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Agriculture and Natural Resources

Weed Control in Non-Crop and Natural Areas

UCCE Farm Advisor: Tom Getts

Lassen, Modoc, Sierra, and Plumas Counties

Outline

- Definitions
- IPM
  - ID
  - EDRR
  - Control
    - Physical
    - Chemical
    - Biocontrol
    - Cultural
  - Research Highlights

Defining Weeds

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Defining Weeds

- Weed - A plant out of place

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Defining Weeds

- Weed - A plant out of place
- Invasive Weed - A plant that can spread outside of it's historic range causing environmental and economic impacts (CAL IPC)

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Defining Weeds

- Weed - A plant out of place
- Invasive Weed - A plant that can spread outside of it's historic range causing environmental and economic impacts (CAL IPC)
- Noxious Weed - A plant deemed to cause environmental and economic harm to the state of California. Legally required to be controlled! A, B, and C list species (State)


UC IPM

IPM - First Step: Identification

Need to identify the pest!

- Why?
- Understand biology
  - Lifecycle
  - Growth patterns
  - Suitable habitat
  - Weakness of pest!!

Image courtesy of: www.wildernessaware.org

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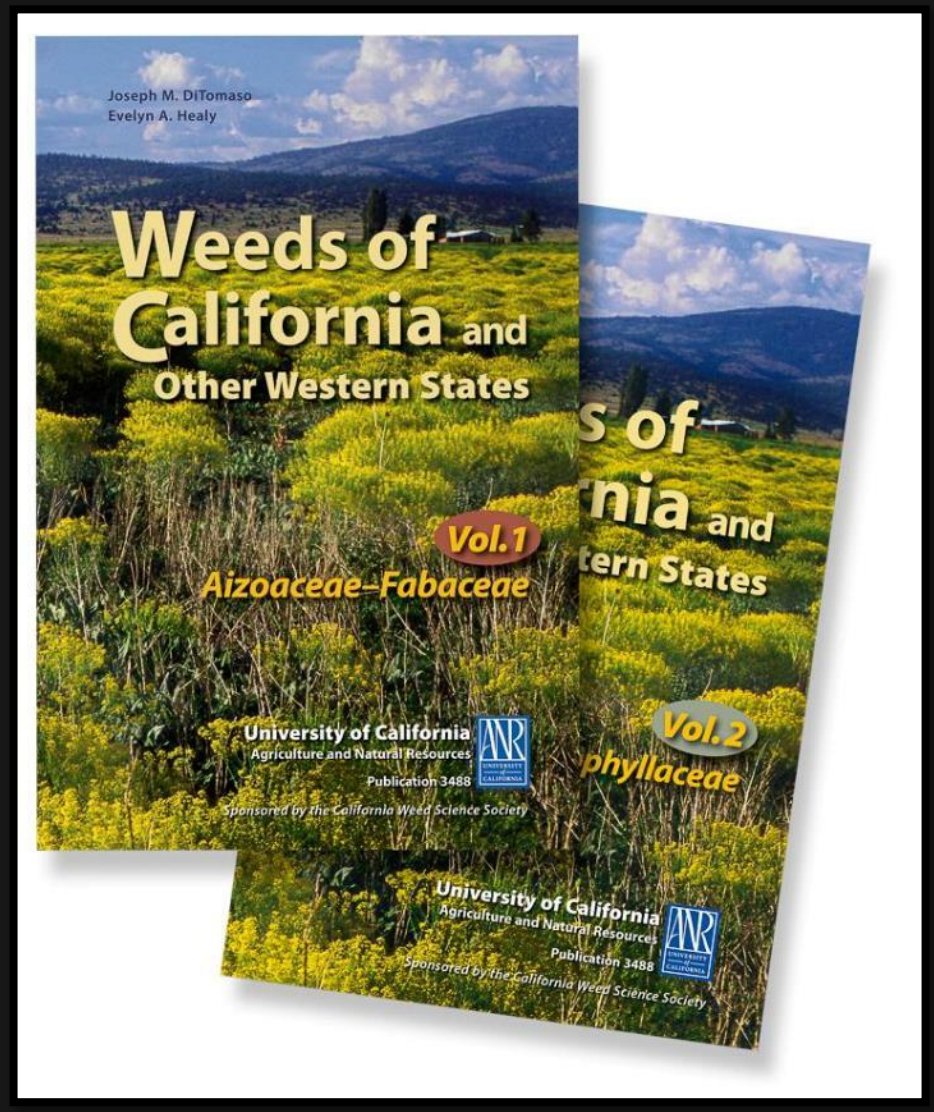
ID Tools

- Books
- People
- Websites
- Apps



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HOME

ON THIS SITE

- What is IPM?
- Home & landscape pests
- Agricultural pests
- Natural environment pests
- Exotic & invasive pests
- Weed gallery
- Natural enemies gallery
- Weather, models & degree-days
- Pesticide information
- Research
- Publications
- Events & workshops
- Online training
- Links
- About us
- Contact us

MAKE A GIFT

Weed photo gallery

The UC IPM Weed Photo Gallery includes many, but not all, weed species commonly found in California farms and landscapes.

Choose a category below or skip to a **LIST OF ALL WEEDS**.

Identify your weeds

Broadleaf
Leaves are wide, veins branch out in different directions.
Identification | **Tutorial** | **Broadleaf list**

Grass
Leaves are narrow, arranged in sets of two; stems are rounded or flattened.
Identification | **Tutorial** | **Grass list**

Sedge
Leaves are narrow, arranged in sets of three; stems are triangular in cross section.
Identification | **Tutorial** | **Sedge list**

SUPPORT CAL-IPC

CAL IPC
CALIFORNIA INVASIVE PLANT COUNCIL

Protecting California's environment and economy from invasive plants

Home | About | Plants | Resources | Solutions | Join, Renew or Donate

Cal-IPC works to stop the spread of invasive plants across California...

Connect with colleagues!
Regular rates through Oct. 21

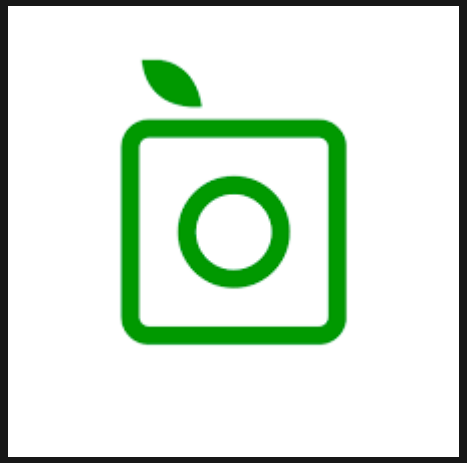
Cal-IPC Project

Invasive Spartina Eradication

Cal-IPC Project

SF Bay Sea Lavender Control

Apps



Biology and Lifecycle
Prevent Reproduction!

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Annual Weeds

Winter annuals

- Germinate in fall

Summer annuals

- Germinate early spring to fall

Image courtesy of: http://mint.ippc.orst.edu/puncturevine.htm

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Annuals

Challenges

- Long germination window
- Multiple control efforts
- Lots of seed quickly

Advantages

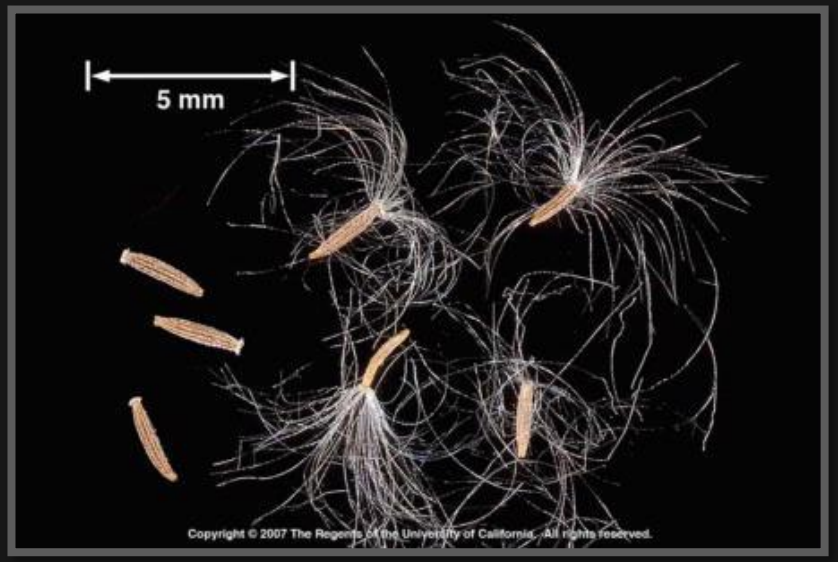
- Can prevent seed
- Physical methods often effective

Image courtesy of: http://www.co.stevens.wa.us/weedboard/other%20weeds/htm%20pages/shepherd's%20purse.htm

Image courtesy of: http://pnwhandbooks.org/weed/punctureVine-seeds-and-seedlings

Seed production

- Italian Thistle - 20,000
- Russian Thistle - over 200,000
- Yellow Star Thistle - 100,0000
- Cheatgrass - 25-20,000



Soil Seed life

- Cheatgrass - 2-4 years
- Yellow Star Thistle- 3 years (Or more)
- Rush Skeltonweed - around 2 years
- Pigweed - 20 years
- Lambsquarters - over 20 years
- Medusahead - 2 years
- Goatheads - 3-6 years
- Common Mullen- Decades
- Scotch Thistle - 7-39 years

Biennial Weeds

Year One

- Germinate
- Grow
- Often basal rosette

Biennial Weeds

Year One
- Germinate
- Grow
- Often basal rosette

Year Two
- Bolt (typically)
- Flower
- Set seed
- Die

Annuals and Biennials
All About Preventing Seeds!

Perennial Weeds

Year One

- Best time to control
- Seedling=annual

After

- Reproductive tissue
  - Roots
  - Tubers
  - Nutlets
- Much more difficult to control!

Photo courtesy of : www.forestryImages.org

Photo Courtesy of : www.Techline News.com

Seed and Root Distribution

- Wind
- Water
- Animals
- Equipment
- Cultivation

Phtot Courtesty of : https://www.turbodieselregister.com/threads/anyone-with-goat-heads.264934/

Poll Question 1

- How long can weed seeds last in the seedbank?

