TABLE B-1

Vegetation Impact Matrix for Owens Valley

Water Table Depression (Feet)	Vegetation Types				
	Tule Marsh	Riparian/ Woodland	Alkali Grassland	Alkali Scrubland	Semide Scrubl
	6/8*	5/8	6-8/8-10	7-8/15	NA/NA
0-10	N-M-VH**	N-L-M	N-M-H	N-L	N
10-15	E	H	VH-E	M-H	N
15+	E	VH	E	H-VH-E	N

* 6/8 = Chronic response threshold/acute response threshold (DTW in Feet).

**Symbolization Legend:

N = No impact likely from changes in depth to groundwater.

L = Low; probably only physiological stress. Very slow ecological or plant successional change likely; 5 or more years probably necessary for changes in composition to be readily evident.

M = Moderate; change evident in vigor and production of key, moisture-requirin plants, particularly grasses and forbs. If a grass type, shrubs will begin to invade. May lose the plants with highest moisture requirement and thin out other high-moisture-requiring species. Moderate rate of change; plant composition changes probably evident in 3 to 5 or not more than 10 years. If xerophytic shrubs are normal component of stand, their density may begin to increase.

H = High; weakening of key plants and definite thinning of stand. Phreato-phytic shrubs may begin to weaken or die. Xerophytic shrubs will tend to increase. Moisture-requiring grass species definitely thin out and begin to die. Rate of change is high. Probability high of easily observable changes in 3 to 5 years, definitely in 10.

VH = Very high; definite shift toward xerism, substantial composition changes. Lose all high-moisture-requiring species. The original phreatophytic species very much weakened and obviously being replaced by more xero-phytic plants. Even deep-rooted phreatophytic shrubs and trees show signs of stress if they are normal component of original vegetation. Changes expected to be rapid; for many species, easily observable in 3 to 5 years. Certainly 10 years will bring about marked changes.

E = Extreme; quick and dramatic changes are likely. Phreatophytic species ca tolerate the environment. Plant succession shifts toward non-phreatophyte except for deepest-rooted shrubs and trees. Succession will move toward equilibrium with the desert environment and prevailing 5-inch rainfall potential.

equilibrium. Many vegetation types are assigned a range of levels rather than a single level since some communities, such as the tule marsh, riparian and alkali scrubland represent a complex of highly similar ecosystems which do not all respond alike with respect to available moisture or minimum moisture requirements. Also, changes in water available to the vegetation can, in some cases, result in shifts from one vegetation type to another through the normal process of plant succession. In some cases vegetation may change from one type to another by merely losing its most water-demanding species or gaining an invading shrub species, with the new type still being highly productive.

Low and even moderate impact levels would probably not cause undesirable changes unless the physiological stress from groundwater limitation also coincided with heavy grazing or severe weather extremes. This would apply especially if the stress period were only of one or two years duration and if alternated with periods of restoration of normal groundwater levels. Persistent low stress would first show up in vigor, growth, and reproduction of the stressed species. It may take five or more years, other factors being satisfactory, for changes in composition to become evident. Persistent moderate stress levels may bring about detectable changes in plant composition, or a thinning of the stand of plants making heavy use of water, in three to five or not more than 10 years. The low and moderate stress levels would become evident as the "chronic threshold" is passed.

High, very high, and extreme stress levels become evident as the "acute threshold" in depth-to-water is approached and surpassed. Under persistent high stress, those species that require groundwater would definitely thin out and begin to die. Evidences of this change would be expected in three to five years, with definite marked changes in 10 years. At the very high and extreme impact levels, irreversible changes are more than likely to be the rule and substantially longer periods of normal conditions would be required for restoration of the vegetation. Depending on the specific plant community involved, changes at these levels could be rapid and easily measurable in a three to five year period. Ten years would most certainly bring about marked and probably completely irreversible changes.

The level of stress is very likely associated with the adaptability of the individual species for high groundwater condition. The more suited it is to high groundwater, the earlier and stronger will be the stress conditions moving between the two threshold values.

Considering the sensitivity of the dominant species that make up each vegetation type mapped in the Owens Valley, the sensitivity and probable impact of a drawdown of the water table may be considered as follows.

The tule marsh complex is extremely variable and actually consists of three different plant communities that grow essentially with their feet in the water. The sensitivity of this type is very high due to the presence of bulrush, common tule, cattail, common reed, and spikerush. Any depression of the water table that eliminates the

free water surface will cause immediate stress or eliminate the bulrush and cattails. If the groundwater table drops much below the surface there is high likelihood of eliminating the spikerush. The common reed is usually peripheral to the marshland and can probably tolerate an "acute threshold" depth of 8 feet.

