the 1970 Los Angeles aqueduct in Grapevine canyon.

Fig. 15: Riverwash of the Mohave river approximately 6km east of Dagget, California showing the towers of the 1944 powerline. Photographed July 6, 1978.

Fig. 16: Dissected fan with Creosote bush scrub 3.22km north of Victorville, California. The three lines of the 1944 powerline are shown. Photographed August 31, 1978.

Fig. 17: Rocky hill site in Creosote bush scrub showing the area under the pylons of the 1952 powerline. Jawbone canyon, August, 1978.

Fig. 18: Rocky hill site showing desert holly scrub along the 1952 powerline 1.6km south of Jawbone canyon, July 17, 1978.

Fig. 19: Alkali scrub over a lava bed at Troy Lake 48.3km west of Barstow, California on I-40. The pile of lava in the center of the picture is the trench, with the berm to the right and access road on the left of the 1963 Pacific Gas and Electric pipeline. Photograph taken August 7, 1978.

Fig. 20: Mixed mountain scrub community on a steep east facing slope of Stoddard Ridge 19.3km south of Barstow California on the Barstow-Lucerne Valley road. The trench of the 1956 pipeline occurs just to the right of the access road shown. Photographed August 30, 1978.

Fig. 21: Sand covered east facing fan showing a dense cover of Hilaria rigida in a creosote bush community. The trench and berm of the 1973 Cal-Neva pipeline just visible in the left-lower corner of the photograph, taken September 14, 1978, 32km SE of Baker, California.

Fig. 22: Dune sand plant community on a sand dune above the Mohave river 3.2km W of Dagget, California. The berm of the 1970 Cal-Neva pipeline is shown in the center of the picture with the trench to the left side. The access road can be seen at the far right. Photograph taken August 28, 1978.

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