A-1-2 years

B- 5-8 years

C- multiple decades

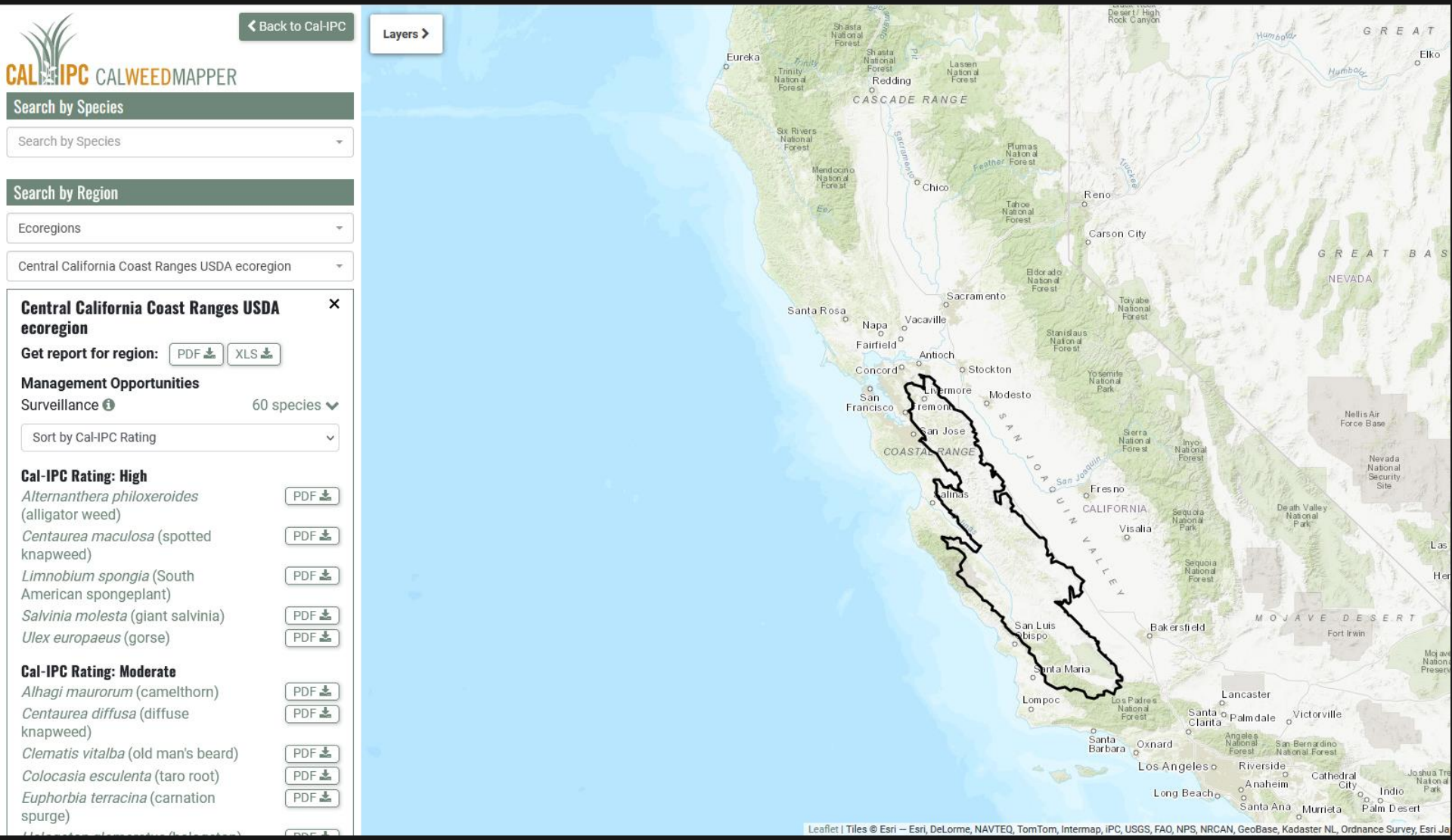
D-All of the above, but it depends on the species of weed, and the environmental conditions of the seedbank.

Active Management In Natural Areas

Natural Areas/Wildlands

Knowing what to be on the lookout for!

- Cal Weed Mapper!
- And Cal Flora


Back to Cal-IPC
CAL-IPC CALWEEDMAPPER
Search by Species
Search by Species
Search by Region
Ecoregions
Central California Coast Ranges USDA ecoregion
Central California Coast Ranges USDA ecoregion
Get report for region: PDF XLS
Management Opportunities
Surveillance 60 species
Sort by Cal-IPC Rating
Cal-IPC Rating: High
Alternanthera philoxeroides (alligator weed) PDF
Centaurea maculosa (spotted knapweed) PDF
Limnobium spongia (South American spongeplant) PDF
Salvinia molesta (giant salvinia) PDF
Ulex europaeus (gorse) PDF
Cal-IPC Rating: Moderate
Alhagi maurorum (camelthorn) PDF
Centaurea diffusa (diffuse knapweed) PDF
Clematis vitalba (old man's beard) PDF
Colocasia esculenta (taro root) PDF
Euphorbia terracina (carnation spurge) PDF
Layers
Eureka
Redding
CASCADE RANGE
Chico
Reno
Carson City
NEVADA
Sacramento
Santa Rosa
Napa
Vacaville
Fairfield
Antioch
Concord
Stockton
Modesto
San Francisco
San Jose
COASTAL RANGE
Salinas
Fresno
CALIFORNIA
Visalia
SAN JOAQUIN VALLEY
Bakersfield
San Luis Obispo
Santa Maria
Lompoc
Lancaster
Palmdale
Victorville
Santa Barbara
Oxnard
Los Angeles
Riverside
Anaheim
Long Beach
Santa Ana
Murrieta
Palm Desert
MOJAVE DESERT
Leaflet | Tiles © Esri — Esri, DeLorme, NAVTEQ, TomTom, Intermap, iPC, USGS, FAO, NPS, NRCAN, GeoBase, Kadaster NL, Ordnance Survey, Esri Ja

CAL-IPC CALWEEDMAPPER

INVASIVE SPECIES MANAGEMENT OPPORTUNITIES IN
Central California Coast Ranges USDA ecoregion

This report summarizes invasive plant management opportunities in Central California Coast Ranges USDA ecoregion. Opportunities are determined from maps of each species' current distribution and suitable range. Species are listed by three types of management opportunity:

- **Surveillance** — surveying to detect new infestations
- **Eradication** — complete removal of infestations
- **Containment** — limiting further spread of infestations

Below is a sample of opportunities in Central California Coast Ranges USDA ecoregion. This information should be combined with local knowledge to set local priorities (see "Using the Report" at the end of this document.) Click on a plant's name below to view a map of that species.

Opportunities:

These are some opportunities in Central California Coast Ranges USDA ecoregion. Tables on proceeding pages of this report contain a complete list of invasive plant management opportunities.

Surveillance:

Alternanthera philoxeroides
alligator weed

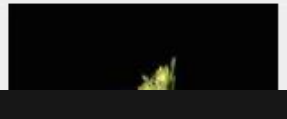
Centaurea stoebe ssp. micranthos (= Centaurea maculosa)
spotted knapweed

Limnobium spongia
South American spongeplant

Salvinia molesta
giant salvinia

Ulex europaeus
gorse

Eradication:



Getting Started

Other Bookmarks

Back to Cal-IPC

CAL-IPC CALWEEDMAPPER

Search by Species

Canada thistle

Cirsium arvense

Canada thistle

Get report for species: PDF

Photo courtesy of Joe DiTomaso

Cal-IPC Rating: **Moderate**
CDFA Rating: **B**

Species description

Cirsium arvense (Canada thistle) is a perennial (family *Asteraceae*) found scattered throughout California, except in the Sonoran and Mojave Deserts and the southern Sierra Nevada.

Show More

Additional information: See Cal-IPC's Plant Profile or Calflora's Taxon Report.

Search by Region

Ecoregions

Central California Coast Ranges USDA ecoregion

Central California Coast Ranges USDA ecoregion

Get report for region: PDF XLS

Layers

TOPO GRAY SATELLITE

95°F

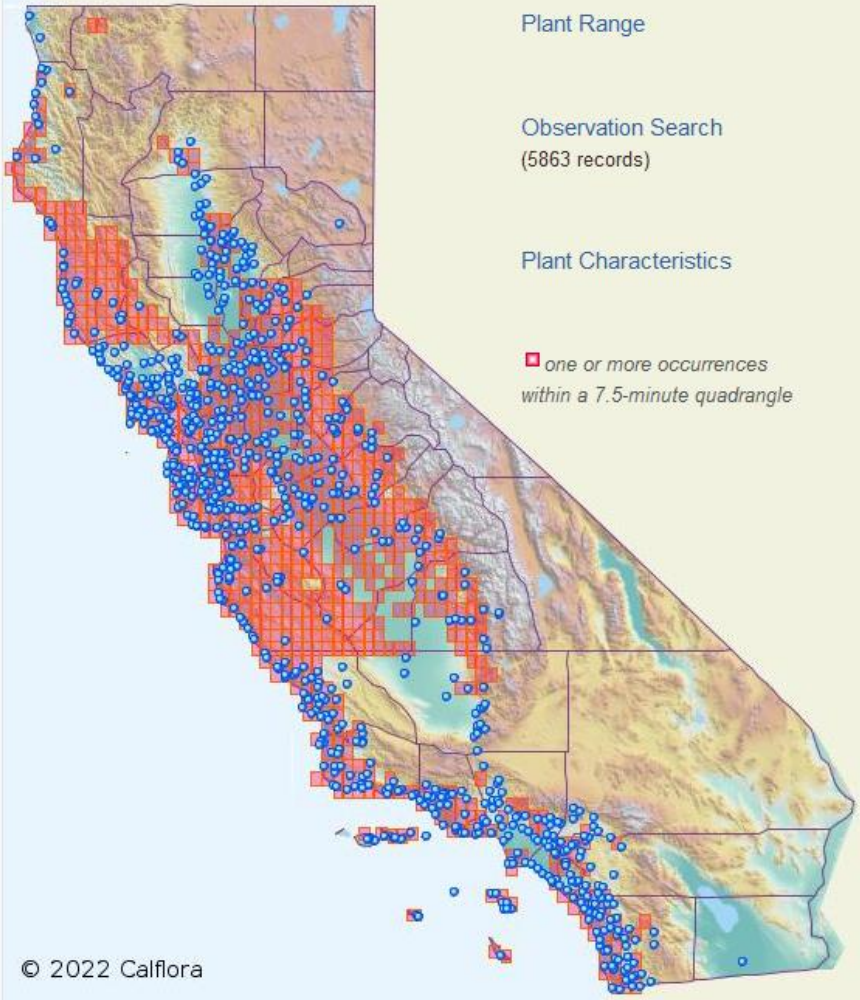
12:33 PM

Silybum marianum (L.) Gaertn.

Blessed milkthistle, Milk thistle

Silybum marianum is an **annual or perennial herb** that is **not native** to California.

Cal-IPC rating: Limited



Plant Range

Observation Search
(5863 records)

Plant Characteristics

one or more occurrences within a 7.5-minute quadrangle

Bloom Period

Photos from Calflora / CalPhotos

Genus: Silybum
Family: Asteraceae
Category: angiosperm
PLANTS group: Dicot
Jepson eFlora section: eudicot

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© 2006 Dr. Amadej Trnkoczy

Name Status:
Accepted by JEF + PLANTS

Alternate Names:

PLANTS Carduus marianus

Habitat: disturbed

Communities: weed, characteristic of disturbed places

Silybum marianum (L.) Gaertn.

Blessed milkthistle, Milk thistle

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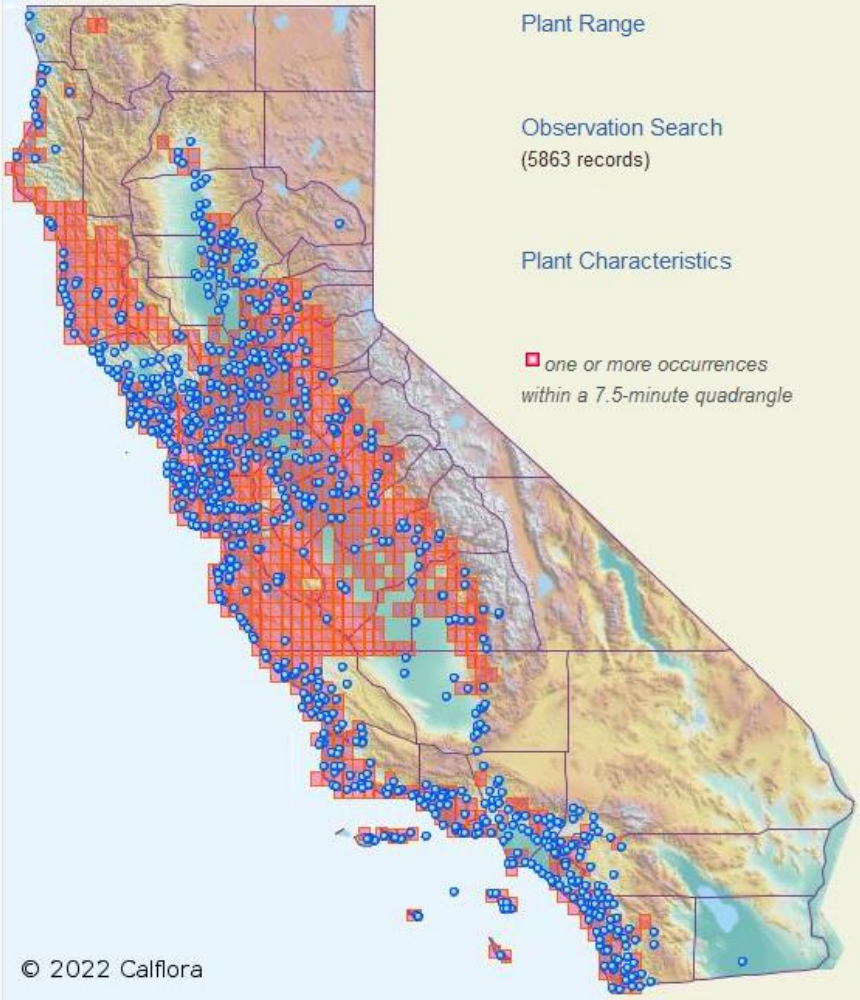

