

# Biocontrol for invasive species



# Invasive species

- Invasive species are organisms that don't belong.

They might seem nice at first...

...but they can do a lot of damage!



# What is an invasive species?

- An invasive species is something that:
  - Is not native to the area
  - Is likely to cause economic, environmental, or human harm.



[Invader Zim clip](#)

# Why are invasive species so bad?

- Invasive species are expensive to control.
  - United States spends over 120 billion dollars per year trying to control invasive species.
  - It is estimated that worldwide cost of invasive species management is equal to 5% of the global economy.



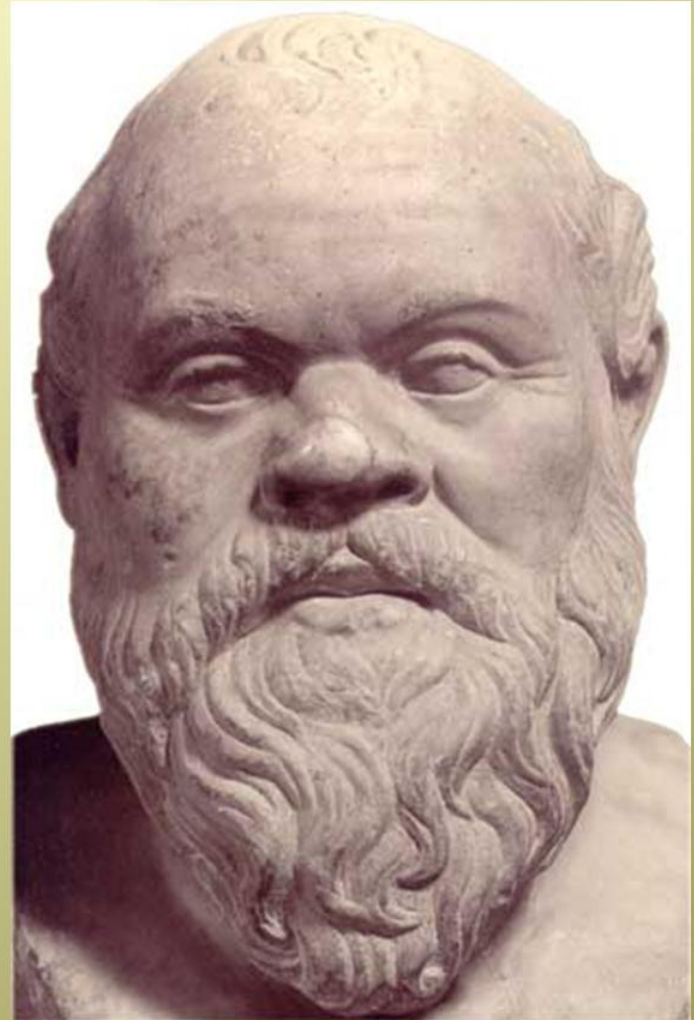
# Why are invasive species so bad?

- Invasive species decrease the biodiversity of an area.
- Biodiversity is a good thing!



# Why are invasive species so bad?

- Invasive species might harm people
  - Socrates and Hemlock
  - Abraham Lincoln's mother and the poisoned milk.



# Why are invasive species so bad?

- Invasive species might harm animals
  - Invasive species are the second leading cause of species extinction. (First leading cause is habitat destruction.)



# Why are invasive species so bad?

- Invasive plant species harm native plant species.





# Why are invasive species so hard to kill?

- Invasive species are not invasive in the areas where they are native to.



# Why are invasive species so hard to kill?

- It all comes back to the “evolutionary arms race.”



# Why are invasive species so hard to kill?

- When invasive species come to a new habitat, they come without all the organisms that are specially adapted to eat them.

Would superman be a “Super Man” if he still lived on Kryton?



# Why are invasive species so hard to kill?

- Most native plants have 30-50 different types of organisms that eat them. Many of those organisms are specially adapted to ONLY eat that plant.
- An invasive species might have 5-10 organisms that eat it, and none of those ONLY eat it.



