

## **Adaptive Management and Exotic Plant Management at Lake Mead National Recreation Area**

**Sandee Dingman**, Natural Resource Specialist, Lake Mead NRA, 601 Nevada Way, Boulder City, NV 89005; sandee\_dingman@nps.gov

**Alice C. Newton**, Vegetation Branch Manager, Lake Mead NRA, 601 Nevada Way, Boulder City, NV 89005; alice\_corrine\_newton@nps.gov

**Carrie Norman**, Exotic Plant Manager, Lake Mead NRA, 601 Nevada Way, Boulder City, NV 89005; carrie\_norman@nps.gov

Lake Mead National Recreation Area (NRA) has been actively engaged in exotic plant management for many years and has learned a great deal about what works and doesn't work. However, the Park's resource managers have come to realize that lessons of the past may be of limited value in the future. Given the inherently dynamic nature of desert plants, lowering lake levels, as well as the realized and anticipated impacts of climate change, a new model is needed to speed up the learning process in a quickly changing landscape. To address this need, Lake Mead NRA is attempting to incorporate adaptive management into the Exotic Plant Management Plan currently under development. A series of decision flow charts have been developed to conceptualize how the outcomes of management actions will be analyzed and the lessons learned incorporated into future decisions in an iterative learning process.

Adaptive management has been defined in various ways since the 1970's when the concept first came into common usage. For the purposes of the Lake Mead Exotic Plant Management Plan, we use the following working definition, taken from the Department of the Interior Technical Guide (Williams, Szaro, and Shapiro 2007):

Adaptive management is a decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error process,' but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decision and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders.

The adaptive management process is six steps which must be completed sequentially:

1. Assess the situation.
2. Design a plan of action to achieve specific outcomes.
3. Implement the plan of action.
4. Monitor the intended and unintended results of the action.

5. Evaluate the actual outcomes against the predicted outcomes.
6. Adjust future decisions based on what was learned.

Adaptive management is incorporated into many aspects of the exotic plant management programs at Lake Mead NRA, as illustrated in the following figures.

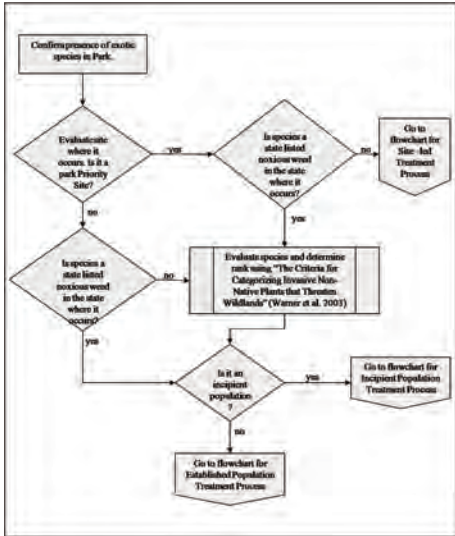


Figure 1. Situation evaluation process.

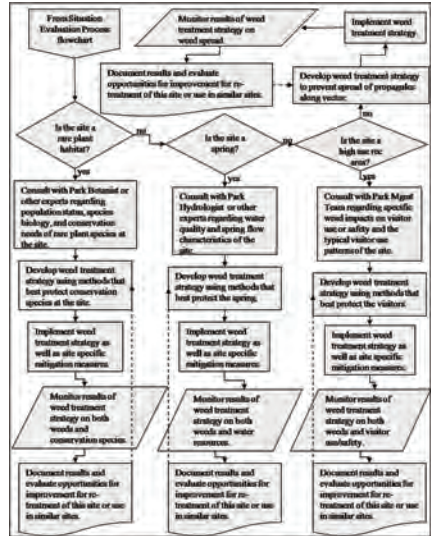


Figure 2. Site-led treatment process.

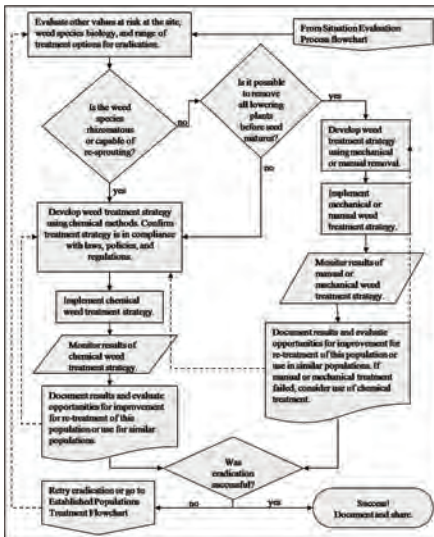


Figure 3. Incipient population treatment process.

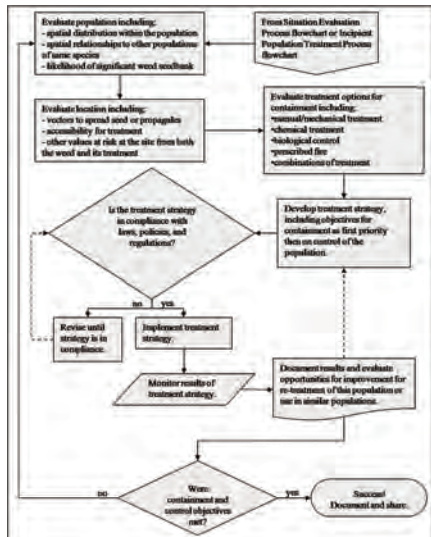


Figure 4. Established population treatment process.

We have also created flowcharts regarding chemical treatment and biological control. Collectively, these flowcharts are graphical representations of the incorporation of adaptive management into the exotic plant management decision-making processes. Adaptive management is a fundamental part of the park's Exotic Plant Management Plan (NPS forthcoming), which is currently in draft and expected to be completed in 2009.

## **References**

- NPS [National Park Service]. Forthcoming. Exotic Plant Management Plan and Environmental Assessment for Lake Mead National Recreation Area.
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