

Are we “missing the boat” on preventing the spread of invasive plants on rangelands?

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Invasive Plants

- decrease biodiversity
- reduce production
- eliminate key wildlife habitat
- displace native species
- and alter ecosystem processes and functions



Costs are extremely large. Not only do invasive species diminish the productivity and ecological services of nonarable lands, but restoration is expensive and often unsuccessful.

In 1994, the negative impacts were estimated to be \$13 billion per year in the U.S. In 2000, losses were estimated at \$137 billion.

Some impacts are irreversible (native species extinctions).



Photo by Tony Knight







Conventional reactive invasive plant management

The problem with conventional reactive invasive plant management is that once populations are established, control is expensive and time consuming, and eradication is unlikely.

Even if invasive plants are controlled, revegetation by native species is often unsuccessful.

Native plants are expensive, if available at all.

Invasive plants can alter physical and chemical properties of the soil.

Invasive plants often develop a persistent seed bank.

Some restoration activities have undesirable impacts on the environment.



We need more focus on prevention.

The general failure to limit the spread of invasives suggests a need to place more emphasis on prevention.

Resources are invested primarily on control. Why?

- ✘ General lack of information detailing prevention strategies
- ✘ Humans tend to be more reactive than proactive.
- ✘ Lack of funding.
- ✘ Uncertainty of the productivity of applying prevention tactics.
- ✘ More research focuses on control than prevention.
- ✘ Control is less abstract, and therefore easier to report.

Prevention won't eliminate the need for control and restoration.

Applied research needs to examine prevention.

Research is needed to develop and test specific management actions to prevent the spread of invasive plants.

Three suggestions:

- ✘ Decreasing propagule pressure
- ✘ Maintaining or increasing plant community biotic resistance to invasion
- ✘ Eradicating small invasive plant satellite populations.



Decreasing propagule (often seeds) pressure

Invasive plant propagules need to be present for invasion to occur.

As propagules increases, so does the probability of invasion.

Managers are lacking studies focused on reducing propagule pressure on noninvaded rangelands from invaded rangelands.

Managers would be more inclined to adopt strategies of prevention if the success and cost effectiveness had been clearly demonstrated.

Critical need: identifying vectors that disperse invasive plants, and then testing the effectiveness and cost efficiency of different management actions by each vector.

Maintaining or increasing biotic resistance

Biotic resistance is the ability of the plant community to limit invasion by exotic plant species.

Influenced by:

- ✘ Plant species diversity and abundance
- ✘ Species dominance
- ✘ Site characteristics
- ✘ Herbivory and other disturbances
- ✘ Interactions of these factors.

Current research is confusing because of mixed and even contradicting results.

Critical need: Determining how different management strategies influence biotic resistance and what strategies are most effective against specific invasive plants.

Eradicating Small Infestations

Even though invasive species will not be eradicated regionally or nationally, small infestations should still be targeted.

Eradicating small infestations is critical, because small infestations greatly increase the risk of invasion of surrounding area.

Early detection is critical, yet searching across entire landscapes is not feasible.

Possible effective and cost-efficient strategies to locate new infestations:

- ✘ Developing risk assessment maps
- ✘ Remote sensing
- ✘ Hyperspectral images

Critical need: Practical and cost-effective methods of locating satellite populations and developing a protocol with treatments and monitoring and retreatment requirements to ensure that satellite populations targeted for eradication actually are eradicated.

Conclusions

Reactive invasive plant management is too costly, and often applied too late to restore native communities.

There is an alarming lack of research in developing prevention tools and strategies.

Resources are allocated primarily to controlling existing infestations, rather than prevention.

Research for prevention is underfunded. There needs to be a higher priority placed on developing better tools and strategies for decreasing propagule pressure, increasing biotic resistance, and detecting and eradicating new infestations earlier.

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