Oregon Interagency Noxious Weed Symposium December 3rd, 2014 -Idaho's Biological Control Program

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Overview

- Idaho's program
  - Releases and results
  - Projects we're working on
  - Things that might interest Oregon
- Standardized Impact Monitoring Protocol (SIMP)
  - How we are using it
- Summary

Idaho's Biological Control Program

- Since 1984, approx. 7,150 releases have been made in Idaho
  - Approx. 18 million agents released
- Monitoring has shown reductions:
  - Canada thistle – 51%
  - Dalmatian toadflax – 79%
  - Leafy spurge – 55%
  - Spotted knapweed – 40%
- Cost/Benefit analysis
  - Australia – 23:1 for biocontrol (Page & Lacey, 2006)
  - Herbicide only programs – 2.5:1

Idaho's Biological Control Program

Our problem weeds:

- Canada thistle
- Dalmatian toadflax
- Diffuse knapweed
- Field bindweed
- Leafy spurge
- Mediterranean sage
- Puncturevine
- Purple loosestrife
- Rush skeletonweed
- Russian knapweed
- Salt cedar
- Scotch Broom
- Spotted knapweed
- Tansy ragwort
- Yellow starthistle
- Yellow toadflax

Idaho's Biological Control Program

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- Canada thistle
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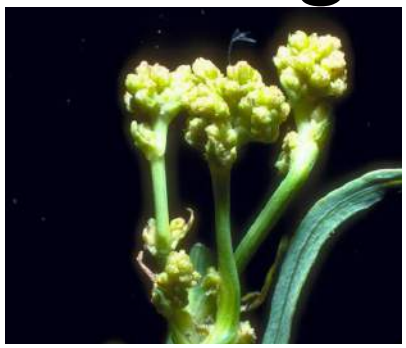
- Yellow starthistle
- **Yellow toadflax**

Rush Skeletonweed
Current Biological Control Agents

Reduces plant vigor and can kill young seedlings

Only effective in reducing plant vigor of the Banks biotype

Rust fungus
(*Puccinia chondrillina)*
Introduced to Idaho in 1977



Galls buds reducing plant vigor and reduces seed production

Gall mite
(*Eriophyes chondrillae)*
Introduced in Idaho, 1979

Galls the leaves and stem reduces plant vigor.

