

DYNAMICS OF FISH POPULATIONS IN THE UPPER VERDE RIVER

by

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ABSTRACT

DYNAMICS OF FISH POPULATIONS IN THE UPPER VERDE RIVER

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The Verde River is one of the larger perennial streams in Arizona and is free-flowing along the upper 60 km. Despite the absence of impoundment, the Verde River supports a diverse fish fauna, including species not endemic to the drainage. Modes of introduction of nonnative fishes include intentional release by state agencies and well-meaning individuals, accidental release of bait by fisherman and, possibly, introduction from winter and summer storm runoff from stock tanks and ponds. Stock tanks have been stocked with nonnative fishes since the 1930's and may be a source of introduced fishes into adjacent waterways. I investigated the possibility of stock tanks providing introduced fishes into the Verde River by examining 57 tanks within the upper watershed. Tanks were categorized based on accessibility, proximity and drainage to the Verde River. I found that very few stock tanks (8%) pose a direct threat, but that with high flows several tanks could be potential sources of transport of introduced fishes into the Verde River.

The upper section of the Verde River is also subject to heavy seasonal flooding and ubiquitous livestock grazing. Upstream and downstream sections appear to be affected differently by these processes. Upstream sections have 76% more streambank vegetation and are 47%

narrower than downstream sections. In addition, velocity and undercut banks are significantly reduced in downstream sections. Native and nonnative fish populations are significantly different between upstream and downstream sites and have decreased between 1994 and 1997. Although overall fish populations appear to be declining, initially due to flooding events in 1995, nonnatives appear to be increasing relative to natives at all sites. Closer examinations of stream channel habitat reveals that predatory nonnatives such as yellow bullhead (*Ictalurus natalis*) and smallmouth bass (*Micropterus dolomieu*) are utilizing undercut streambanks and may be displacing natives into less desirable habitat.

Given prevalent nonnative fishes and anthropogenic influences such as livestock grazing, specific identification of habitats within the Verde River is critical for protection of native threatened and endangered species. To date, these habitats have been identified subjectively and may not be comparable from year to year, among different investigators, or with other studies. ANOVA results indicate that there are significant differences in physical parameters between sampling sites, habitats, and individual transects across all years (1994-1997). However, by using a visual, subjective method of classification, high and low gradient riffles and pools and glides were difficult to consistently discern and were correctly classified less than 50% of the time. Increasing sample numbers in 1996 did not significantly increase accuracy of classification. I found that by including gradient analyses, classification of aquatic habitat was consistent nearly 82% of the time. Results indicate that for closely related habitats, additional parameters may be required to accurately classify aquatic habitats.