

DEVELOPING SHORELINE COMMUNITIES AND POTENTIAL FOR NATURAL VEGETATION IN GLEN CANYON NATIONAL RECREATION AREA, ARIZONA-UTAH

GWENDOLYN L. WARING
MUSEUM OF NORTHERN ARIZONA
FLAGSTAFF

The plant community along the shoreline of Lake Powell in Glen Canyon National Recreation Area is resilient and dynamic. It is surviving the fluctuations in water level that characterize such reservoirs, and native plants are becoming established. Although the diversity of animals associated with the exotic dominant, *Tamarix ramosissima*, is lower than that of native riparian species, a surprising number of species are associated with tamarisk in this harsh country.

♦ STATUS OF RESEARCH

I. PLANT SURVIVORSHIP AND GROWTH EXPERIMENTS

Preliminary information is presented on the growth and survivorship of plants in the experimental garden at Wahweap. Both results and analyses are preliminary and must be regarded as such. *Tamarix ramosissima*, and the native species, *Baccharis salicifolia*, *B. emoryi*, *Salix gooddingii*, and *Populus fremontii* were introduced into watered and nonwatered plots in the garden in July, 1989. In the nonwatered plot, *T. ramosissima* (70%), *B. salicifolia*

(50%), and *B. emoryi* (45%) survived through the fall of 1990.

In September, 1990, I planted another set of rooted plants and unrooted cuttings in the unwatered experimental plot at Wahweap, to further evaluate establishment of native species in tamarisk stands without supplemental water. Plants larger than those used in 1989 were used in this experiment. The survivorship and growth of these plants will be monitored through the growing season of 1991.

All species and individuals survived in the watered plot at Wahweap, and exhibited strong growth between September, 1989, and May, 1990 (Table 1). Of the native species, *P. fremontii* grew best, particularly when in close proximity to tamarisk. The presence of native plants appears to inhibit tamarisk growth (Table 1). These results are opposite those found when the same experiment was conducted in pots. With adequate water, native riparian plant species appear are to establish in tamarisk stands.

II. ANIMALS ASSOCIATED WITH TAMARISK STANDS

In June, 1990, with assistance from Resource Management at GCNRA and two biologists from Northern Arizona University, a census of animals (amphibians, reptiles, mammals, birds and insects)

associated with *Tamarix ramosissima* was conducted at fourteen shoreline sites along Lake Powell. I will provide density estimates for all taxa in the final analysis. Animal diversity associated with these plants is low, due to the exotic nature of the plant, its currently water-stressed condition, and the monospecific nature of the riparian plant community.

Table 1. Plant growth measurements in the watered experimental plot at Wahweap. Included are overall plant growth measurements (1.), measurements by treatment (2.), and (3.) growth of tamarisk adjacent to experimental plants. Level 1 is open sand; level 2 is adjacent to tamarisks.

1. Mean growth of species (Height in cm):

	Mean	S.D.	n
<i>Tamarix ramosissima</i>	30.89	22.27	18
<i>Baccharis salicifolia</i>	5.11	12.26	18
<i>B. emoryi</i>	4.18	4.23	18
<i>Salix gooddingii</i>	4.89	6.24	18

2. Plant growth by treatment (Mean (S.D.))

	Level 1		Level 2		P
<i>Tamarix ramosissima</i>	26.13	(22.16)	33.25	(22.92)	ns
<i>Baccharis salicifolia</i>	2.33	(5.72)	6.50	(14.53)	ns
<i>B. emoryi</i>	7.80	(5.72)	2.67	(2.35)	0.02
<i>Salix gooddingii</i>	1.00	(1.67)	6.83	(6.82)	0.05
<i>Populus fremontii</i>	16.33	(12.24)	23.73	(13.22)	ns

3. Growth measurements of tamarisk adjacent to native plants (Mean (S.D.)); $F_{4,51}=2.07$, ns.

<i>Tamarix ramosissima</i>	10.50	(17.16)
<i>Baccharis salicifolia</i>	1.67	(3.68)
<i>B. emoryi</i>	3.75	(6.18)
<i>Salix gooddingii</i>	1.20	(3.79)
<i>Populus fremontii</i>	2.40	(5.15)

The black-throated sparrow (*Amphispiza bilineata*) is actively using tamarisk for nesting; and the black-tailed jackrabbit (*Lepus californicus*) is using it as a major source of food. This represents one of the few studies to detail all major animals associated with an exotic plant species.

III. PRODUCTIVITY AND RECRUITMENT IN THE SHORELINE PLANT COMMUNITY

In November, 1990, I did a 'repeat' census of the riparian plant community along the shoreline of Lake Powell. Plots established in 1988 were revisited, and survivorship, growth and recruitment of plants growing in different substrates were measured. These data are not yet analyzed. The indication from this trip, however, was that there has been remarkably little plant mortality, despite the fact that the lake level is

now 23 m below the full pool line. There has been very little plant growth or recruitment along the shoreline. I collected adequate information to be able to model the architecture that a tamarisk assumes when growing in different substrates. *Baccharis salicifolia* continues to be one of the principal native riparian plant species along Lake Powell. It stands to make a major contribution to animal diversity in the riparian community as over 100 species of insects are reported to utilize it throughout the Southwest (Boldt and Robbins 1990).

◆ LITERATURE CITED

- Boldt, P. E., and T. O. Robbins. 1990. Phytophagous and flower-visiting insect fauna of *Baccharis salicifolia* in the southwestern United States and northern Mexico. *Environ. Ent.* 19:515-523.