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Photos from Calflora / CalPhotos

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Alternate Names:

PLANTS Carduus marianus

Habitat: disturbed

Communities: weed, characteristic of disturbed places

Photos

Contribute

er of matches: 130

4

Click on the thumbnail to see an enlargement

Silybum marianum
Milk Thistle
ID: 0177 3303 3352 0090 [detail]
© 2001 CDFA

Silybum marianum
Blessed Milkthistle
ID: 0000 0000 1203 0527 [detail]
© 2003 Keir Morse

Silybum marianum
Milk Thistle
ID: 0175 3301 3808 0010 [detail]
© CDFA

Silybum marianum
Milk Thistle
ID: 0177 3303 3352 0091 [detail]
© 2001 CDFA

Silybum marianum
Milk Thistle
ID: 6249 3022 3538 0034 [detail]
© 1995 Saint Mary's College of California

Silybum marianum
Blessed Milkthistle
ID: 0000 0000 0703 0777 [detail]
© 2003 George W. Hartwell

Silybum marianum
Blessed Milkthistle
ID: 0000 0000 0703 0776 [detail]
© 2003 George W. Hartwell

Silybum marianum
Milk Thistle
ID: 6249 3022 3538 0035 [detail]
© 1995 Saint Mary's College of California

Silybum marianum
Blessed Milkthistle
ID: 8120 3181 4903 0130 [detail]

Silybum marianum
Blessed Milkthistle
ID: 8120 3181 4903 0131 [detail]

Silybum marianum
Blessed Milkthistle
ID: 8120 3181 4567 0046 [detail]

Silybum marianum
Milk Thistle
ID: 0177 3303 3352 0088 [detail]

Silybum marianum (L.) Gaertn.

Blessed milkthistle, Milk thistle

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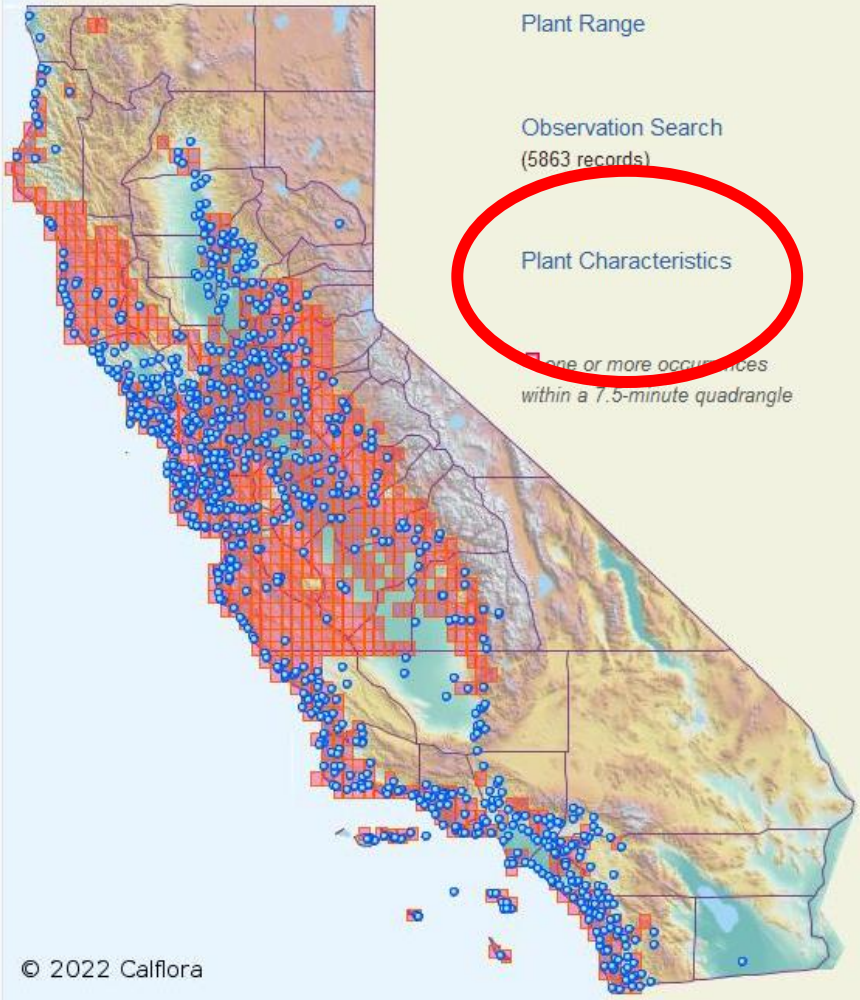
Cal-IPC rating: Limited



Bloom Period

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PLANTS Carduus marianus

Habitat: disturbed

Communities: weed, characteristic of disturbed places

Calflora Plant Characteristics and Associations HELP

Silybum marianum

Milk thistle

not native / invasive

Annual, Perennial herb

ASTERACEAE

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© 2006 Dr. Amadej Trnkocz

TOLERANCES	Low water tolerant	
Elevation	0 to 6495 ft	0 to 1980 m
Annual Precipitation:	13 to 101 inches	33 to 257 cm
Wet Season	2 to 8 months	
Temperature Range	18 to 59 ° F	-8 to 15 ° C
December Low	28 ° F	-2 ° C
July High	98 ° F	37 ° C
Accumulated Temperature	78 to 274 ° F	26 to 134 ° C
Growing Season	3 to 12 months	
Hardiness Zones	8b to 11a (15 to 45 ° F)	

SOIL:

pH	5 to 8.5	
Max Salinity	59 mmhos / cm (strongly saline)	
Min Depth	2 inches	5 cm
Texture(s):	fine + medium + coarse	
Max CaCO3	14 % (medium)	
Min AWS	0.1 cm	

Location count: 3992 (climate), 3432 (soil)

Bloom Period:

April - July

Plant Range Location Suitability

ASSOCIATED ORGANISMS

beneficials:

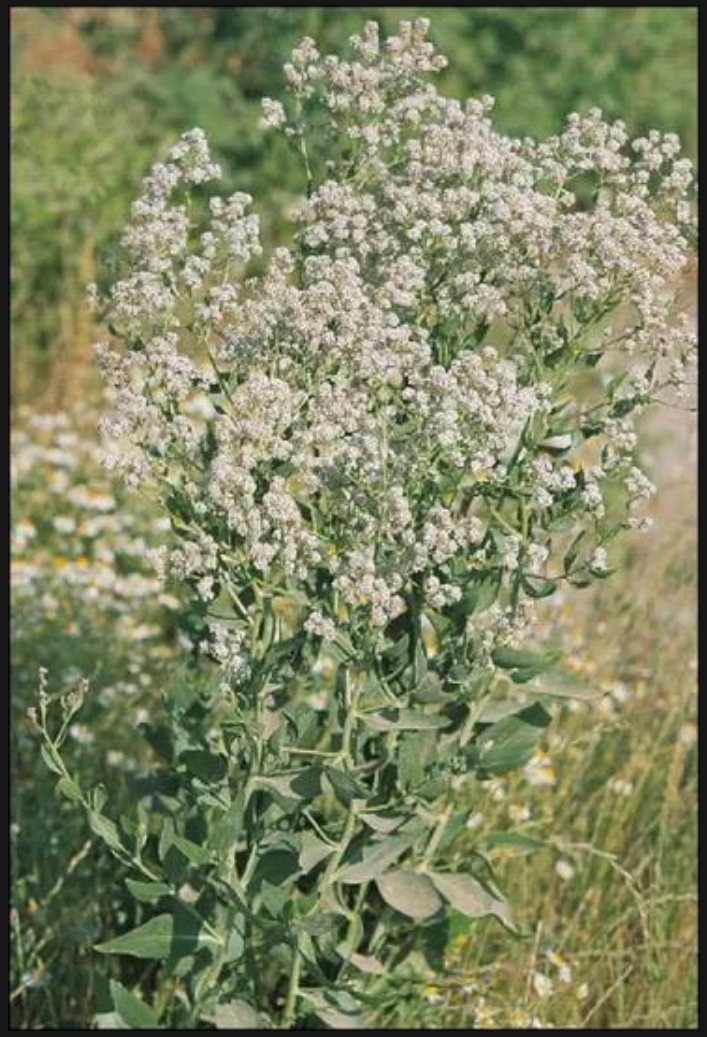
butterflies

* Mylitta Crescent	*Phyciodes mylitta*	(host)	AS
* Painted Lady	*Vanessa cardui*	(host)	AS

What Weeds?

- Species to be on the look out for
- Species in adjacent areas
- New invaders!
- EDRR!
  - Early Detection Rapid Response!

Early Detection Rapid Response



https://crookcountyweeds.com/perennial-pepperweed

Early Detection Rapid Response

Cultural Control

- Limit Seed Distribution
  - Certified seed
  - Clean equipment
  - Boot cleaning stations
- Prevent Seed Production!
- Boot cleaning stations

Photo Courtesy of: http://ccia.ucdavis.edu/Certification_Programs/Seed_Certification/Seed_Lot_Blend_Information/

Avoid Disturbance/Bare ground

Competitive Environment!

Poll Question 2

- How are noxious weeds defined?

A -A plant out of place

B -Plants that grow on the roadsides

C -Plants with a legally designated status to be controlled, deemed to cause undue negative impacts to California agriculture or the environment

D -Plants deemed by the California Invasive Plant Council to be “bad actors”

Active Control!