# Why are invasive species so hard to kill?

- Native plants can't compete against invasive species.



# How do we control invasive weeds?

- Hand pulling



# How do we control invasive weeds?

- Graze animals on them



# How do we control invasive weeds?

- Spray them with chemical





# How do we control invasive weeds?

- Use Bugs!
  - Biocontrol



# Biocontrol

- We find bugs from the area where the plant originally came from that feed ONLY on that plant.
- After A LOT of testing, the bugs are approved to be released on the plants that they specialize on.



[Video trailer](#)

# The Curses and the Cures

- The Curse: **Dyers Woad**
  - Introduced from Europe to use as a dye.
  - Yellow flowers produce black seeds.
  - Crowd out surrounding plants



# Dyers Woad



Nathan Belliston



Nathan Belliston



Nathan Belliston

# The cure: Rust



# The Curses and the Cures

- The curse: **Salt Cedar**
  - Drops salt all around it on the ground to kill other plants nearby.
  - Grows along riverbanks and outcompetes native plants



# Salt Cedar



# The cure: Saltcedar leaf beetle





# Saltcedar leaf beetle “brown outs”



# The Curses and the Cures

- The curse:

## **Dalmation Toadflax**

- Thick waxy leaves make them hard to spray.
- It might look pretty, but is extremely bad for the environment

(Like Rebecca Black)