The riparian/woodland type occurs in the floodplains of the river and streams and is also highly sensitive to a water table drawdown. This type includes cottonwood, willow, and wild rose intermixed with lush stands of saltgrass, alkali sacaton, and giant wildrye. The riparian/ woodland is also intermixed with tule marsh species, depending on local site conditions. This type is the last to be impacted, due to topographic position. There is evidence, however, that plant succession will cause changes in portions of this community if the water table should be depressed for long periods of time.

Since the increased pumping will allow a continuation of water supplies to the vegetation currently being supported directly or indirectly by irrigation, stockwater, and wildlife enhancement projects, and will also maintain the existing flow regime in essentially all streams, canals and ditches for ponds and lakes, little or no significant impact is expected in the tule marsh or riparian/woodland communities.

The alkali grasslands will probably be the most noticeably impacted vegetation type. The Department's consultant plant ecologists mapped the grasslands on the valley floor as four subclasses, three of which are based on the ground cover or density of saltgrass in the in the saltgrass-alkali sacaton meadows. The present density of saltgrass in these meadows does not appear to be dependent upon depth to groundwater but probably has been determined by a combination of variation in soil salinity, past grazing pressure, and fire history. In its best condition there is little or no shrubby component. The fourth subclass is the rush-saltgrass meadow, maintained mostly by flood irrigation along with shallow depth to groundwater. This subclass comprises about one quarter of the grassland type. This is the most rapid changing association in the Valley as rush (Juncus) is particularly sensitive and with changes in shallow depth to groundwater or irrigation practice increases or decreases as a component of the community. Long-term decreases in availability of groundwater will result first in a loss of the rush, then saltgrass, then alkali-sacaton as the shrubby species invade the community moving progressively to an alkali scrubland community. Actually, most of the areas now classed as alkali scrubland are probably deteriorated saltgrass-alkali sacaton meadows. These areas consist of rabbitbrush, Nevada saltbush or greasewood as the shrub layer over saltgrass and alkali sacaton. The alkali scrubland is moderately sensitive and any depression of the water table will undoubtedly eliminate the grasses.

Alkali grassland and scrublands within impact category 4 would not necessarily change to shadscale scrub or creosote bush.

conditions of soil alkalinity would prevent successional changes to the climax vegetation of the desertic region. It might instead move toward salt-tolerant xerophytic shrubs, and broad leaved, herbaceous plants that can complete their life cycle on soil moisture stored from less than 6 inches of annual precipitation, or even become alkali barrens with annual forbs and Russian Thistle comprising the bulk of the vegetation. Russian Thistle is one of the most dominant and aggressive invaders in the Valley. Disappearance of the existing communities could occur relatively soon because of their closeness to the wells, although the confined nature of the aquifer in the Independence area would tend to lengthen the transition period there considerably.

It should be noted that the Los Angeles Aqueduct is encompassed by some of the most sensitive vegetation associations. Sub-irrigation of the grasslands for about one-quarter mile to either side of the Aqueduct should maintain the grass species.

Only a very small amount of the semidesert scrubland community was mapped within the depression areas. They are not directly influenced by groundwater drawdown since the plant species are xerophytes.

Fauna

The occurrence of fauna throughout the Owens Valley was listed in RDEIR Table 5-2. Data on food preferences, occurrence, and abundance has been added for the Final and the updated table appears in Appendix 4, Volume III. The information therein was used in writing the following impact descriptions.

Changes in the composition and density of wildlife species present would naturally occur with a change in vegetation types. For example, if a vegetation type changes to a different type due to some changing environmental condition, the wildlife occupying the site will also undergo changes. Basically, the wildlife presently occupying the site will find that the new conditions are less favorable for survival. There is always, however, another similar species for which the changed site would be ideal.

It is obvious, then, that to the extent that fauna is uniquely associated with a plant grouping that will be significantly impacted, there will be adverse impacts upon that fauna. In general for the Owens Valley, the wetter the habitat the more valuable it is for wildlife. Of the 377 species of birds, mammals, reptiles, and amphibians found in the Valley, over 200 are uniquely associated with the tule marsh and riparian/woodland communities and nearly 40 are uniquely associated with the semidesert scrubland community. These communities are not expected to be impacted. The alkali grassland community is the grouping expected to be the most significantly impacted by a lowering of the water table. This community has been found to be the least productive for wildlife; the least suitable by far for reptiles. With the possible exception of some invertebrate species, there do not appear to be unique fauna associations with the grasslands. Some rodents were found in the grassland community during the Department of Fish and Game's