Methods for Managing Weeds in Wildlands

Weed Control User Tool (WeedCUT)

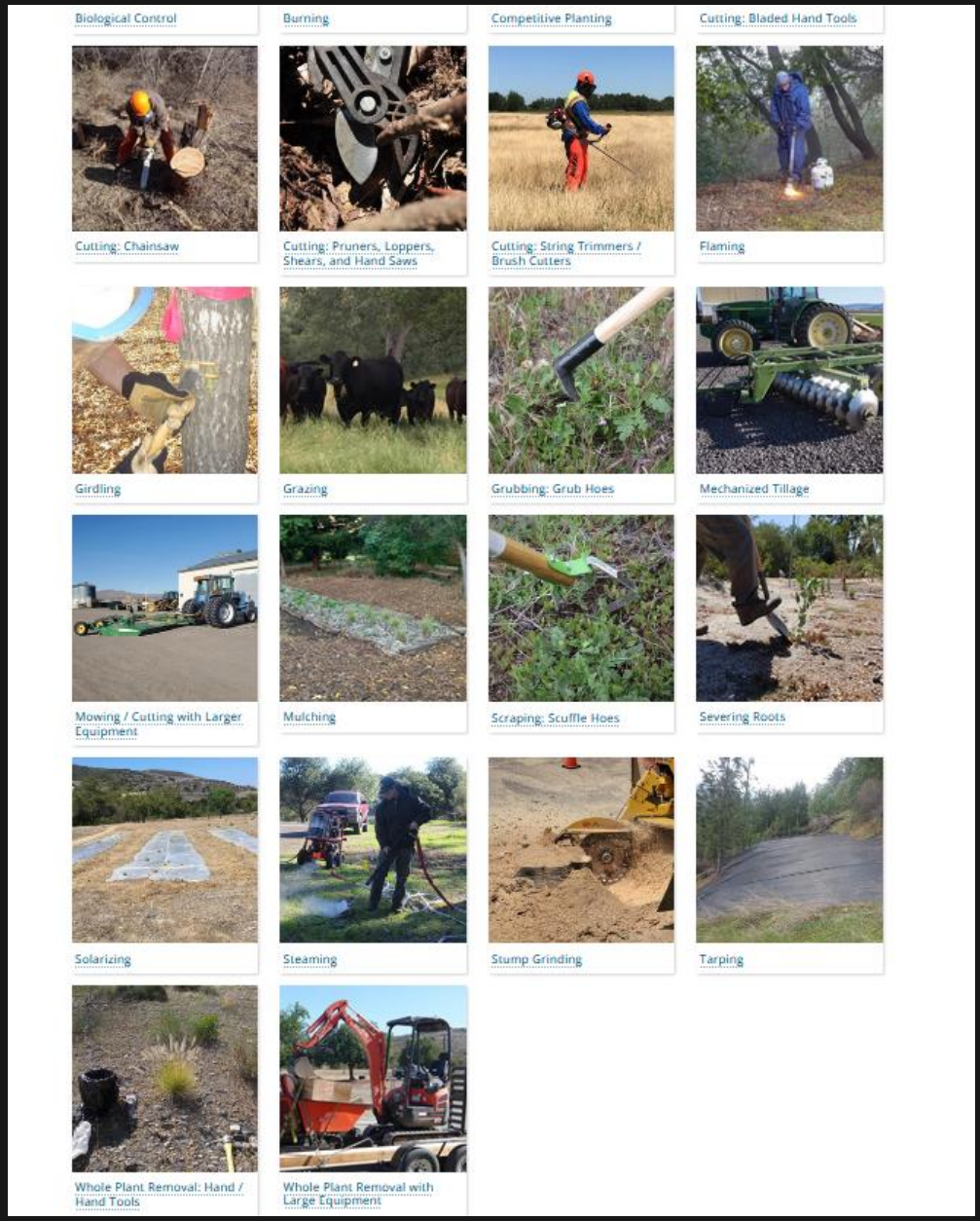
This decision support tool provides land managers with guidance on a range of methods for managing invasive plants in wildlands using non-chemical approaches exclusively, for situations when use of herbicides is restricted or not desired. The tool is intended to be developed further to include management practices including herbicides in the future. Explore all management practices below or enter the characteristics of your weed and your site to filter for the most effective practices. A manual containing all listed management techniques is available for free download. Biological control is currently not an outcome for the filtering tool but can be accessed directly through the thumbnail grid below. An Executive Summary provides summary information about using non-chemical methods at a programmatic level.

+ Filter by plant and site characteristics

+ View management practices by select plant species

Physical

- Burning
- Cutting
  - Hand Tools
  - Chainsaws
  - Brush Cutters
  - Loppers
  - Hoes
  - Mowing
  - Etc.
- Tarping
- Solarizing
- Whole plant removal



Hand Cutting/Weed Whacking/Mowing

- Target bud/early flower stage
- Suppression
- Small Patches
- Multiple entries per season
  - Based on moisture
- Limitations
  - Labor
  - Selectivity (Mowers)
  - Terrain
- Great tool use in combination with other methods

Physical Removal

- Hand Pulling
  - Good if you can get root
  - Small patches
- Large Equipment
- Cultivation
  - Good for annual where you will replant

Tarping/Covering

- Nonselective
- Good for small patches
- Impact to perennial species
- Re-seeding maybe necessary

Biological

- Grazing
  - Right time
  - Right livestock
  - Right weeds
- Often suppression
- University of Idaho Grazing Handbook

Photo Courtesy of:
http://livingsystemslandmanagement.com/images/IMG_1101.JPG

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Classic Bio-Control

- Insects
- Pathogens
  - Selective
  - Passive control

Photo Courtesy of: Natureswonders.org

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Russian Knapweed Gall Wasp

- *Aulacidea acroptilonica*
- CDFA Biocontrol
- Mike Pitcarin
- Viola Popescu
- Established Populations at Multiple locations in NE California

Puccinia punctiformis Canada Thistle Rust

Presentation from: John Kaltenbach Colorado

https://upperarkcwma.weebly.com/uploads/2/8/4/8/28489687/canada_thistle_rust_fungus_upper_ark_nov_2017.pdf

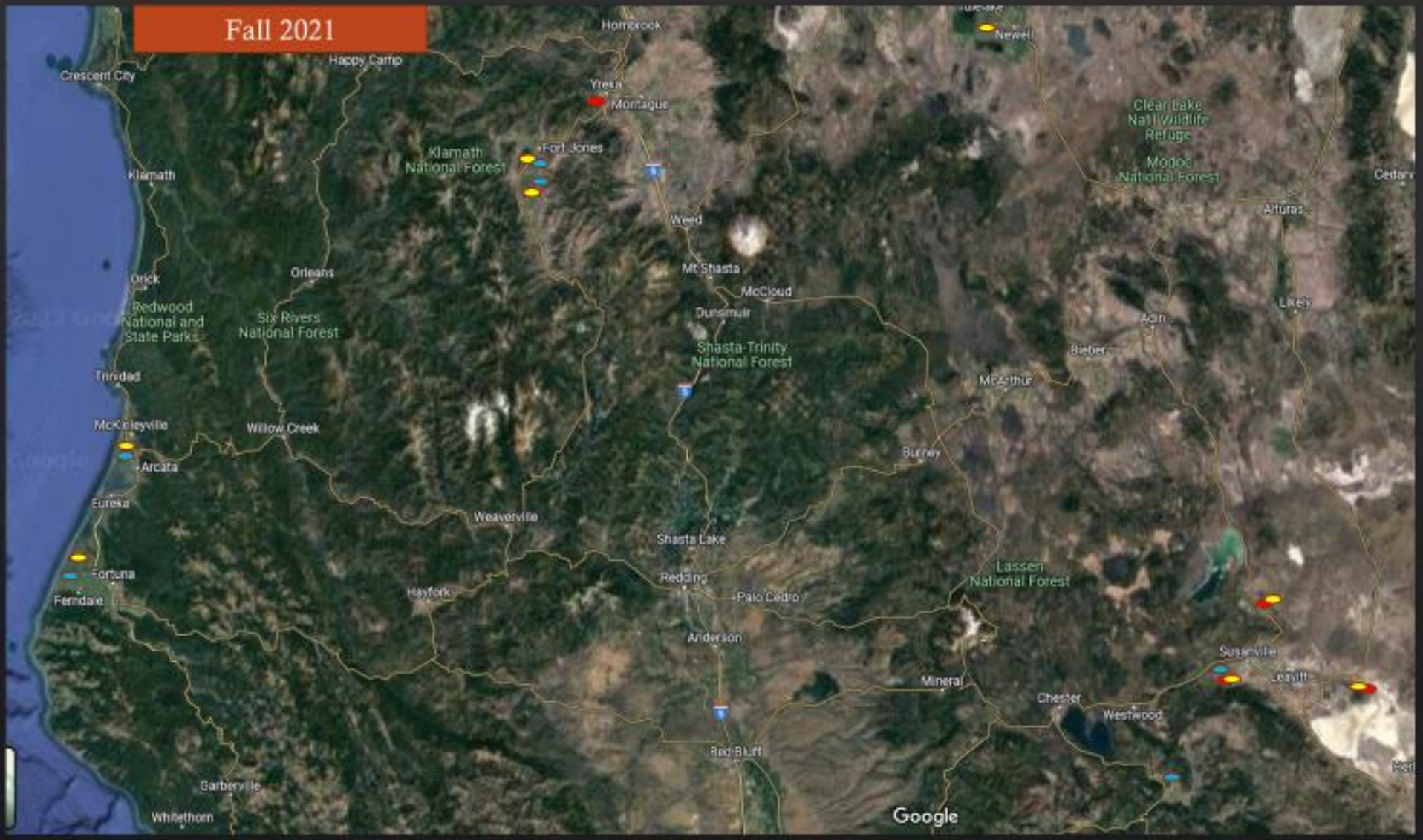
Presentation from: John Kaltenbach Colorado

McFarland - ↓100%

2014

2017

https://upperarkcwma.weebly.com/uploads/2/8/4/8/28489687/canada_thistle_rust_fungus_upper_ark_nov_2017.pdf


Fall 2021
Crescent City
Happy Camp
Klamath
Klamath National Forest
Fort Jones
Montague
Yreka
Hornbrook
Weed
Mt Shasta
McCloud
Dunsmuir
Shasta-Trinity National Forest
Orick
Redwood National and State Parks
Orleans
Six Rivers National Forest
Trinidad
McKinleyville
Willow Creek
Arcata
Eureka
Fortuna
Ferndale
Hayfork
Weaverville
Shasta Lake
Redding
Palo Cedro
Anderson
Red Bluff
Garberville
Whitethorn
Burney
Bieber
Adin
Alturas
Likely
Modoc National Forest
Clear Lake Natl Wildlife Refuge
Newell
Lassen National Forest
Mineral
Chester
Westwood
Susanville
Google

Poll Question 3

What are physical control methods for removing the above ground biomass of invasive weeds in natural areas to suppress vegetation?

(Choose all correct answers)

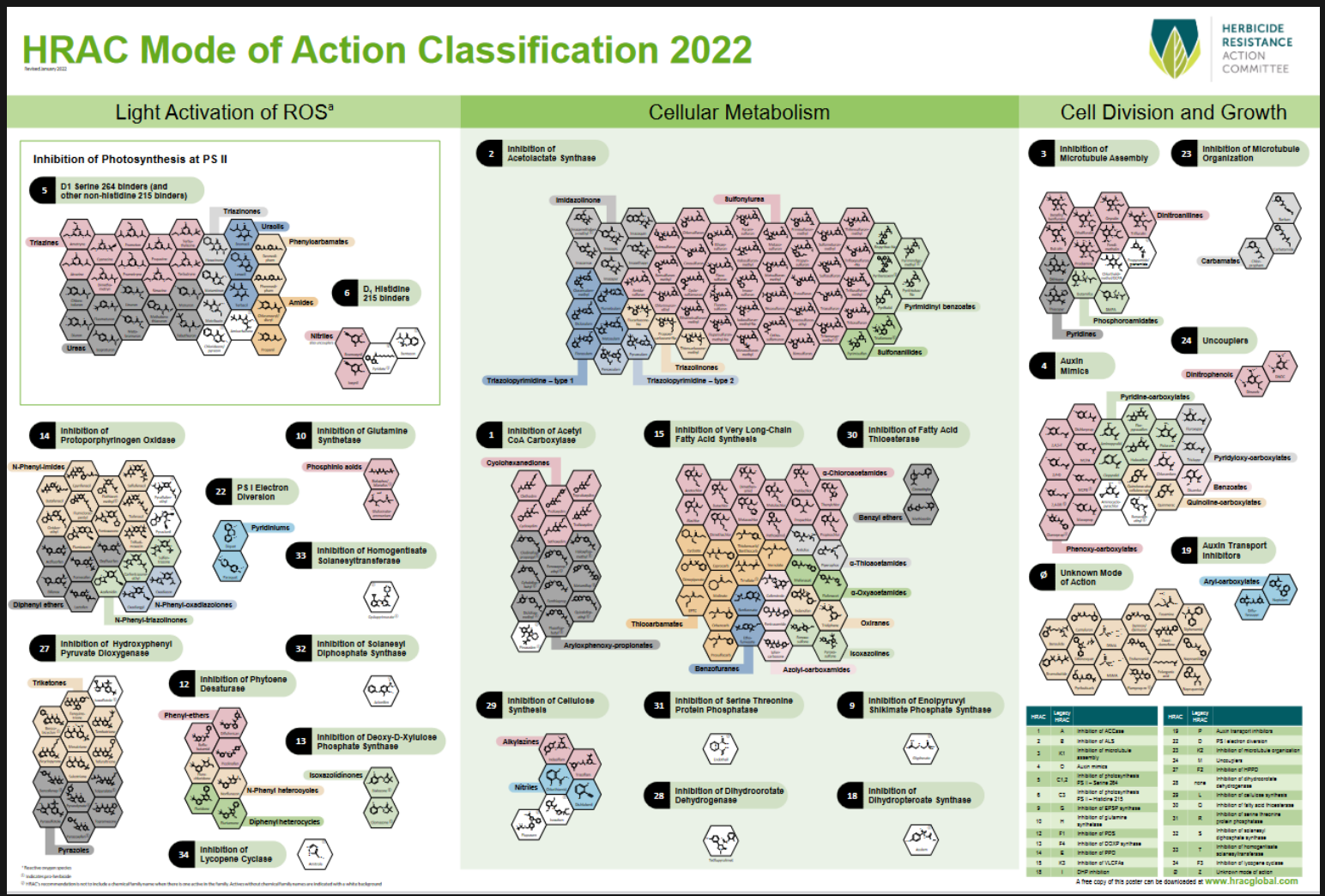
A- Mowing

B- Weed whacking

C- Hand pulling

D- Herbicides

Chemical Control



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Herbicides

- Timing (Weed and Desirable Plants)
- Plant Growth Stage
  - Annuals- when young and small
  - Perennials
    - Bud Stage
    - Or specific species in fall
  - Pre-emergence
    - Prior to rain for incorporation

Herbicides

- Contact
  - Oils, vinegar, paraquat
  - Seedlings
  - Top growth
- Systemic
  - Glyphosate, aminopyralid, 2,4-D etc.
  - Larger Weeds
  - Perennial Weeds
  - Roots!

