

RIPARIAN FORESTS OF THE CORONADO NATIONAL FOREST

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Abstract. The natural resources unit of the Coronado National Forest has been collecting data from riparian areas since 1984. The Coronado National Forest, in Southeastern Arizona, occupies about 1.8 million acres in the Sky Islands. Riparian areas have long been recognized as important resource areas because they have different vegetation compared to surrounding areas, they often contain surface water sources, they are an infiltration zone for groundwater replenishment, and they provide habitat for many species including many listed threatened and endangered animals and plants. For decades, management activities and land uses, including grazing, mining, urban development, agriculture, and recreation, have been concentrated more in riparian areas than in upland areas. The purpose of the data gathering for this study was to identify the various ecosystems represented under the riparian umbrella and to collect baseline measurements and information about these areas. Repeated data gathering in the same locations will enable us to find out if changes are taking place in riparian areas over time.

DIFFERENT VEGETATION TYPES IDENTIFIED

The data collected between 1984 and 1993 consisted almost exclusively of vegetation information (Kennedy et al. 1984; USDA Forest Service 1989). We found that four riparian area types could be identified, and that some channels just had upland vegetation on the banks. The names were debated, and even whether or not each of these types was actually riparian was debated. Nevertheless, the following types were identified and mapped for the 1986 Coronado National Forest Plan (USDA Forest Service 1986): Dry Desert Riparian, Deciduous Riparian, Evergreen Riparian, and Coniferous Riparian.

The Dry Desert Riparian is generally lower than 5200 ft in elevation and has a mean annual temperature of 66–72° F. The dominant vegetation is mesquite (*Prosopis velutina*), desert willow (*Chilopsis linearis*), seep willow (*Bacharis glutinosa*), and desert broom (*Bacharis sarothroides*). Whether or not this type is really riparian has been debated.

The Deciduous Riparian is generally higher than 4200 ft in elevation and has a mean annual temperature of 56–64° F. The dominant vegetation is Fremont cottonwood (*Populus fremontii*) and Arizona sycamore (*Platanus wrightii*).

The Evergreen Riparian is generally higher than 4200 ft and has a mean annual temperature of 54–58° F. The dominant vegetation is Emory oak (*Quercus emoryii*) and alligator juniper (*Juniperous depens*). This type is often not considered truly riparian, but it is recognized as a higher ecosystem extension, where stringers of vegetation generally found at higher elevations extend into drier, hotter areas due to the more favorable microclimate provided by the channels they occupy.

The Coniferous Riparian is generally higher than 5200 ft and has a mean annual temperature of 46–52° F. The dominant vegetation is Rocky Mountain maple (*Acer glabrum*), Arizona sycamore (*Platanus wrightii*), Arizona alder (*Alnus oblongifolia*), Arizona cypress (*Cupressus arizonica*), ash (*Fraxinus* spp.), and aspen (*Populus tremuloides*).

In addition to these typical riparian species, the following species are also found along many channels: desert hackberry, Arizona walnut, Goodding willow, yewleaf willow, Arizona cypress, Arizona oak, pinyon pine, silverleaf oak, ponderosa pine, alligator juniper, one-seed juniper, and soapberry. Channels with upland vegetation communities are not mapped as having riparian vegetation. These "upland vegetation" areas often have larger, more vigorous individuals compared to the same species away from the channel. They also have occasional riparian species individuals.

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VEGETATION INFORMATION

Information collected about vegetation included stems per acre of true riparian species and of upland species, and age classes of true riparian tree species and upland tree species. Figure 1 displays the range of stems per acre by riparian vegetation type (from less than 100 stems to more than 600 stems per acre). Of interest is that the driest areas had the highest percentage of true riparian species represented in the stem count, although the total number of stems is low. Conversely, the deciduous riparian type had one of the lowest percentages of true riparian species represented in the stem count. The Coronado Plan of 1986 set a standard for riparian areas that at least 60 percent of the stems be true riparian tree species.

Figure 2 displays the age class distribution for all species. Before any data had been collected, the folklore among riparian specialists was that large old trees, with no reproduction to provide for sustaining these habitats, dominated the riparian areas of the Coronado National Forest. The data showed this to be completely false. In every vegetation type observed, young, seedling, and mature trees dominated the area.

CHANNEL MORPHOLOGY

Information collected since 1998 has also included channel morphology information. Channel cross sections and pebble counts on 33 cross sections have been analyzed with the vegetation information described above in an attempt to discover if channel morphology alone can be used to determine if a given system can be expected to meet the Forest Plan standard for riparian vegetation representing at least 60 percent of the stems.

Entrenchment Ratio

The entrenchment ratio is the width of the flood-prone area compared to the surface width of the bankfull channel (Rosgen 1996). Entrenchment ratios less than 1.2 are generally thought of as incised systems, or gullies. Our data showed that wider floodplains alone do not promote riparian vegetation. Although no channels with entrenchment ratios of 1.2 or less met the Plan standards for riparian vegetation, only 32 percent of those with entrenchment ratios greater than 1.2 met the standards.

Width to Depth Ratio

The width-to-depth ratio is the bankfull channel width divided by mean depth of the bankfull channel (Rosgen 1996). Of the channels analyzed, none with a width-to-depth ratio of less than 20 were found to meet the Plan standards for riparian vegetation. Only 41 percent of those with width-to-depth ratios greater than 20 met Plan standards.

Pebble Counts

Pebble counts (Bevenger and King 1995) can be used to describe the fineness or coarseness of the channel substrate. The data are arranged to display the particle size represented by 50 percent of those sampled: the d50 statistic. Of the channels analyzed, 67 percent met the Plan standards for riparian vegetation with a d50 of 5 mm (sand) or less. The channel with the coarsest material that still met Plan standards had a d50 of 20 mm (medium gravel). Of interest is that the channels with entrenchment ratios of less than 1.2 all had a d50 greater than 20 mm—apparently this is a bad combination for growing predominantly riparian vegetation, as none met the Plan standards.

CONCLUSIONS

The lowest elevation, driest riparian areas are most likely to meet the Plan standards for riparian vegetation dominance, although total numbers of stems are fewer than in higher elevation, wetter areas. Riparian areas associated with wide, shallow channels with fine material (gravel or sand) are also most likely to meet the plan standards. The wide, sandy desert wash with a few riparian trees is indeed a very desirable feature of the Coronado National Forest landscape.

REFERENCES

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