Native parasitoids & grasshoppers diminished the effectiveness of this agent

Fly or gall midge
(*Cystiphora schmidti)*
Introduced in 1975

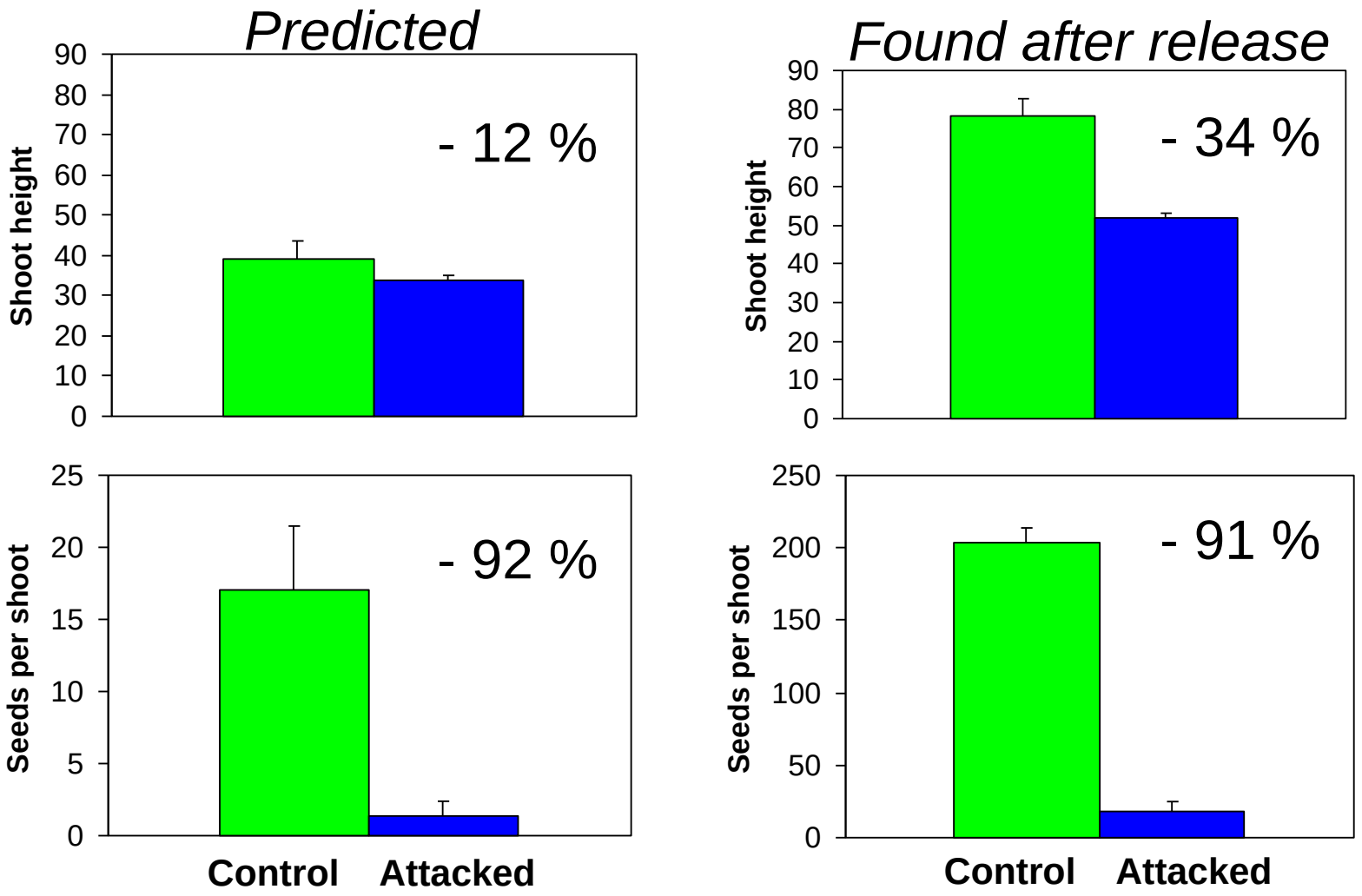
Feeds on cortical and vascular tissues of roots impacting plant vigor

Root moth
(*Bradyrrhoa gilveolella)*
Introduced in Idaho in 2002

Russian Knapweed

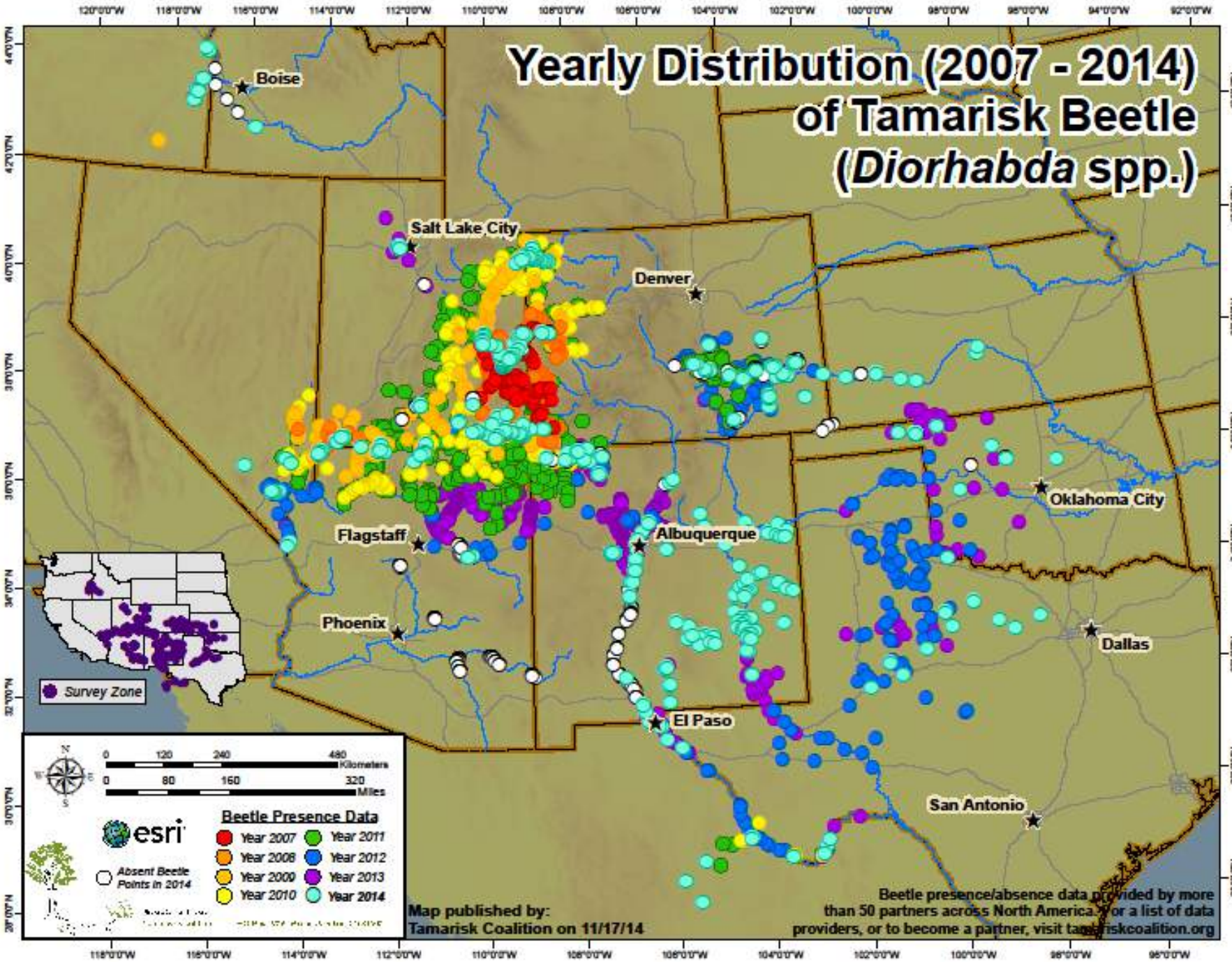
- Gall midge *Jaapiella ivannikovi* for control of Russian knapweed
- Established in Alberta, Wyoming, Oregon, Washington, and now Idaho
- Recent release of the gall wasp, *Aulacidea acroptilonica*