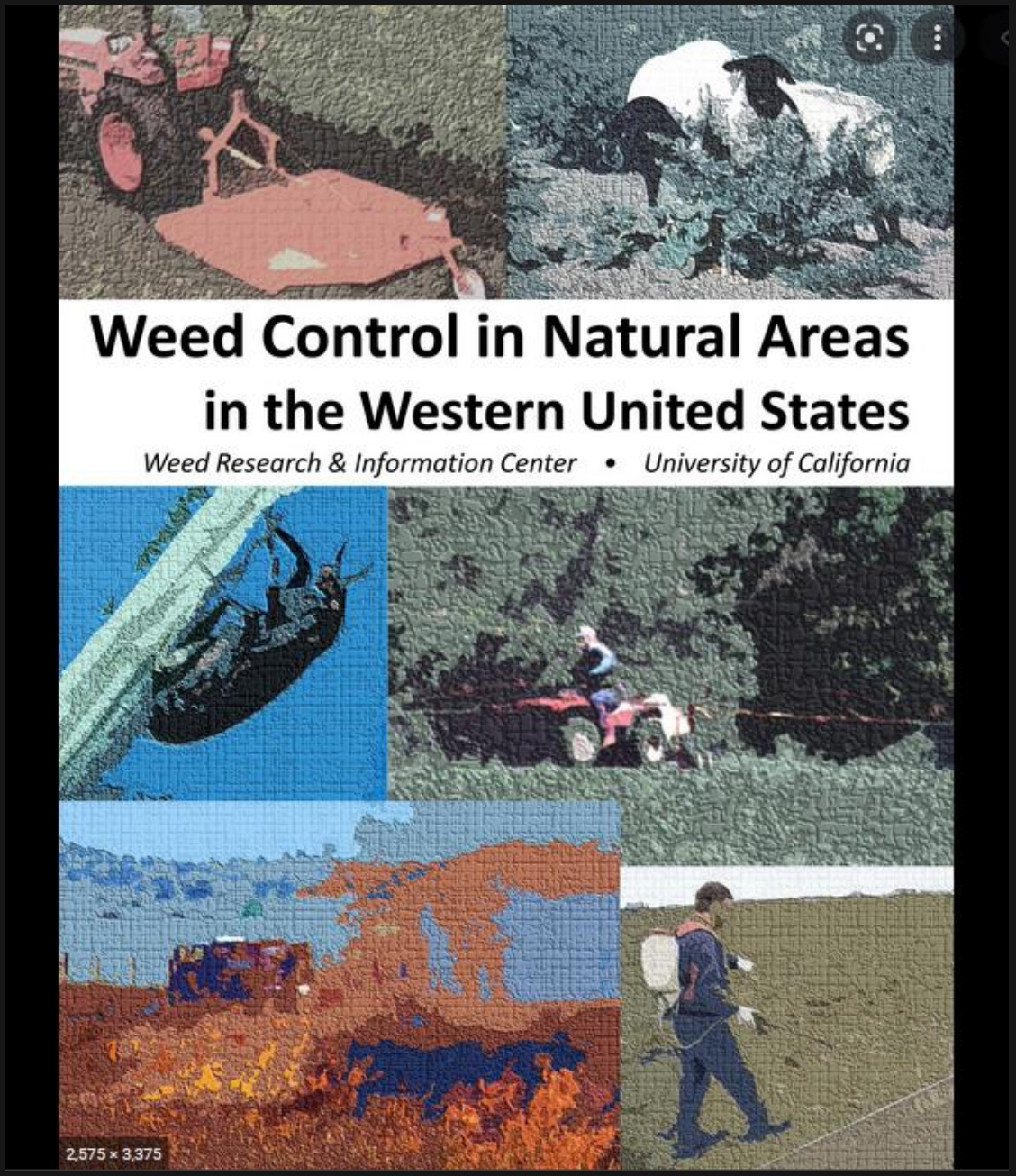
Soil Activity

- Pre-emergent only
  - Dithiopyr, indaziflam, pendimethalin
  - Target seeds!
- Pre and Foliar
  - Aminopyralid, chlorsulfuron, etc.
  - Target actively growing plants, and seeds!
- No Residual/limited residual
  - Glyphosate, 2,4-D, Dicamba
  - Good for reseeding

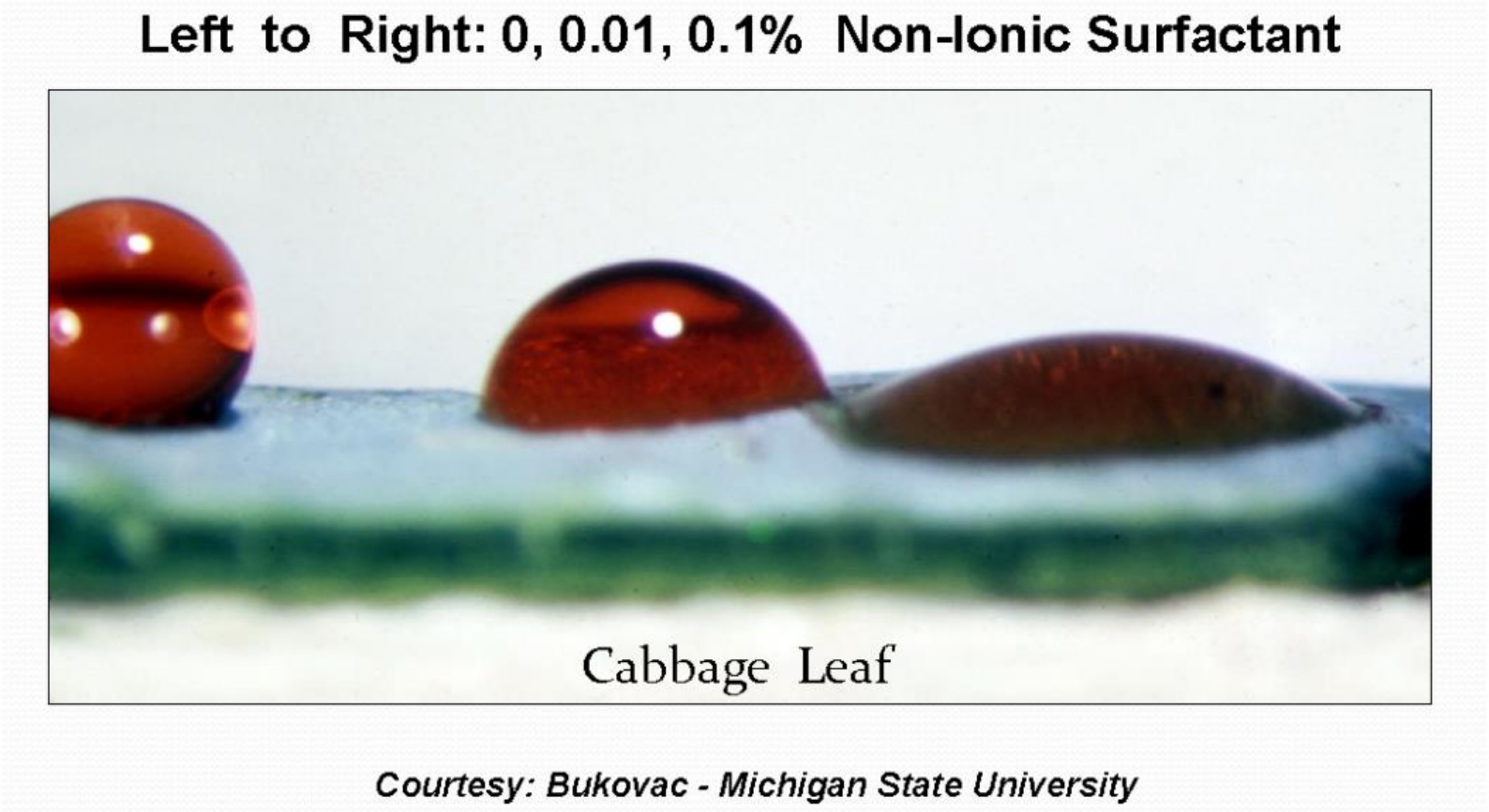
Application Method

- Application Method
  - Spot
  - Wick
  - Broadcast
  - Directed
  - Cut Stump
  - Basal Bark
- Selectivity

Photo courtesy of Cal IPC


Weed Control in Natural Areas
in the Western United States
Weed Research & Information Center • University of California
2,575 × 3,375

