

Fuel Management Approaches in Desert Wetlands



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In Mojave desert wetlands in Las Vegas, Nevada, where management goals included reducing hazardous fuels of the invasive common reed (*Phragmites australis*) and increasing native plant diversity, we assessed variation in reed cover, the degree of native plant colonization, and soil seed banks after reed management treatments (cutting and glyphosate-imazapyr herbicide) and wildfires across gradients in soil properties.

Based on change in reed cover during six measurement events over 24 months, 24 study sites formed three groups: 1) decreasing cover, where initially high reed cover (60-85%) decreased to < 5% following multiple cutting or herbicide treatments; 2) sustaining low cover, where wildfire or clearing was associated with initially low reed cover which remained low (< 30%) after multiple herbicide applications; and 3) sustaining high cover (45-100% initially and remaining 30-100%), including sites unmanaged or treated/burned only once (Figure 1). No native plants were detected in the sustaining high reed cover group, despite natives occurring in the seed bank. Where management reduced reed cover, minimal native plant colonization did occur. Secondary invasion by other non-native plants was nearly absent. High soil salinity correlated with low post-management reed cover.

If reed can be initially cleared, multiple herbicide applications can persistently keep cover low, especially on drier, saline soils. Slow native plant colonization suggests that a phased approach may be useful to initially reduce reed cover, keep it low via repeated treatments, and actively revegetate sites with native species tailored to the moisture-

salinity gradient across reed-invaded habitats. On moister or less-saline soil where reed appeared more resilient, native species with potential to competitively suppress reed resprouts may be suitable as an initial native cover. On extremely saline soil, selecting native species most tolerant of salinity rather than primarily for their competitive ability may be most appropriate. Coupling active revegetation of native species with maintenance management activities (e.g., managed flooding or fires) to keep reed cover low could be a next research step in identifying long-term strategies for converting reed monocultures to more diverse native, less-fire-prone communities in desert wetlands.

MANAGEMENT IMPLICATIONS

- Different trajectories in cover of invasive reed and native plant colonization occurred across variation in initial conditions, the number of management treatments (cutting, herbicide) or wildfires, and soil properties such as salinity.
- By 24 months after our study began, 15 of 18 (83%) managed sites had reed cover $\leq$ 16%, compared with 80-100% cover on six unmanaged sites.
- A multi-phase approach may be useful to managing reed monocultures in desert wetlands. This could include taking advantage of initial wildfires (or potentially conducting prescribed fires) to cost-effectively clear reed fuels, applying herbicide multiple times to deter resprouting and reestablishment, and allowing native plants to colonize slowly with reed kept at low abundance or using active revegetation to hasten native plant establishment.
- Active revegetation using saline-tolerant native species may hasten native plant establishment on saline soil where reed had lower resilience. More competitive natives may be suitable for moister or less saline soil where reed was more resilient after treatments and wildfires.



Figure 1. Repeat photos from the same locations on three representative plots in each of three *Phragmites* cover groups in desert wetlands, Las Vegas, Nevada.

Additional Information

This brief is based on the following article:

Abella, S.R., S.L. Porter, K.A. Kline, L.P. Chiquoine, and B.S. Jurand. 2024. Changing dominance of invasive common reed (*Phragmites australis*) and native plant colonization with variation in management, wildfires, and soils in a desert wetland. *Invasive Plant Science and Management* 17: 172-181. <https://www.cambridge.org/core/journals/invasive-plant-science-and-management/article/changing-dominance-of-invasive-common-reed-phragmites-australis-and-native-plant-colonization-with-variation-in-management-wildfires-and-soils-in-a-desert-wetland/C506CF1E594F4032D460C0B9DE7D90A6>

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