Impact of *Jaapiella ivannikovi* on Russian knapweed



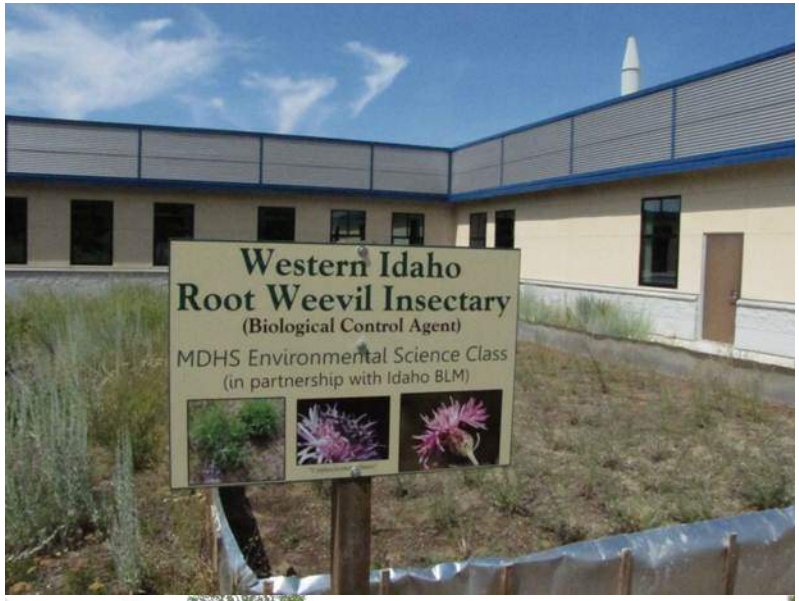
Salt Cedar (*Tamarix* spp.)