Adjuvants



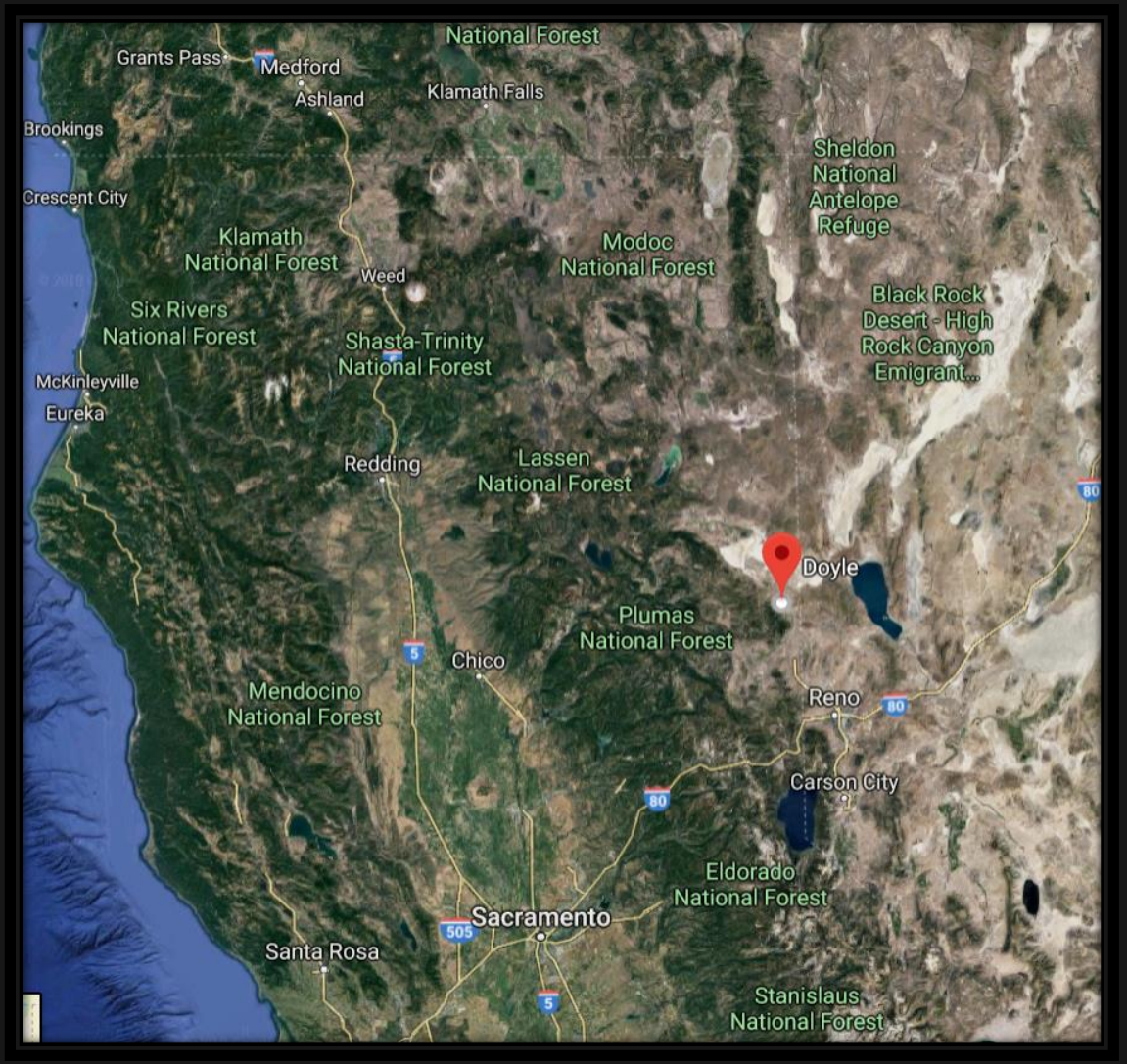
Courtesy: Bukovac - Michigan State University

Herbicides

- Effectiveness
  - Perennial weeds?
  - Selectivity
  - Economics (Vs multiple mows)
- Public Push Back?
- Doesn’t have to be a boom spray!

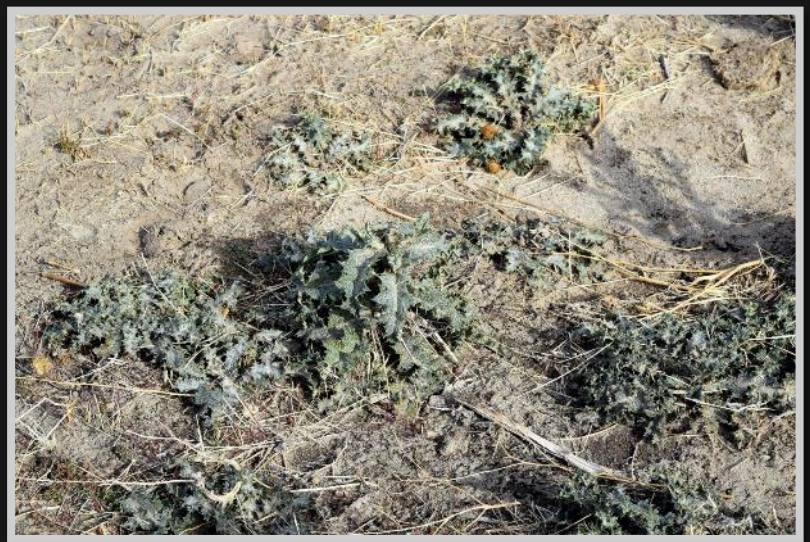
Scotch Thistle Trial (South of Doyle, CA)

- Objectives:
- Fall vs Spring applications
- Test Method (Aminocyclopyrachlor)



Applications

- Knock old stems down….
- October 22, 2016
  - 3-12 inch
- May 2, 2017
  - 4-22 inches
- 10*20 ft. plots
- Assessed
  - Control
  - Species cover



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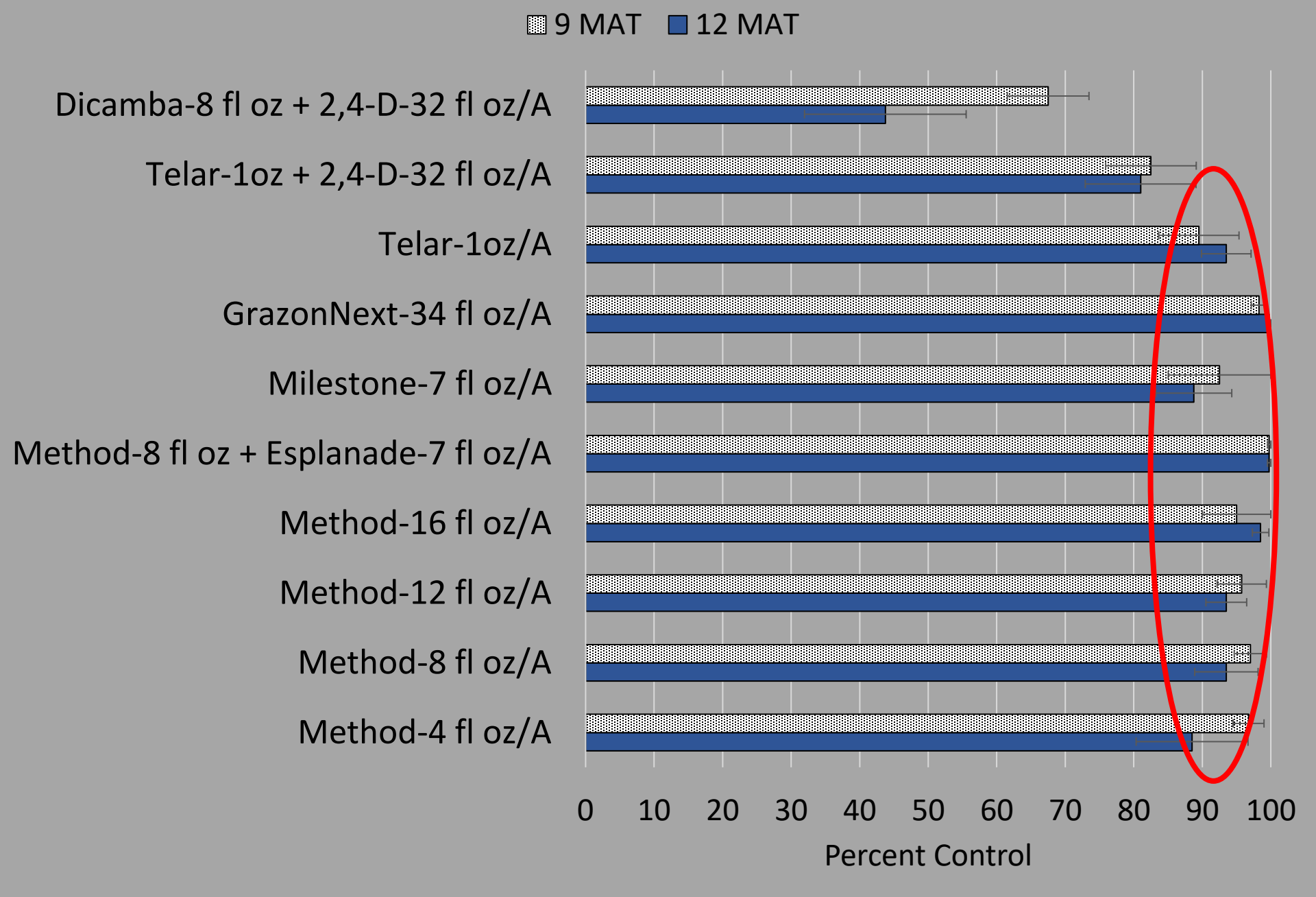
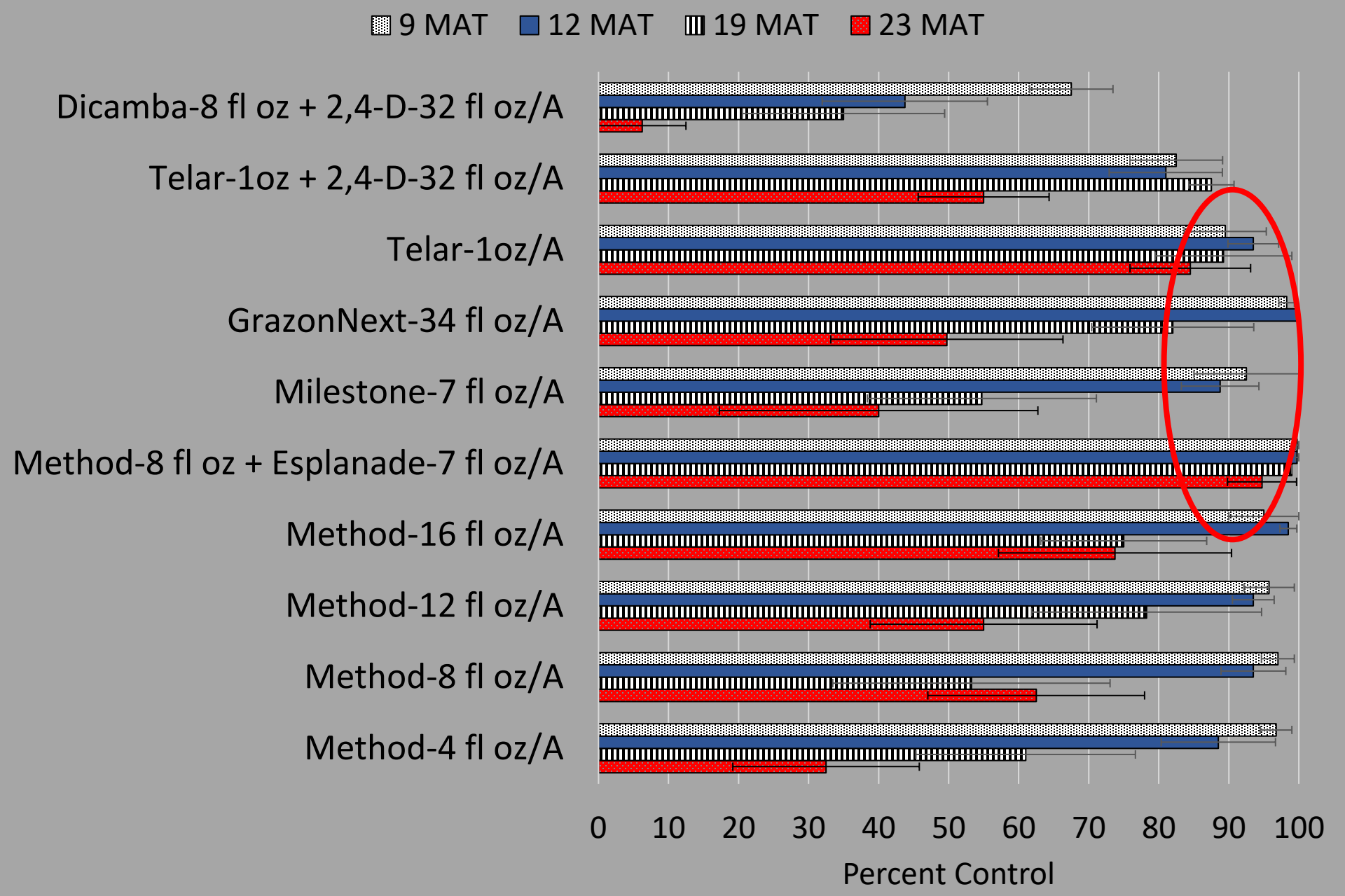
Agriculture and Natural Resources

