Identifying Trends in Distribution of Noxious Weeds for Early Detection and Rapid Response (EDRR) in Nevada

Lisa A. Blecker[1], J. Earl Creech[2] and Jason C. Davison[1]

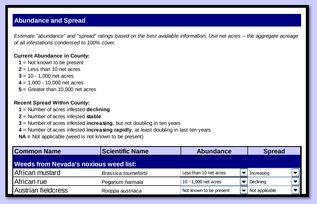
1. University of Nevada Cooperative Extension, Fallon, NV (bleckerl@unce.unr.edu),; 2. Utah State University, Logan, UT

Introduction

Changes in climate across the Mojave Desert and Great Basin regions are likely to have variable effects on noxious weed dynamics by enhancing, inhibiting or shifting their habitat and ability to spread (Bradley et al., 2008). Early detection of new weed species in an area involves diligent monitoring for new invasions and once a new weed has been detected in an area, eradication is essential. Research indicates that eradication efforts are most successful for infestations less than one hectare in size (Rejmanek & Pitcairn 2002). Traditionally, new weed invasions are not detected or addressed until they are so dense and widespread that eradication is not feasible. Furthermore, there have been no statewide weed surveys to uncover the presence, distribution or abundance of high-impact weeds. To address these issues, a county-based weed survey was completed in Nevada and bordering counties of surrounding states. Survey data were translated into maps to illustrate the abundance and distribution of key weed species. These maps were utilized alongside a set of criteria to develop "Weeds to Watch" lists for each Nevada County. These weeds will be targeted for early detection and rapid response (EDRR) in Nevada. These baseline data documenting the current trends in weed distribution and abundance allow us to tailor identification and eradication education efforts to each county, to monitor future trends in the spread of these weeds, and to determine areas of focus for more detailed research.

Goals

- To determine presence and abundance of high-impact weeds in Nevada Counties
- To determine which counties are susceptible to invasion by these weeds
- To direct education efforts in each county to the early detection of weeds that have the potential to invade
- To monitor future trends in the spread of these weeds
- To determine areas of focus for more detailed research



Abundance and Spread

Estimate "abundance" and "spread" ratings based on the best available information. Use net acres – the aggregate acreage of all infestations condensed to 100% cover.

Current Abundance in County:
1 = Not known to be present
2 = Less than 10 net acres
3 = 10 - 1,000 net acres
4 = 1,000 - 10,000 net acres
5 = Greater than 10,000 net acres

Recent Spread Within County:
1 = Number of acres infested **declining**
2 = Number of acres infested **stable**
3 = Number of acres infested **increasing**, but not doubling in ten years
4 = Number of acres infested **increasing rapidly**, at least doubling in last ten years
NA = Not applicable (weed is not known to be present)

Common Name	Scientific Name	Abundance	Spread
Weeds from Nevada's noxious weed list:			
African mustard	*Brassica tournefortii*	Less than 10 net acres	Increasing
African rue	*Peganum harmala*	10 - 1,000 net acres	Declining
Austrian fieldcress	*Rorippa austriaca*	Not known to be present	Not applicable

Figure 1. An excerpt from the weed survey executed in each Nevada County and in bordering counties in neighboring states (Arizona, California, Idaho, Oregon and Utah). Weed managers were asked to rank the abundance and spread of high-priority weed species according to the classifications in the survey.

Methods

A county-based weed survey was developed using the survey administered in California by the California Invasive Plant Council (Cal-IPC). Utilizing the same questions and answers as Cal-IPC facilitates data sharing between the two states. All 47 weeds found on the Nevada Noxious Weed List were added to the survey as well as any weed that was found on two or more other western states' noxious weed lists. The survey was conducted in Nevada Counties as well as in bordering counties in neighboring states (Arizona, California, Idaho, Oregon and Utah). Expanding the survey allowed us to see current weed distribution and potential range shift . The survey was completed via in-person meetings with weed managers in each Nevada County and via phone and email contact for each of the bordering counties. A total of 131 weeds were surveyed in 42 counties.

Arc Map software was utilized to translate survey data into weed distribution and abundance maps and to give a visual representation of the survey data. The maps were utilized alongside a set of criteria to develop a "Weeds to Watch" list for high-impact species in each county.