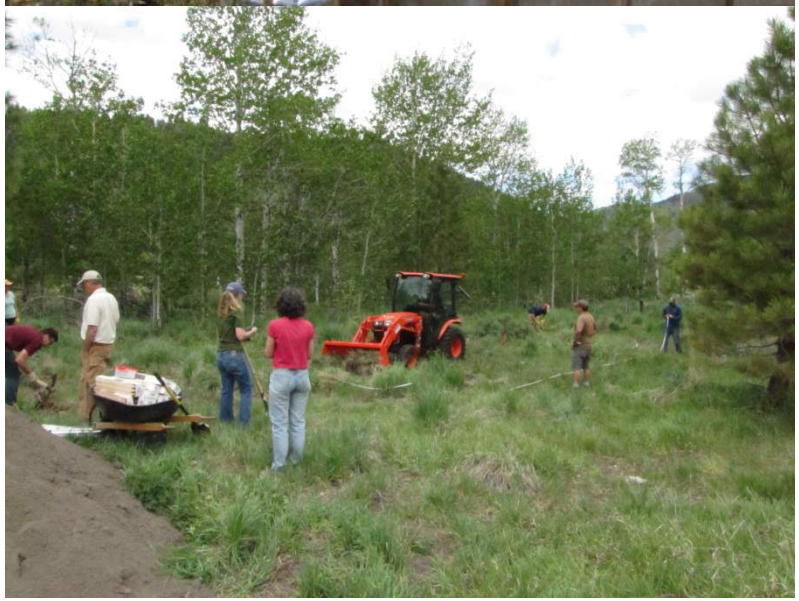
- *Diorhabda carinulata*
- Established in Oregon
- Found in Idaho
  - Plan to redistribute within the state following the 2014 field season
  - Delimit with pheromone traps (USFS & MSU)
    - Every 25 miles from the Idaho-Oregon border to central Idaho along the Snake River


Yearly Distribution (2007 - 2014)
of Tamarisk Beetle
(Diorhabda spp.)
Boise
Salt Lake City
Denver
Oklahoma City
Albuquerque
Flagstaff
Phoenix
Dallas
El Paso
San Antonio
Survey Zone
Beetle Presence Data
Year 2007
Year 2008
Year 2009
Year 2010
Year 2011
Year 2012
Year 2013
Year 2014
Absent Beetle Points in 2014
0 120 240 480 Kilometers
0 80 160 320 Miles
esri
Map published by:
Tamarisk Coalition on 11/17/14
Beetle presence/absence data provided by more than 50 partners across North America. For a list of data providers, or to become a partner, visit tamariskcoalition.org

Spotted Knapweed

- Continue to see declines in spotted knapweed across the state
- Three “bug corral” insectaries have been developed
  - Salmon, ID
  - McCall, ID
  - Sun Valley, ID



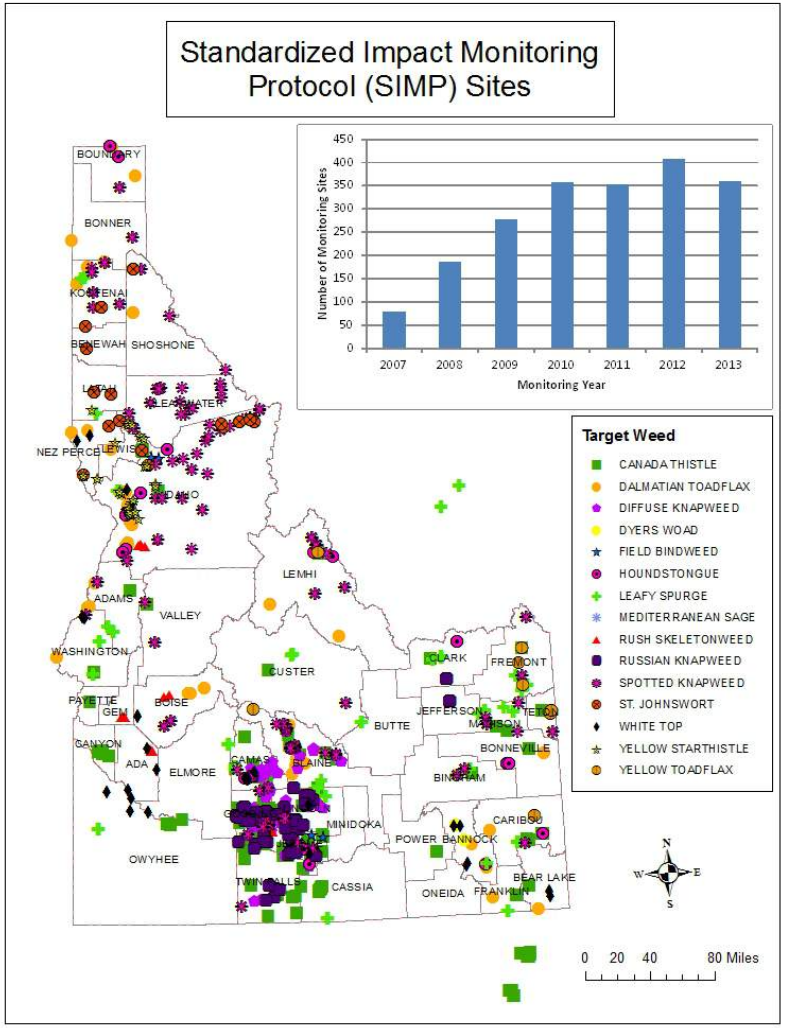


Yellow Toadflax

- *Mecinus janthinus* on *Linaria vulgaris*
- Many biological control agents released with minimal success
- Hybrid toadflax issues
- Now have insecataries in Idaho and Montana
  - YT is receding rapidly

