Sonoran and Sinaloan Interior Marshlands and Submergent Communities

Freshwater marshes are rare in these biogeographic provinces. This is because of their dependence on old oxbows of large rivers as the Colorado, Yaqui, Mayo, etc. Today, many of the larger marshlands occur where rivers enter large reservoirs (e.g., the "delta" of the Bill Williams River in Lake Havasu, Arizona). A very few are associated with natural springs or intersect groundwater tables, the last as at Laguna Prieta (Fig. 151). More common today are brackish and saltwater marshlands dependent for their existence on wastewater discharges, agricultural drains, and silt-laden reservoirs. These include the managed marshes at the edges of the Salton Sea in Imperial County, California, Santa Clara Slough near the Gulf of California, and Picacho Lake in Pinal County, Arizona.

Emergent vegetation varies from pure stands (=consociations) of such short statured and alkali resistant species as Saltgrass, Alkali Bulrush (*Scirpus maritimus* var. *paludosus*), and Three-square (*Scirpus americanus*), to dense, impenetrable communities of reed (*Phragmites australis*) and Giant Bulrush (*Scirpus californicus*), locally called "tules." Often, however, the most prevalent and characteristic species is the cattail, principally represented in these parts of the Southwest by *Typha domingensis*. At the edge of the marsh there is typically much intermingling with adjacent scrublands of Saltcedar, Arrow-weed, Quailbush (*Atriplex lentiformis*), and mesquite (Fig. 192). In more seasonally flooded areas the communities are often mosaics of the shorter marsh species (i.e., *Juncus* spp., *Eleocharis* spp., *Cynodon dactylon, Distichlis spicata*) and taller scrub (e.g., Saltcedar) depending on slight variations in hydrology or successional stage. As with all marshlands, hydrosoil mud bottoms are characteristic.

Emergent aquatic vegetation along the channel of the now stabilized Colorado River mainstream includes larger sedges such as Giant Bulrush and Three-square (Minckley, 1979). These plants form thick stands which rise as high as 3 m above the surface, creating a broad, 1-5 m zone of quiet, shaded water to 1.5 m deep. Cattail also forms beds on sloping, stabilized or aggrading banks that extend as far as 15 m from shore in water to a meter deep, especially on the quiet side of bends. When currents contact such beds, dense roots and rhizomes hold as dense mats, and undercuts of more than 2.5 m may occur. Stands of Giant Reed also are present, living as large clumps along less hygric shorelines.

Numerous small, semi-aquatic plant taxa form understories within marsh communities and along the banks. Included here are Pennywort (*Hydrocotyle verticillata*), Water-hyssop, Smartweed (*Polygonum fusiforme*), Spearmint (*Mentha spicata*), and a diversity of sedges and grasses (*Cyperus strigosus, C. erythrorhizos, Eleocharis parvula, E. caribaea, Leptochloa uninervia,* and *Paspalum dilatatum*).

Present-day submergent communities of the lower Colorado River channel are obviously new since drastic fluctuations in water levels and scour prior to dams scarcely allowed their development in more than a periodic or rudimentary way. Today there are large, monospecific stands of Sago Pondweed (*Potamogeton pectinatus*) with Water Milfoil (*Myriophyllum spicatum*) and the introduced Parrot-feather (*M. brasiliense*) collectively second in abundance (Minckley, 1979). The pondweed is most common in deeper water (to 4.5 m) and often in current that exceeds a meter per second. Milfoil and Parrot-feather form dense beds in shallower (to 2.5 m) water that moves at less than 0.5 m/second. Charophytes are in eddies or other places with slower currents, but are also interspersed with other taxa in the channel. Shorelines and quiet backwaters support some Hornwort (*Ceratophyllum demersum*), but more commonly these areas are choked with Holly-leafed Naiad (*Najas marina*). Shallow waters are inhabited by stands of Leafy Pondweed (*Potamogeton foliosus*), Common Pondmat (*Zannichellia palustris*), and sparse stands of Water Nymph (*Najas guadalupensis*). Bladderwort (*Utricularia* spp.) and duckweeds (*Lemna* spp.) commonly inhabit quiet backwaters, and often are entangled with other plants in the channel.

Although these marshlands and aquatic communities are justifiably considered important wintering grounds for water-

Figure 192. *Topock Marsh, an interior marshland on the Colorado River at the northernmost edge of the Sonoran Desert, Mohave County, Arizona. The cattail is* Typha domingensis; *the shrub in foreground is* Atriplex lentiformis. *Elevation ca. 260 m; photograph by Richard L. Todd.*

fowl, they also possess (or possessed) a distinctive nesting avifauna, some distinctly Neotropical. Examples of the latter are Fulvous Whistling Duck (*Dendrocygna bicolor*), Purple Gallinule (*Porphyrula martinica*), Least Grebe (*Podiceps dominicus*), and Snowy-egret (*Egretta thula*). Other species such as Sora, Coot (*Fulica americana*), Black-crowned Night Heron, Least Bittern (*Ixobrychus exilis*), Red-winged Blackbird, and Yellow-throat are widespread species in both temperate and tropical North America. Nesting populations of the Yuma Clapper Rail, a fresh- or brackish-water race of the species, are restricted to spring-wet Sonoran marshlands along the Colorado River, and in more interior locales whenever several hectares of marsh vegetation approaches or exceeds a meter in height.

The Muskrat (*Ondatra zibethicus*) is the common mammalian inhabitant, foraging on vegetation and on the now abundant, introduced Asiatic Clam (*Corbicula fluminea*). The Sonoran Mud Turtle (*Kinosternon sonoriense*) and other mud turtles are still locally common, as are the Colorado River and Giant Toads (*Bufo alvarius, B. marinus*) within their respective ranges. Nonetheless, the former distribution of the Sonoran Mud Turtle once included the lowermost Colorado and Verde rivers where it now is rare or absent, possibly replaced by the Spiny Softshell Turtle, introduced into the Colorado River at around the turn of the century (Miller, 1946). Another introduction, the Bullfrog (*Rana catesbeiana*), is now widespread throughout many mudbottomed, freshwater habitats within the Sonoran and Sinaloan provinces, where it contributes to the present day rarity of the native Checkered Garter Snake (*Thamnophis marcianus*; see also Moyle, 1973 and Conant, 1978), and at least locally, native frogs.

Populations of small fish species, such as Desert Pupfish and Sonoran Topminnow, now are extirpated from much of their former ranges in this zone because of interactions with introduced fishes and dewatering of streamside marshes. Salton Sea agricultural drains and a few spring-fed marshes still support small numbers of the pupfish, but African cichlids and a myriad of other, tropical fishes (e.g., Sailfin and Mexican Mollies, *Poecilia latipinna* and *P. mexicana*) now threaten even these refugia. These non-native forms also are present along the lower Colorado River and are exerting inexorable pressure; the pupfish remains common only in hypersaline parts of Santa Clara Slough on the Colorado River Delta.