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Post-Fire Plant Recovery in the Mojave and Sonoran Deserts of Western North America

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POST-FIRE PLANT RECOVERY IN THE MOJAVE AND SONORAN DESERTS OF WESTERN NORTH AMERICA

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Table 1. Summary of studies meeting inclusion criteria that examined post-fire plant recovery in the Mojave and Sonoran Deserts.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Data type</th>
<th>Mojave Desert</th>
<th>Sonoran Desert</th>
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</thead>
<tbody>
<tr>
<td>Abella et al. unpubl.</td>
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<td></td>
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<tr>
<td>Brooks and Matchett 2003</td>
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<td>Callison et al. 1985</td>
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<td>Lei 1999</td>
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<td></td>
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<tr>
<td>Medica et al. 1994</td>
<td>x</td>
<td></td>
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<td>Minnich 1995</td>
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<td></td>
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<td>Webb et al. 2003</td>
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PROJECT RATIONALE

Fire is thought to have been generally rare historically in the Mojave and Sonoran Deserts. However, invasion by exotic grasses (e.g., *Schismus* ssp.) has increased fuel continuity, promoting fire in these deserts. Succession and recovery are not well understood processes in deserts, nonetheless for a novel disturbance like fire. In addition to helping build theories of desert succession and recovery, information on post-fire recovery has numerous practical implications (e.g., determining whether active revegetation is needed).

Systematic reviews provide a means for obtaining literature using reproducible search criteria. This approach facilitates a balanced appraisal of available information, synthesizes scattered literature, and may result in insights not apparent by examining research studies individually. Using the systematic approach, I addressed these questions:

1. What are post-fire resprouting frequencies among species?
2. How quickly does perennial plant cover recover following fire?
3. What is the relationship of species composition and time since fire?
4. Which species are major post-fire colonizers?
5. What variation occurs in post-fire responses between deserts?

REFERENCES

Full citations are not provided due to space but are available by contacting the author.

METHODS

Surveyed the article databases of Google Scholar, Agrica Biological Abstracts, and JSTOR using combinations of the key words “succession,” “disturbance,” “fire,” “recovery,” “change,” “Mojave,” and “Sonoran.”

Search other reviews (e.g., Fire Effects Information System) and reference lists in located papers, and cross-reference search.

To qualify for inclusion in the review, studies had to monitor vegetation after wildfire or prescribed fire in the Mojave or Sonoran Deserts, report quantitative resprout or community data, and include burned and unburned areas for comparison, and be published.

To analyze community data, I updated species nomenclature and computed a relative measure of abundance to standardize the different raw measures (cover, density, or frequency) reported in original publications.

Table 2. Resprouting percentages of representative species (of 31 species) after fire.

<table>
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</tbody>
</table>

Table 2. Resprouting percentages of representative species (of 31 species) after fire. Reference1


ACKNOWLEDGEMENTS

I thank Lake Mead National Recreation Area for supporting this study through a cooperative agreement with the University of Nevada Las Vegas, and Sharon Altman and Mark Stallings (University of Nevada Las Vegas) for helping construct the poster.

HIGHLIGHTS

A total of 14 studies met inclusion criteria, with seven studies conducted in each of the Mojave and Sonoran Deserts (Table 1).

Five studies measured post-fire resprouting of native perennials, providing resprouting estimates for 31 species (Table 2). Resprouting was generally limited but varied among species.

Three studies covering the longest time since fire (>30 years) found that total perennial cover had recovered to within 10% (raw cover) of unburned cover within approximately 40 years (Fig. 1).

In contrast to cover, burned perennial species composition showed little trend to converge with unburned composition overall among six studies ranging from 1-47 years since fire (Fig. 2).

Based on ordinating data from 13 community studies, overall perennial composition after fire differs between the Mojave and Sonoran Deserts (Fig. 3).

Some species exhibited versatility by being dominants in both burned and unburned habitats (e.g., *Ambrosia deltoidea, Ephedra nevadensis*), at least in terms of their relative abundance even if their raw abundance declined after fire.

CONCLUSION

This analysis suggests that post-fire composition consists both of resprouting species present prior to the fire and early colonizers that are more, less, or similar in abundance to unburned areas. It is unclear how much time is required for species composition on burns to resemble that of unburned areas, as generally weak trends for compositional convergence were evident even in the longest studies extending 37 years since fire. It also is possible that even in the absence of further fire, fire has induced a new trajectory of vegetation change diverging from unburned areas. However, though species compositions will differ, it appears that total perennial cover on burns will resemble that of unburned areas within approximately 40 years after fire.