Idaho's Biological Control Program

- Program began in 2006
- Initiated the Standardized Impact Monitoring Protocol (SIMP)
  - 2007 – 80 sites
  - 2014 – 367 sites
- Currently over 1,100 sites in the US
  - Other countries are using it too



Standardized **I**mpact **M**onitoring **P**rotocol (SIMP)

Objectives

1. To collect on a regional scale robust data over time documenting the efficacy (or lack thereof) of biological weed control
2. To do so using a simple and fast protocol that allows involvement of constituents and citizen scientists

Standardized **I**mpact **M**onitoring **P**rotocol (SIMP)

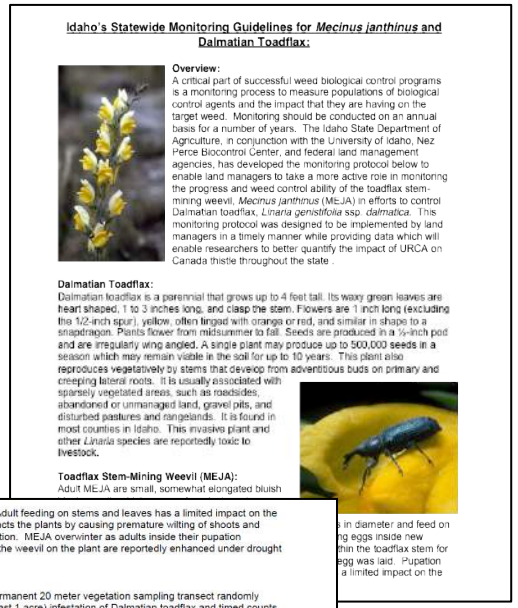
Who came up with it?

In 2006, a small group representing the BLM, USFS, Nez Perce Biocontrol Center and the University of Idaho met in Moscow, to develop the monitoring protocol.

Standardized Impact Monitoring Protocol (SIMP)

Approach

- User-friendly protocol
  - (Educational 2-page leaflets)
  - Google “BLM Biological Control”
- 45 minute time requirement
- Once per year
- Training workshops



Idaho's Statewide Monitoring Guidelines for *Mecinus janthinus* and Dalmatian Toadflax:

Overview:
A critical part of successful weed biological control programs is a monitoring process to measure populations of biological control agents and the impact that they are having on the target weed. Monitoring should be conducted on an annual basis for a number of years. The Idaho State Department of Agriculture, in conjunction with the University of Idaho, Nez Perce Biocontrol Center, and federal land management agencies, has developed the monitoring protocol below to enable land managers to take a more active role in monitoring the progress and weed control ability of the toadflax stem-mining weevil, *Mecinus janthinus* (MEJA) in efforts to control Dalmatian toadflax, *Linaria genistifolia* ssp. *dalmatica*. This monitoring protocol was designed to be implemented by land managers in a timely manner while providing data which will enable researchers to better quantify the impact of URCA on Canada thistle throughout the state .

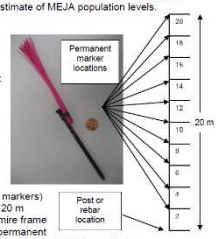
Dalmatian Toadflax:
Dalmatian toadflax is a perennial that grows up to 4 feet tall. Its waxy green leaves are heart shaped, 1 to 3 inches long, and clasp the stem. Flowers are 1 inch long (excluding the 1/2-inch spur), yellow, often tinged with orange or red, and similar in shape to a snapdragon. Plants flower from midsummer to fall. Seeds are produced in a ½-inch pod and are irregularly winged angled. A single plant may produce up to 500,000 seeds in a season which may remain viable in the soil for up to 10 years. This plant also reproduces vegetatively by stems that develop from adventitious buds on primary and creeping lateral roots. It is usually associated with sparsely vegetated areas, such as roadsides, abandoned or unmanaged land, gravel pits, and disturbed pastures and rangelands. It is found in most counties in Idaho. This invasive plant and other *Linaria* species are reportedly toxic to livestock.