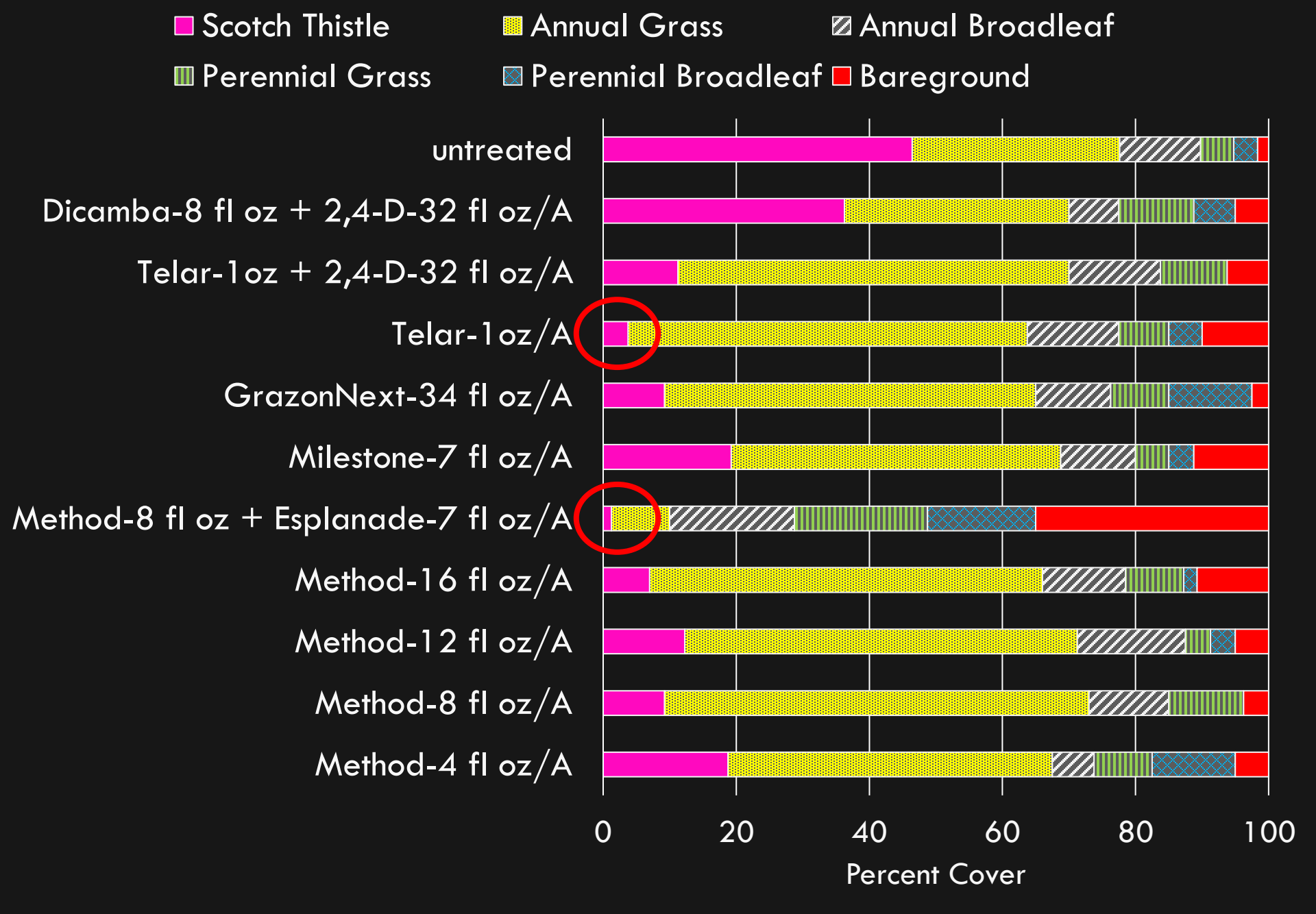
Scotch Thistle Control: Fall Treatments



Scotch Thistle Control: Fall Treatments

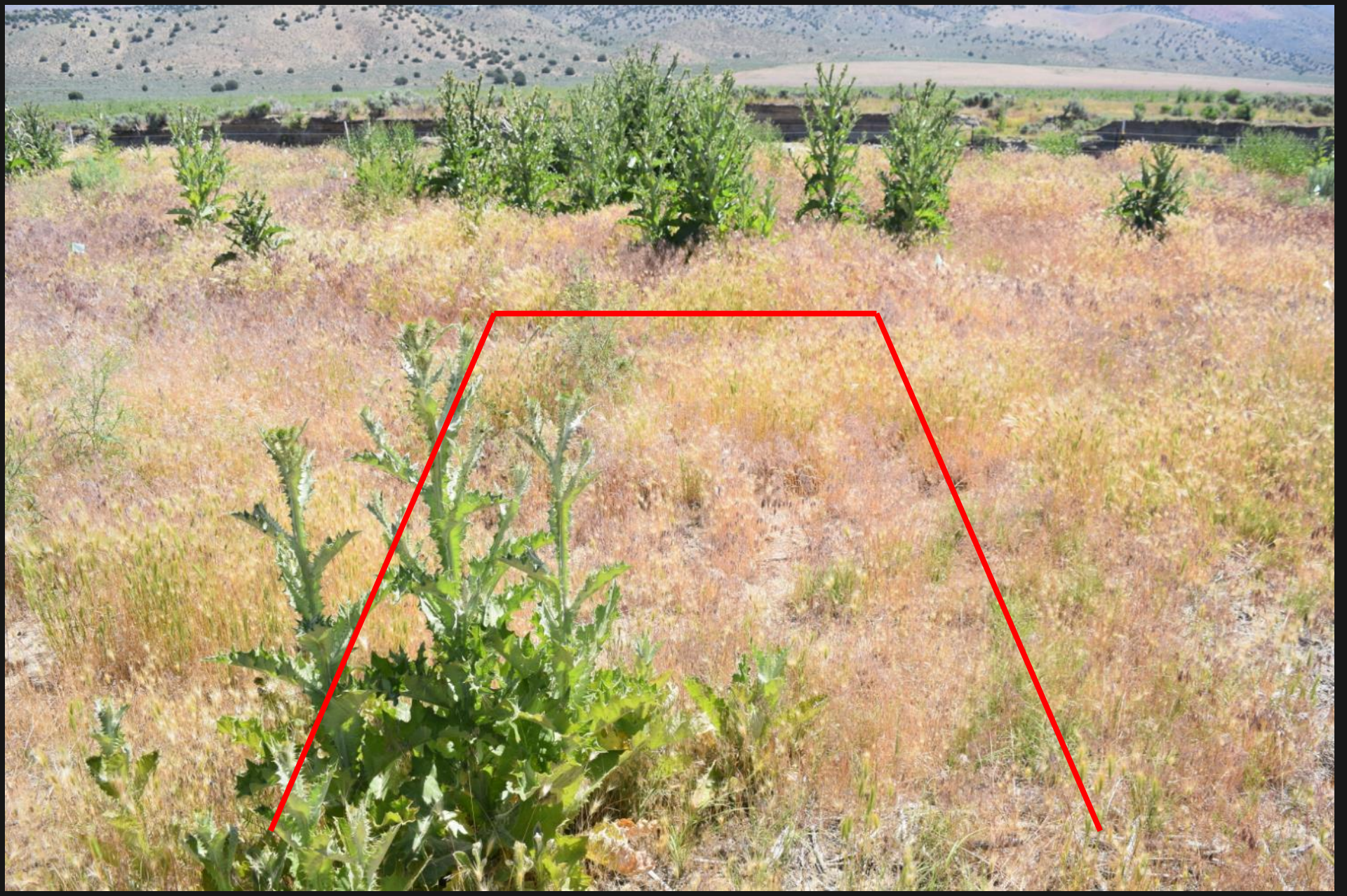


Twenty Three Months After Fall Treatments: Species Cover

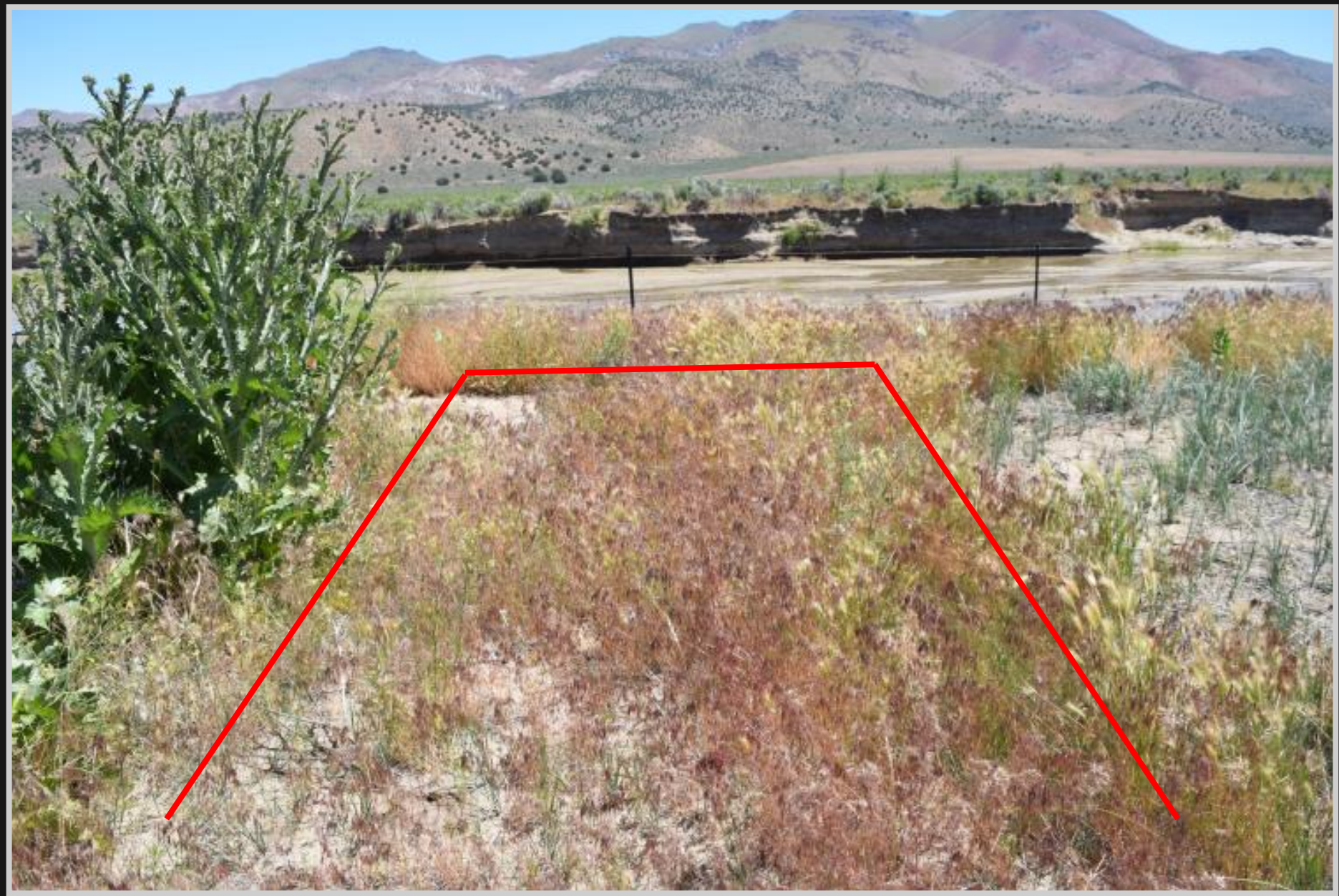


Untreated Control – 21 MAT

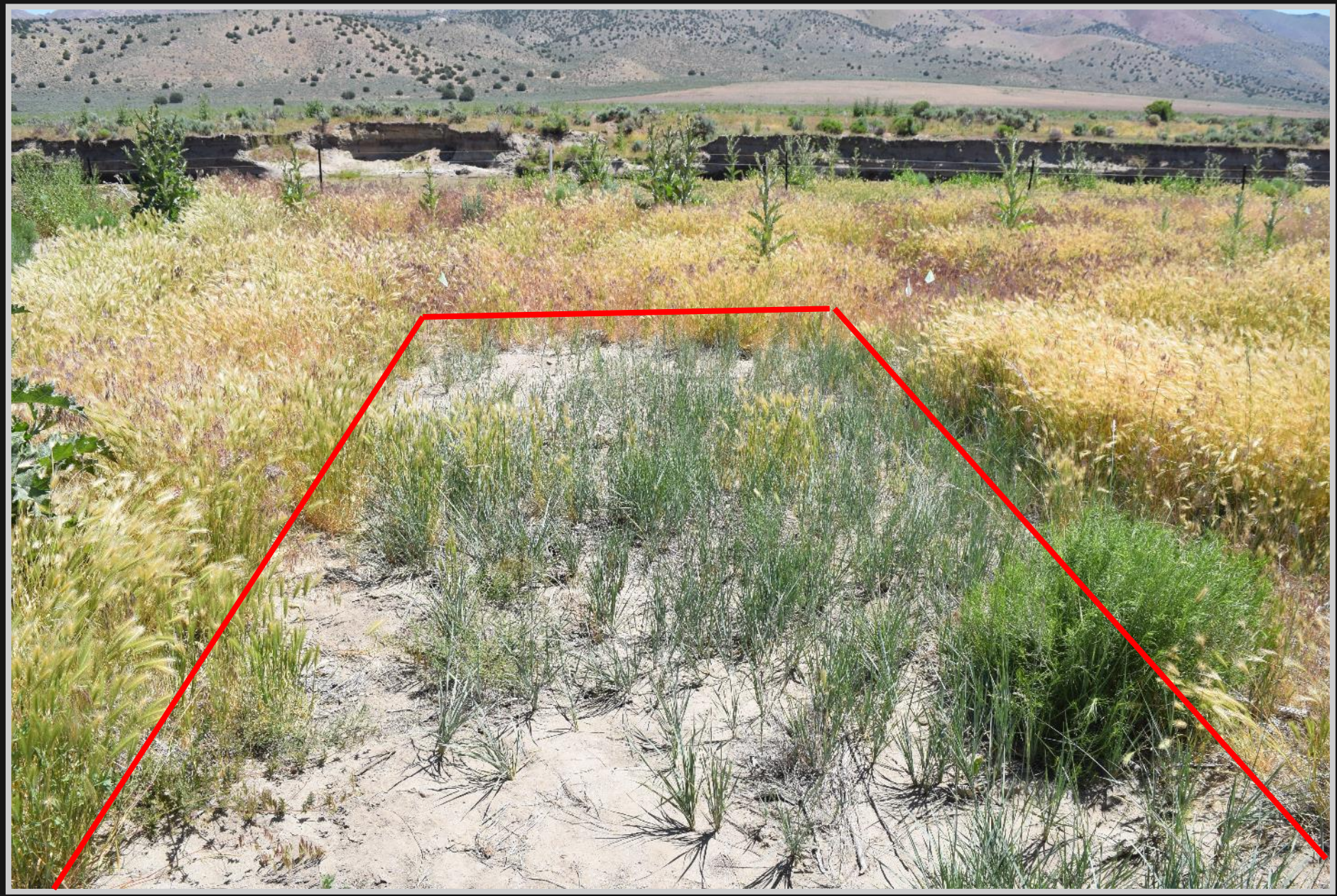
Milestone Fall - 21 MAT - June 2018



Telar Fall - 21 MAT - June 2018



Fall-Method - 8 oz + Esplanade - 21 MAT - June 2018



Fall-Method - 8 oz + Esplanade-21 MAT- June 2018