# Dalmatian Toadflax



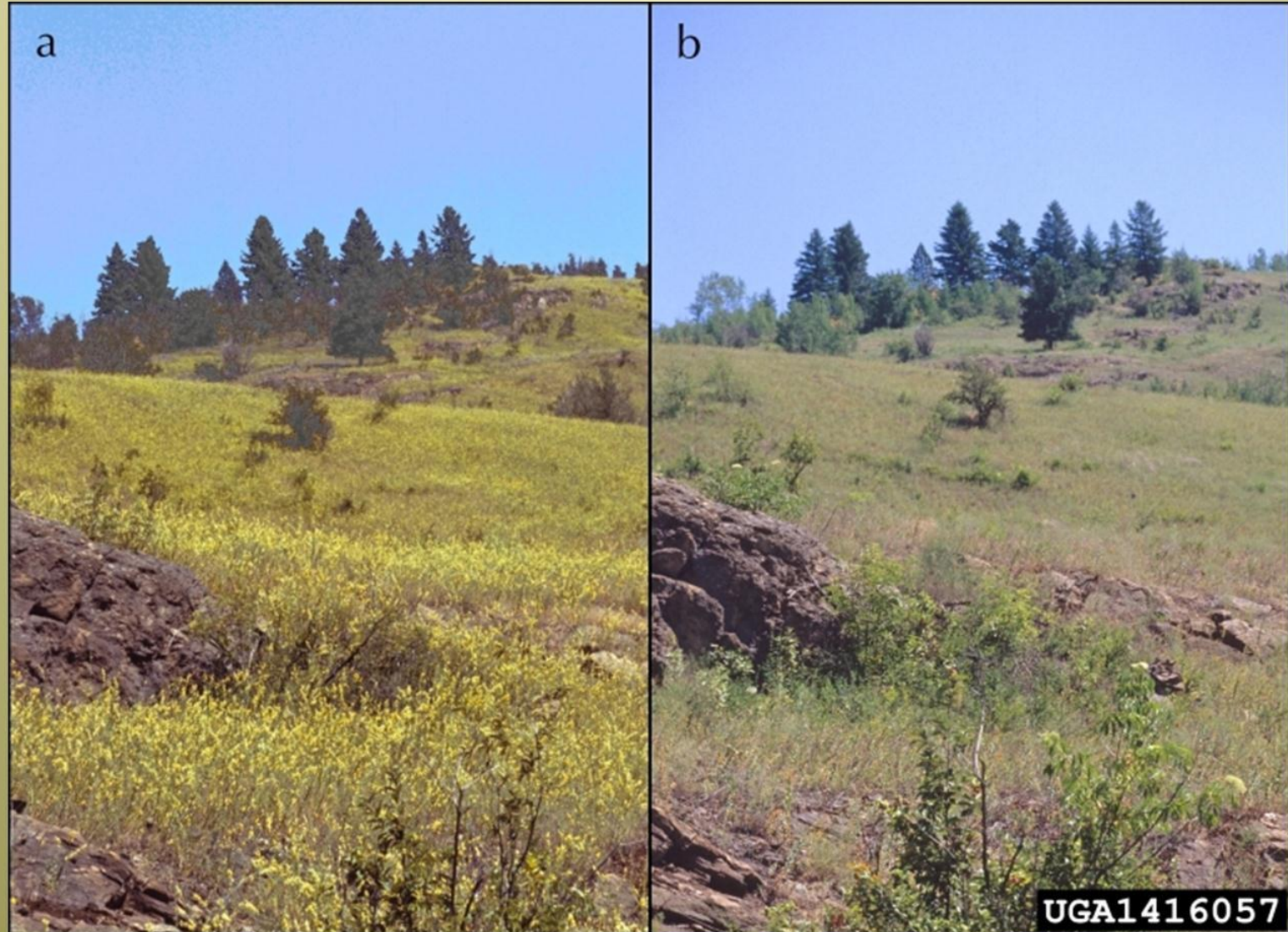
# The cure: Toadflax stem boring weevil



*Mecinus  
janthinus*



# Toadflax: Before and after



# The Curses and the Cures

- The curse: **Yellow Starthistle**
  - Very narrow leaves make it hard to spray.
  - Causes chewing disease in animals that graze near them



# Yellow Starthistle



# The cure: Yellow starthistle hairy weevil





# The Curses and the Cures

- The curse: **Spotted Knapweed**
  - Puts out poison from its roots to kill all surrounding plants
  - Pushes out local deer and elk populations.



# Spotted knapweed



# The cure: Knapweed root weevil, Lesser knapweed flower weevil, and banded gall fly



# Knapweed biocontrol: Before and after



# The Curses and the Cures

- The curse: **Leafy Spurge**
  - Sap can cause a rash if exposed to skin
  - Contains one of the largest single cells in the world. (Used for sap storage.)
  - Can shoot seeds up to 15 feet
  - Roots may be 20 feet long and 14 feet deep.
  - Hard to spray because they are able to redirect poison to their sap.



# Leafy spurge



# The cure: Leafy spurge flea beetles and Red-headed leafy spurge stem borer



*Aphthona czwalinae*  
(Black Flea Beetle)



*Aphthona nigriscutis*  
(Black Dot Flea Beetle)



*Aphthona flava*  
(Copper Flea Beetle)



*Oberea erythrocephala*  
(Red-headed stem borer)

[Biocontrol bugs for sale](#)

# Leafy spurge biocontrol: Before and after





# Steps for biocontrol

- Step 1: Find a collection site with biocontrol on it (insectory), and a release site without biocontrol on it.