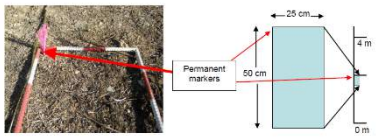
Toadflax Stem-Mining Weevil (MEJA):
Adult MEJA are small, somewhat elongated bluish

occurs within the stem. Adult feeding on stems and leaves has a limited impact on the plant. Larval mining impacts the plants by causing premature wilting of shoots and suppressing flower formation. MEJA overwinter as adults inside their pupation chamber. The effects of the weevil on the plant are reportedly enhanced under drought stress.

Monitoring:
SIMP is based upon a permanent 20 meter vegetation sampling transect randomly placed in a suitable (at least 1 acre) infestation of Dalmatian toadflax and timed counts of MEJA adults. Annual vegetation sampling will allow researchers to characterize the plant community and the abundance and vigor of Dalmatian toadflax. Visual counts of MEJA adults will provide researchers with an estimate of MEJA population levels.

Permanent Site Set-up:
To set up the vegetation monitoring transect, you will need: 1) a 25 x 50 cm Daubenmire frame made from PVC (preferred) or rebar, 2) a 20 m tape measure for the transect and plant height, 3) 10 permanent markers (road whiskers and 16 penny nails – see picture below), 4) a post (stake or piece of rebar) to monument the site (see pictures for examples of field equipment), and 5) 30-45 minutes at the site during the **week before Memorial Day**. To set up the transect, place the 20 m tape randomly within the infestation. Mark the beginning of the transect with a post. Place permanent markers every 2 m (for a total of 10 markers) beginning at the 2 m mark and ending with the 20 m mark on the tape measure. Place the Daubenmire frame parallel to the tape on the 50 cm side with the permanent marker in the upper left corner starting at 2 m (see pictures). **Refer to the data collection sheet for how to conduct monitoring.** Repeat the frame placement at 2 m intervals for a total of 10 measurements (one at each permanent marker).





Monitoring biological control agents is an essential component of a successful biological control program. Monitoring can be used to accurately document the impact of this weed management practice. This monitoring form has been endorsed by the Nez Perce Biocontrol Center, University of Idaho, Forest Health Protection, Bureau of Land Management, and Idaho State Department of Agriculture. The monitoring information from this form will be used to document vegetation cover, target weed density, and biological control agent abundance. When conducted annually monitoring data will document changes that occur over time.

Standardized Impact Monitoring Protocol (SIMP) Biological Control Monitoring Form

General Information:

Observer(s):	Date:	Landowner:
Permanent site? Y N	Site name:	Weed:
Biological control agent:	Insect Stage:	
Lat/Long: N ° '	W ° '	UTM Datum: UTM E:
		UTM Year : UTM N:

Weed Infestation:

Size in acres:	Picture taken?	Yes No	If Y, picture direction:

Vegetation cover (all in %, rows add to 100%):

Frame	Target weed%	Other weed%	Forb/shrub%	Perennial Grass%	Bare ground%	Litter%	Moss%	Tota
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Target weed size/density:

Frame	Number of Stems	Height of tallest stem (cm)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Biological control agent:

10 sweeps repeated 6 times (for AP, GA, LA, CYAC & OBER) **OR** a 3 minute timed count repeated 6 times (for MEJA, ACMA galls & URCA galls)

Count site	Insect (or gall) count
1	
2	
3	
4	
5	
6	

Notes:

SIMP as a post-release analysis tool

- Provides evidence of biocontrol impact
  - Long-term
  - Varying scales (local to regional)
- Evaluation of other environmental factors (e.g. plant community composition, precipitation, elevation) affecting weed
  - What other factors influence weed dynamics?
  - Is impact locally variable?
  - Are changes desirable?
- Enhance integrated weed management
  - Improve understanding of biocontrol whether or not it is working & adapt release strategies and control measures accordingly

In Summary…

- Where we were:
  - All years prior to 2006 – 1,300 releases, 1.8 mil agents
  - No coordinated effort
- Where we are now:
  - From 2006 to present – 5,225 releases, 10 mil agents
  - Forefront for new agents
  - Strategic plan (used as a template for other states)
  - Compare apples to apples via SIMP and assess biocontrol successes and failures at landscape levels
  - Cooperative Biological Control Task Force with several entities involved

Questions?

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