Profusion of Mistletoe on Western Honey Mesquite in the Grand Canyon, Arizona

by Susan B. Infalt

INTRODUCTION

Woody plant species of the old high water line (OHWL) community have been in decline since the closure of Glen Canyon Dam (GCD) due to lack of flooding. High spring flows previously provided the plants communities of this area with moisture and nutrients during the flowering and fruiting season and prior to seed germination in the midsummer. There has been a decrease in areal extent of western honey mesquite (*Prosopis glandulosa*) attributed to reduced growth rates and/or increased mortality, and the absence of successful germination and establishment of juveniles in the OHWL community since the completion of GCD. Though mature plants that established before GCD are surviving, many observed during our recent survey of the area between GCD and Lake Mead seem to be in decline and exhibiting low vigor.

Mistletoe

Mistletoes are plant parasites that are usually dispersed by birds. They often display highly specialized relationships with their host species, and are an example of both seed dispersal mutualism and a vector transmitted disease (Aukema 2004).

Desert mistletoe (*Phoradendron californicum*) is a parasite of legume trees in the arid southwest of North America. Its primary seed disperser is the silky flycatcher (*Phainopepla nitens*), though its berries are consumed by many other bird species (Aukema 2004). Seeds are spread by adhering to the birds and then deposited on a potential host, or by being consumed and defecated unharmed onto a potential host. After germination, the mistletoe penetrates the branch and begins to utilize water, minerals, and other nutrients from the host's xylem.

Figure 1. Mistletoe infestation in western honey mesquite at river mile 220 (left and center) and fruiting mistletoe (right).

PREDICTIONS FOR MESQUITE POPULATIONS

The mature mesquites of the OHWL communities were observed to be suffering from severe infestations of desert mistletoe from approximately Lava Falls Rapid to the Lake Mead delta (Figure 1). Unfortunately, the infestations are quite possibly an indication that these individuals are in what has been termed a mortality spiral (Harris et al. 2004). Trees often die from a series of related stress events, rather than from any one causation agent. Harris et al. (2004) describe the mortality spiral as the succession from vigorous to stressed, from stressed to injured, from injured to declining, and from declining to dead. In this specific case, it seems likely that the stress imposed by the post-dam hydrograph led to an overall reduction in vigor of the mesquite populations below GCD. This has probably led to the extreme predisposition of these individuals to mistletoe infestation. The dam and associated altered moisture and nutrient regimes caused the shift from vigorous to stressed, and the severe mistletoe infestations have pushed the trees into injured and in some cases declining states. Though mistletoe itself is usually not harmful enough to kill a tree, it does further reduce the tree by draining valuable moisture and nutrient resources, thus increasing the susceptibility of the tree to other diseases, pathogens, and physical stressors.

It seems likely that even if managed flows are altered in such a way as to provide historical levels of moisture and nutrients to the OHWL communities, the mature trees will not recover from the damage they have suffered and will eventually be extirpated from the OHWL zone. Since recruitment is minimal or nonexistent in the OHWL (Infalt 2005, this volume), I predict that mesquite populations will continue to decline and individuals will become rare.

REFERENCES

Aukema, J.E. 2004. Distribution and dispersal of desert mistletoe is scale-dependent, hierarchically nested. *Ecography*, **27**(2): 137.

Harris, R.W., J.R. Clark, and N.P. Matheny. 2004. Arboriculture: Integrated Management of Landscape Trees, Shrubs, and Vines, 4th edition. Pearson Education, Inc., Upper Saddle River, New Jersey.