# Leafy Spurge Insectory



Image State of Utah  
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

© 2011 Google  
elev 1387 m

2008 Google

2006

Eye alt 1.84 km

41°56'23.37" N 111°48'45.53" W

# Leafy Spurge insectory



Image State of Utah  
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

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elev 1391 m

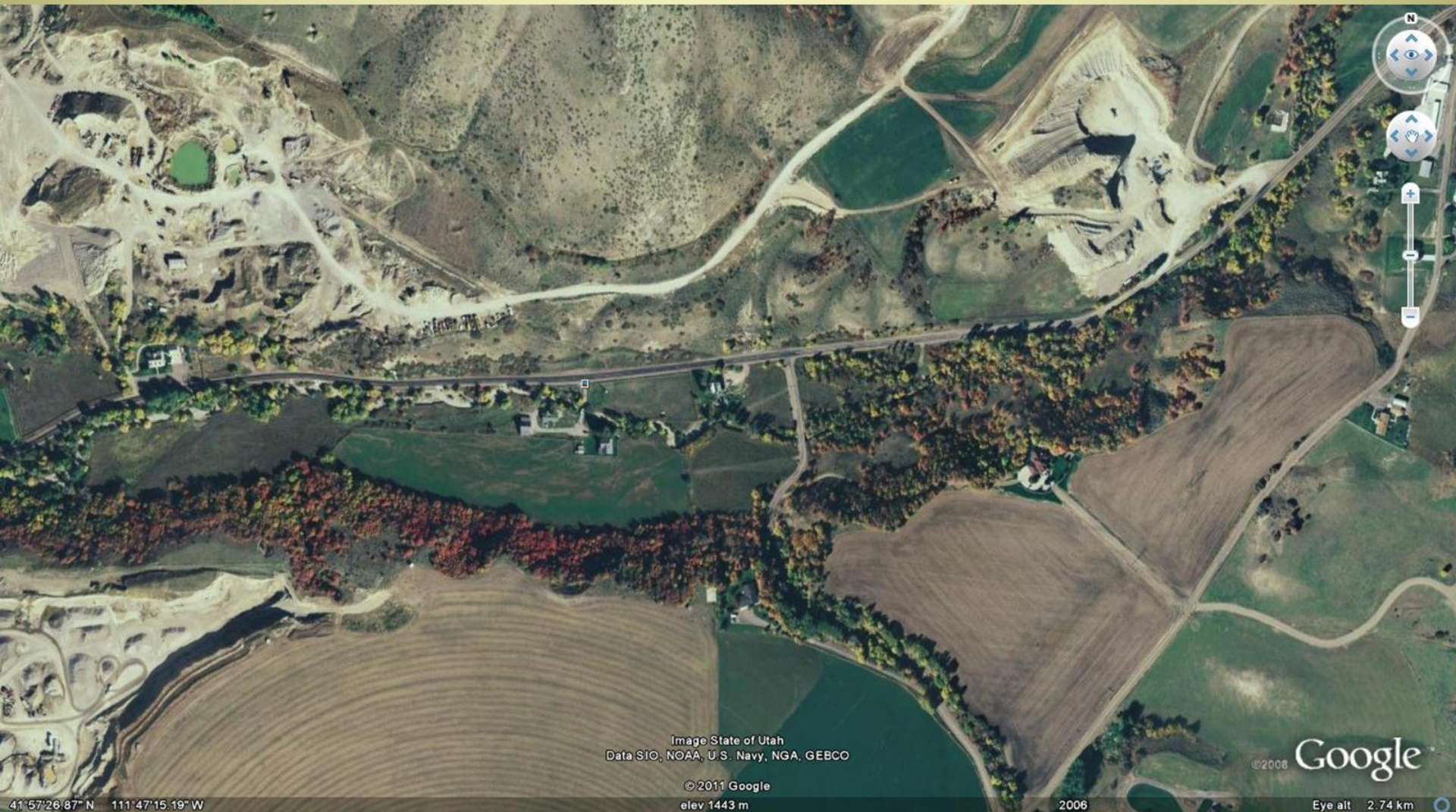
© 2008 Google

41°56'27.46" N 111°48'39.52" W

2006

Eye alt 1.68 km

# Leafy Spurge Release Site



# Leafy Spurge Release Site



Image State of Utah  
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

© 2011 Google

elev 1462 m

©2008 Google

2006

Eye alt 1.64 km

41°57'23.48" N 111°47'09.16" W

# Steps for biocontrol

- Step 2: Collect the bugs



# Steps for biocontrol

- Step 3: Separate the bugs out from everything else. (Using the aspirators and the bug accelerator)



# Steps for biocontrol

- Step 4: Release bugs on site and fill out a release form.





# Steps for biocontrol

- Step 5: Monitor site for years to come



# Precautions

- Milky sap
- Ants
- Steep hillside
- Bees

