1-1-2008

Implications for Management Prioritization of Exotic Annual Weed Monitoring Near Roadsides in the Eastern Mojave Desert, USA

Donovan J. Craig
University of Nevada, Las Vegas

Jill E. Craig
University of Nevada, Las Vegas

Scott R. Abella
University of Nevada, Las Vegas, scott.abella@unlv.edu

Public Lands Institute,

IMPLICATIONS FOR MANAGEMENT PRIORITIZATION OF EXOTIC ANNUAL WEED MONITORING NEAR ROADSIDES IN THE EASTERN MOJAVE DESERT, USA

Donovan J. Craig[1], Jill E. Craig[1], and Scott R. Abella[2]. [1]Public Lands Institute, University of Nevada Las Vegas, 4505 S. Maryland Parkway, Las Vegas, NV 89154-2040. donovan.craig@unlv.edu, jill.craig@unlv.edu, [2]Public Lands Institute and Department of Environmental Studies, University of Nevada Las Vegas. scott.abella@unlv.edu.

The study

We hypothesized that exotic species cover would:

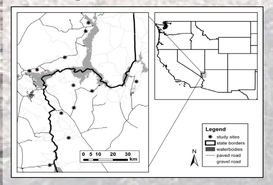
- **Decrease as distance from roadside increases,**
- **Increase below perennial shrub canopy, and**
- **Decrease in perennial shrub interspace.**

Invasive exotic plants provide an unnatural conduit for fires in the Mojave Desert. For the last five years, roadside monitoring for exotic invasive species has been a common practice for documenting distributions in Clark County, Nevada (Abella et al., *in press*). Yet, studies have shown that weed relationships to road corridors differ depending upon the natural system (Hansen and Clevenger, 2005). In the Mojave Desert, it is unknown whether exotic species are limited to or even predominant along roadsides.

Compounding this uncertainty, fertile islands under shrubs are known to enhance conditions for many annuals (Thompson et al., 2005). Thus, a site's shrub composition could influence exotic invasive plant distributions.

Sampling methods

Study site selection



- Stratified random throughout Lake Mead NRA
- Along gravel and paved roadways

Transect set-up

- Five, 100-m transects
- 2 m wide
- 5, 15, 25, 35, 45 m from road

Along each transect

- 2 of each microsite
- Center a 0.25-m^2 quadrat
- Record species and % cover

Data analysis

This design was a split-split plot design, consisting of two levels of the whole plot factor road type (gravel or paved), five levels of the subplot factor distance from roadside (5, 15, 25, 35, 45 m), and three levels of the sub-subplot factor microsite type (below *Larrea tridentata*, below *Ambrosia dumosa*, and interspace). The partially nested design was analyzed using PROC MIXED in the statistical software SAS V9.1 (2003 SAS Institute Inc., Cary, NC). Exotic cover was arcsine square-root transformed prior to analysis.

Results and Discussion

Table 1. Analysis of variance results for relationships of exotic species distributions to road type, distance from roadside, and perennial shrub microsite.

Effect	NumDF	DenDF	F	P-value
Roadtype	1	10	0.14	0.7201
Distance	4	40	3.54	**0.0145**
Roadtype*Distance	4	40	0.52	0.7247
Microsite	2	97	9.10	**0.0002**
Roadtype*Microsite	2	97	0.01	0.9875
Microsite*Distance	8	97	0.75	0.6447
Roadtype*Microsite*Distance	8	97	0.37	0.9350

A significant distance effect was found (Table 1); however, exotic cover did not vary in a systematic way with distance. The effect we found only revealed a general trend for higher exotic cover in plots closer to the road.

Microsite effects were much stronger with shrub microsites having higher exotic cover than interspace microsites. No significant interactions were detected.

Schismus spp. and *Erodium cicutarium* accounted for much of the exotic cover among all microsites (Figure 1). Exotics such as *Brassica tournefortii* and *Bromus rubens* appear to prefer shrub microsites to interspaces (Figure 1).

Most of the exotic species encountered in this study are very common and widespread in the Southwest. Likewise, these exotics are some of the most destructive by increasing fire frequency and severity in the Mojave.