Results

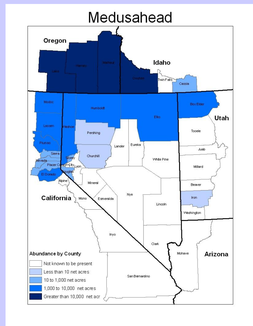
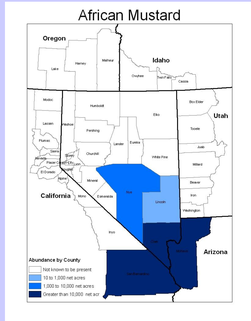


Figure 2. Medusahead (*Taeniatherum caput-medusae*) is an aggressive winter annual weed whose range is currently expanding from Oregon and California into Nevada. Due to the proximity of Lander, Eureka, White Pine, Storey and White Pine counties to heavy infestations of medusahead, it is important to educate landowners in those counties about identification and control of medusahead.

Figure 3. African mustard (*Brassica tournefortii*; also known as Sahara mustard) is an annual mustard whose distribution is concentrated in the southern part of the state – primarily in the Mojave Desert. It is poised to expand its range northward. This expansion could be facilitated by global climate change. It is a good EDRR candidate in White Pine County.



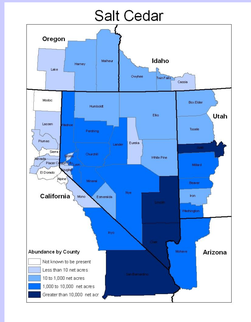
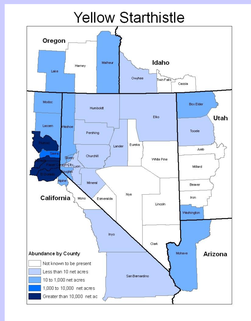


Figure 4. Salt cedar (*Tamarix* spp; also called tamarisk) is an aggressive perennial that grows along waterways. Roots can reach the water table, which – coupled with excessive salt deposition from fallen leaves – creates an environment that native plants cannot tolerate. Climate change models predict that the range of this species will expand in the future (Bradley et al., 2008).

Figure 5. Yellow starthistle (*Centaurea solstitalis*) is an annual that is beginning to move into all parts of Nevada. It can be devastating to grazing lands because it causes "chewing disease" in horses. Climate change models predict that the range of this species will expand in the future (Bradley et al., 2008).



Weeds to Watch Lists

The criteria for being added to a county "Weeds to Watch" list included:

- Any weed found at low levels (less than 10 net acres) in the county
- Any weed found in a bordering county

These criteria were very broad and resulted in county watch lists with 31-60 weeds per county. The goal is to narrow down these lists to 15 key weeds by utilizing additional criteria. Additional criteria include:

- Abundance of the weed in a bordering county
- Length of border between counties
- Number of western states' noxious weed lists on which the weed is found
- Input from county weed managers

Figure 6. Education is an integral part of any early detection and rapid response (EDRR) program. University of Nevada Cooperative Extension (UNCE) faculty focus on educating land managers about identification and management of weeds as well as using GPS/GIS technology to map weed invasions.

Future Directions

Once the "Weeds to Watch" lists have been narrowed down in each county, we will highlight these weeds in "Weeds to Watch" posters, which will have high quality photos of each weed, a brief description of identifying characteristics and where each weed is likely to be found. These lists allow us to tailor weed identification and eradication education efforts to each county. We intend to track early detection and removal of the weeds featured on these posters by having a contact person in each county (listed on the poster) and by doing follow-up surveys.

Survey data collected will serve as baseline data for future study. Weed surveys will be repeated every 5-10 years to monitor trends in weed abundance and distribution across the state. More detailed mapping and reporting will be conducted in areas of concern, as indicated by the preliminary maps.

Figure 7. Example "Weeds to Watch" posters that are being developed for each Nevada County based on the weeds surveys and resulting weed distribution and abundance maps. The posters have high quality photos of each weed on the front. The back side will feature a brief description of identifying characteristics and where each weed is likely to be found. Posters will be tailored to the individual needs of each county.

References

Bradley, B.A , M. Oppenheimer and D.S. Wilcove. 2008. Climate Change and Plant Invasions: Restoration Opportunities Ahead? Global Change Biology: 15(6) 1511-1521.

Rejmanek, M. and M.J. Pitcairn. 2002. When is Eradication of Exotic Pest Plants a Realistic Goal? Pages 249-253 *in* Veitch, C. R. and M.N. Clout (eds). Turning the Tide: The Eradication of Invasive Species. Gland, Switzerland and Cambridge, UK: ICUN SSC Invasive Species Specialist Group.