Invasive Plant Management in the West – A Scientific Assessment
We asked:

Is the science available to achieve our conservation goals during invasive plant management?
Conservation goals

- Protect non-infested rangeland
- Enhance quality and quantity of goods
- Control undesirable vegetation
- Create desired plant communities
- Repair the underlying cause of invasion
- Restore vegetation to protect soils
- Protect and enhance wildlife
- Protect life and property from wildfires
- Minimize negative impacts
Stop treating Symptoms

What are we going to do about this?
What is Ecologically Based Invasive Plant Management?
Plant communities are always changing

What caused this?

What can we do to cause this?
## Prioritizing Management

### No/Light Infestation
- **Prevention/Protection**
  - Develop prevention plan & gain adoption with adjacent land owners
  - Prioritize prevention program. Implement the program
  - Assess and improve

### Moderate Infestation with Some Desired Plants
- **Management Focus**
  - Control infestation & increase desired species
  - Detailed mapping combined with environmental data & local knowledge
  - Develop control methods to favor desired species using EBIPM
  - Design Adaptive Management program and implement
  - Assess and improve

### High Infestation without Desired Species
- **Revegetation/Restoration**
  - Highly accurate mapping with max environmental data & local knowledge
  - Contain large infestations
  - Develop an Augmentative Restoration plan
  - Implement restoration plan & establish adaptive management program
  - Assess and improve

### Priority Level & Likelihood of Success
- **Highest**
- **Lowest**
No/Light Infestation

Management Focus

Prevention/Protection

Develop prevention plan & gain adoption for adjacent land owners

Prioritize prevention program. Implement the program

Assess and improve
Prevention Plan

- Education
- Interruption of Movement
- Early Detection & Eradication
Education

WEED Prevention Areas

ATTENTION ALL HUNTERS WHEN SPOTTED CALL 357-3200
Weed Prevention Framework

Create goals

Create list of priority species for prevention

Create general map of known infestations and weed free areas

Early Detection & Eradication

Identify protection, action, and containment zones

Delineate boundaries for each of the zones

Frequently: Survey boundary zones

Maintain containment zone boundaries

Interrupting Movement

Identify spread vectors and corridors of movement

Develop and implement comprehensive program for limiting spread of weeds

Frequently: Survey spread corridors in action zones

Eradicate all infestations within action zones, corridor areas, and high risk zones

GPS location in an...
Management Focus – Control infestations and increase desired species

- Moderate Infestation with Some Desired Plants
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Prescribed Burning Options
High amount of combustible forage increases fire intensity and greater seed mortality.

Shown more effective in low elevation, warm winter areas with high biomass production generally not as successful in semi-arid cool winter areas.

Can be used prior to herbicides to remove thatch buildup.
Herbicide Options

Control is highly variable; gives about 2 years control. Herbicides and burning better control; more risky and expensive.

Weeds return rapidly if niches are not filled.
Grazing Options
Principle 1:
Keep Annual Grasses from Flowering
Principle 2: Keep Perennial Desired Species Strong and Healthy
"GREEN AND BROWN"
GRAZING STRATEGY FOR INVASIVE ANNUAL GRASSES

<table>
<thead>
<tr>
<th>Grazing Period</th>
<th>Perennial Grasses</th>
<th>Annual Grasses</th>
<th>Month</th>
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<tr>
<td></td>
<td>Senescence</td>
<td>Germination</td>
<td>Oct</td>
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<td>Dormancy</td>
<td>Growth initiation</td>
<td>Nov</td>
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<td></td>
<td>Growth initiation</td>
<td>Leaf growth</td>
<td>Dec</td>
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<td></td>
<td>Leaf growth</td>
<td>Boot stage</td>
<td>Jan</td>
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<td></td>
<td>Growth &amp; seed development</td>
<td>May</td>
<td>Feb</td>
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<td>Flowering &amp; seed development</td>
<td>June</td>
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<td>Seed hardening &amp; senescence</td>
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<td>Death</td>
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Management Focus - Revegetation

High Infestation without Desired Species

Management Focus

Revegetation/Restoration

Highly accurate mapping with max environmental data & local knowledge

Contain large infestations

Develop an Augmentative Restoration plan

Implement restoration plan & establish adaptive management program

Assess and improve
The goal is to:

- Maximize productivity
- Maximize diversity

Leads to:
Healthy functioning plant communities that are invasion resistant and meet other land use objectives
Restoration costs and outcomes

- **40,000 acres**
  - Crested ($40/ac)
  - Natives ($100/ac)
  - Natives with invaders ($150/ac)

**Cost**
- $1.6 million (50% chance)
- $4 million (25% chance)
- $6 million (<5% chance)

**Loss**
- $0.8 million
- $3 million
- $5.9 million
**EBIPM Revegetation Guidelines**

**STEP 1 MAKE A GOAL STATEMENT**
Formulate goal statements that describe desired condition and potential use.

**STEP 2 DETERMINE NECESSITY OF REVEGETATION**
Make sure revegetation is necessary. If unsure, contact local Extension, weed coordinator, NRCS, or Conservation District office and arrange a site visit.

**STEP 3 ASSESS SOIL AND SITE PROPERTIES**
Are they acceptable?

- **YES**
  - Can soil be amended or are species available that are adapted to the soil?
    - **YES**
      - Consider topsoil and vegetation salvage.
    - **NO**
      - **STEP 4 SALVAGE RESOURCES PRIOR TO PLANNED DISTURBANCE**
        - Is it known in advance that a project will disturb an area and require revegetation?
          - **YES**
            - **STEP 5 SITE PREPARATION**
              - Consider seedbed preparation and/or soil amendments.
          - **NO**
            - **STEP 10 PLANT MATURE PLANTS**
              - Complement reseeding by transplanting salvaged, locally collected, or nursery stock.

- **NO**
  - All native species when their abilities meet your needs. Nonnatives are sometimes the only choice when needs are based on considerations like forage production and competitiveness with invasive weeds.

**STEP 4 SALVAGE RESOURCES PRIOR TO PLANNED DISTURBANCE**

**STEP 5 SITE PREPARATION**
Consider seedbed preparation and/or soil amendments.

**STEP 6 REDUCE WEED INTERFERENCE**
Methods vary depending on many factors.

**STEP 7 LONG-TERM MANAGEMENT**
Carefully manage to favor desired species.

**STEP 9 CALCULATE SEEDING RATE**
Rates vary depending on many factors.

**STEP 10 PLANT MATURE PLANTS**
Complement reseeding by transplanting salvaged, locally collected, or nursery stock.

**STEP 11 DETERMINE THE BEST TIME TO REVEGETATE**
Indicated by selected species, method of planting, and soil texture.

**STEP 12 ASSIST ESTABLISHMENT**
May include actions that precede or immediately follow seeding/planting.

**STEP 13 MONITOR**
Monitor establishment to identify and rectify problems in time to allow for successful revegetation.

**STEP 14 LONG-TERM MANAGEMENT**
Carefully manage to favor desired species.

**STEP 15 DETERMINE THE BEST TIME TO REVEGETATE**
Indicated by selected species, method of planting, and soil texture.
Determine if revegetation is necessary

- **YES**
  - YES= < 15% cover of desired plants

- **NO**
  - NO= > 15% cover of desired plants
DETERMINE SEEDING OR PLANTING METHOD

Is the site accessible to equipment?

Yes

No

• Broadcast seed at non-prepared seedbed at double to triple seeding rate.
• Hand-plug wetland riparian plants.

• Hydroseed sloped sites.
• Roughen soil surface before and after broadcast seeding and apply hydromulch.
• Hay mulch seed.
• Plant rhizome sprigs in high-salinity sites.
DESIGN A SEED MIX
Create seed mix based on goals and site characteristics.
Is the site a natural area?

No

Always use native species when their abilities meet your needs. Non-natives are sometimes the only choice when needs are based on considerations like forage production and competitiveness with invasive weeds.

Yes

Use native species to provide ecological stability and maintain plant community integrity.
CALCULATE SEEDING RATE

Rates vary depending on many factors.

Ecological Principles:
Increase dispersal frequency and increase amounts of desired species increases establishment.

Factors:
- Site conditions
- Weed interference
- Seed mix components
- Seedling vigor
Adaptive Management

Create controls and replication to identify and rectify problems in time to allow for successful revegetation.

Design and Execute a Plan Using Adaptive Management
Prioritizing Management

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- Moderate
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