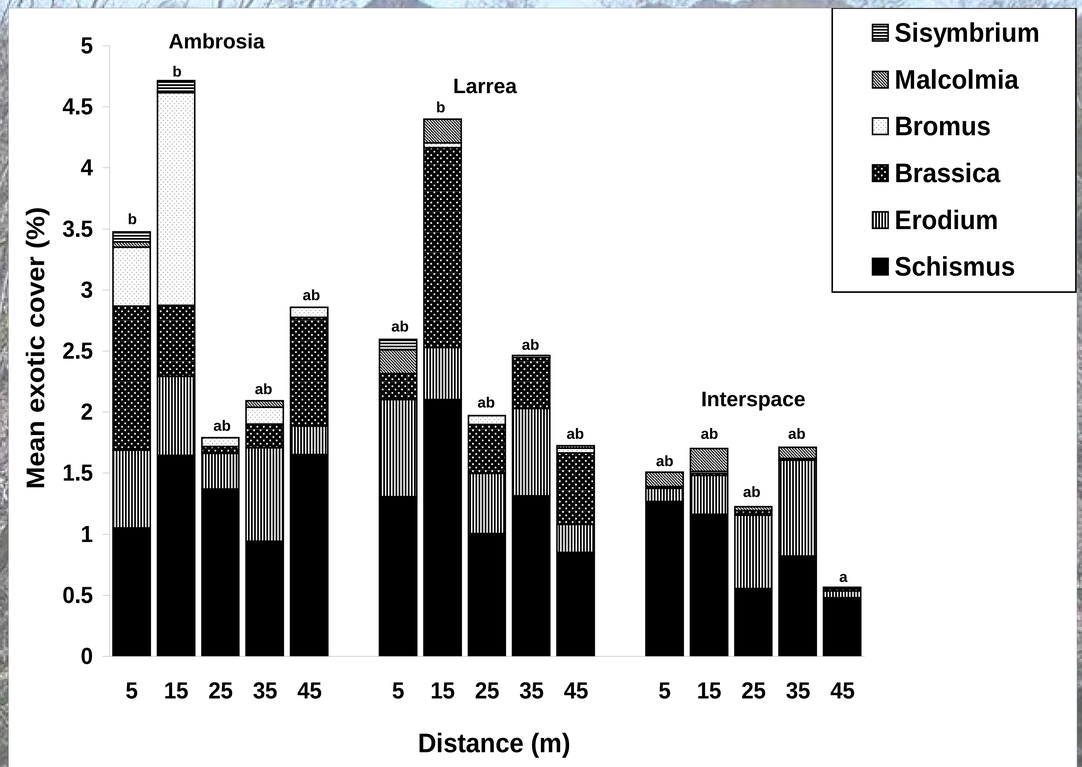


Figure 1. Mean percent exotic species cover for each microsite (*Ambrosia dumosa*, *Larrea tridentata*, and Interspace) across distances from roadside (m). Patterns within bars represent the relative contribution of each exotic species to the total. Exotic species are *Schismus* spp., *Erodium cicutarium*, *Brassica tournefortii*, *Bromus rubens*, *Malcolmia africana*, and *Sisymbrium irio*. Bars with different letters are significantly different ($p < 0.05$).

Conclusions

Roadways have been considered a vector for exotic plants. However, once exotic plants have been established in an area for some time, roads may not be the most reliable indicator of exotic plant distributions. Several species found in this study have clearly dispersed beyond roadsides. Microsite composition plays a significant role in determining the overall exotic cover of a site. Disturbances coupled with microsite influence could be more influential to exotic species distributions than road corridors. Future surveying should incorporate landscape features beyond roadsides to detect exotic species distributions. Additional research examining a greater variety of shrub microsites is needed to determine if some shrubs facilitate or inhibit exotic species.

References

Abella, S.R., Spencer, J.E., Hoines, J., Nazarchyk, C. Assessing an exotic plant surveying program in the Mojave Desert, Clark County, Nevada, USA. Environmental Monitoring and Assessment (in press).

Hansen, M.J., Clevenger, A.P. 2005. The influence of disturbance and habitat on the presence of non-native plant species along transport corridors. Biological Conservation 125, 249-259.

Thompson, D.B., Walker, L.R., Landau, F.H., Stark, L.R. 2005. The influence of elevation, shrub species, and biological soil crust on fertile islands in the Mojave Desert, USA. Journal of Arid Environments 61, 609-629.

Acknowledgements

We thank Cayenne Engel, Chris Roberts, and Alex Suazo (Public Lands Institute) and Toshi Yoshida (Great Basin Institute) for assistance with field sampling. Dianne Bangle and Jessica Spencer (Public Lands Institute) assisted with plant identification. Cheryl Vanier provided statistical analysis. This study was funded by the Joint Fire Science Program (proposal 07-1-3-24) and a cooperative agreement between Lake Mead National Recreation Area and the University of Nevada Las Vegas.