Herbicides

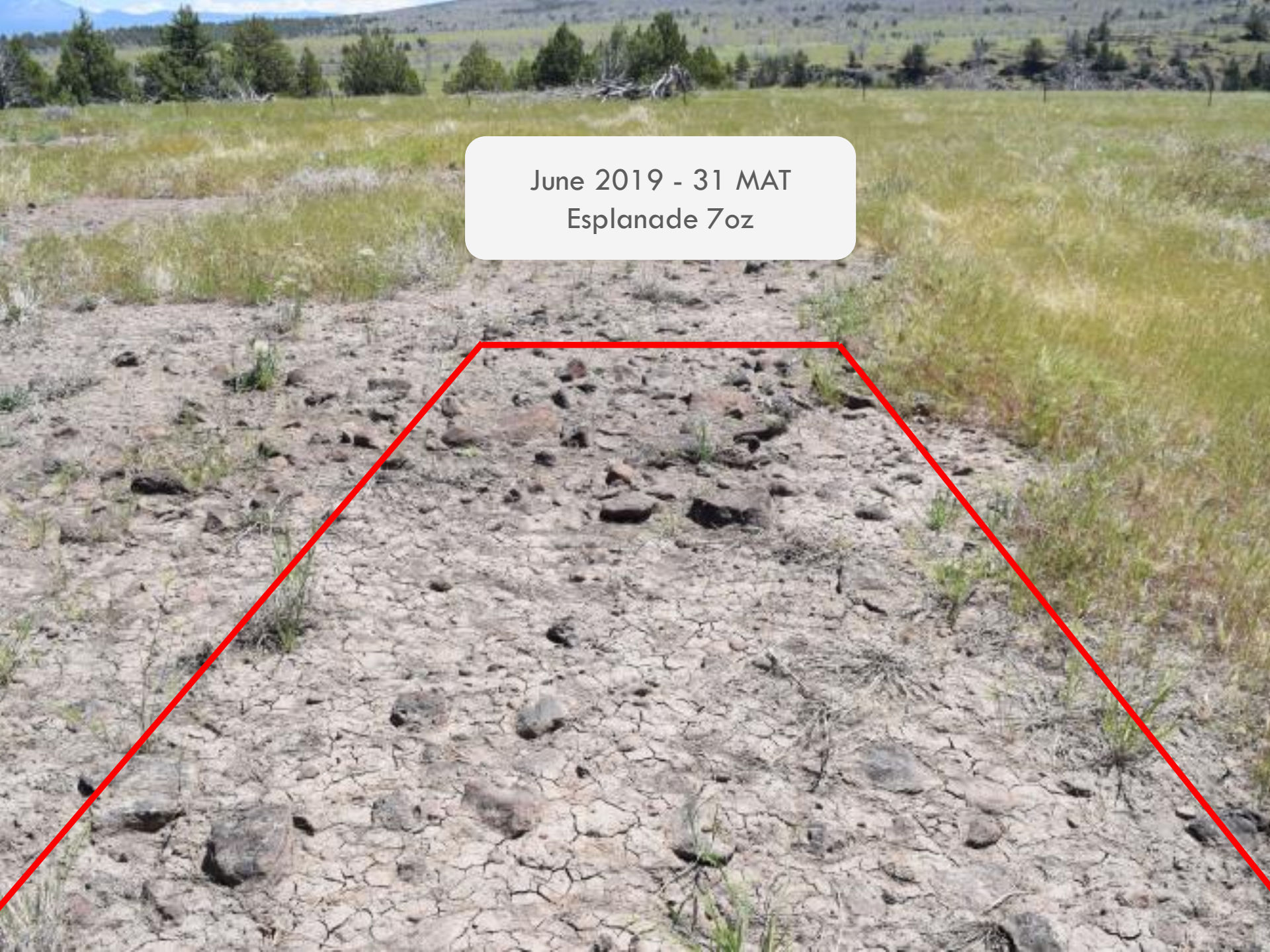
- Glyphosate
  - 12-16oz/ac
  - Dormant Season
  - Germination Window
- Imazapic
  - No labeled for CA
- Rimsulfuron
  - Expensive (although generic now)
  - Can be effective
- Milestone
  - Pre and Post

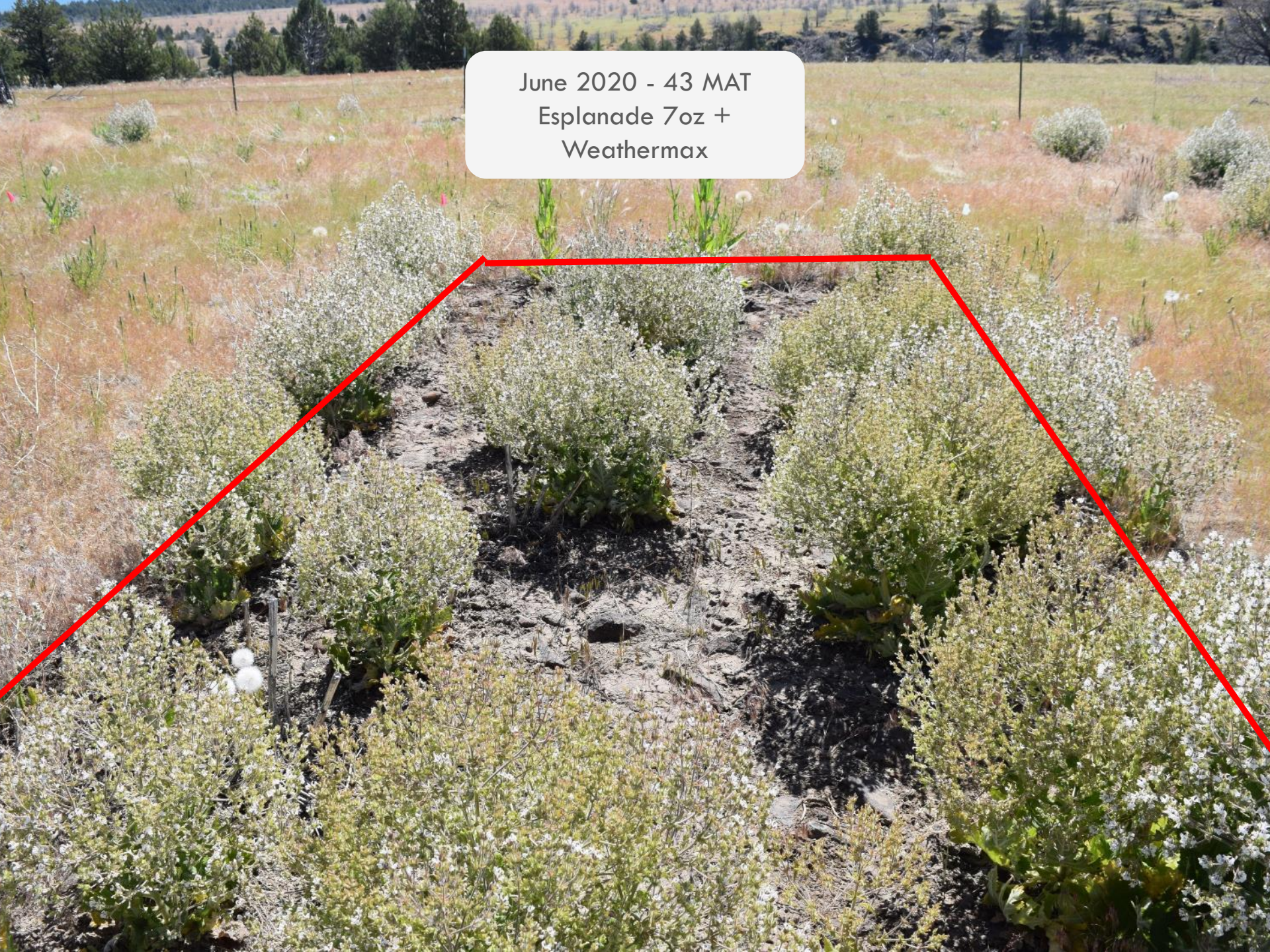
Tree and Vine Herbicide?

- Indaziflam
- Group 29 herbicide
  - Inhibit Cellulose Biosynthesis
- Alion-
  - Tree and Vine Market
- Esplanade 200 SC
- Rejuvra!
  - Grazing

BAYER
Alion®

GROUP 29 HERBICIDE
BAYER
EsplAnade®
200 SC

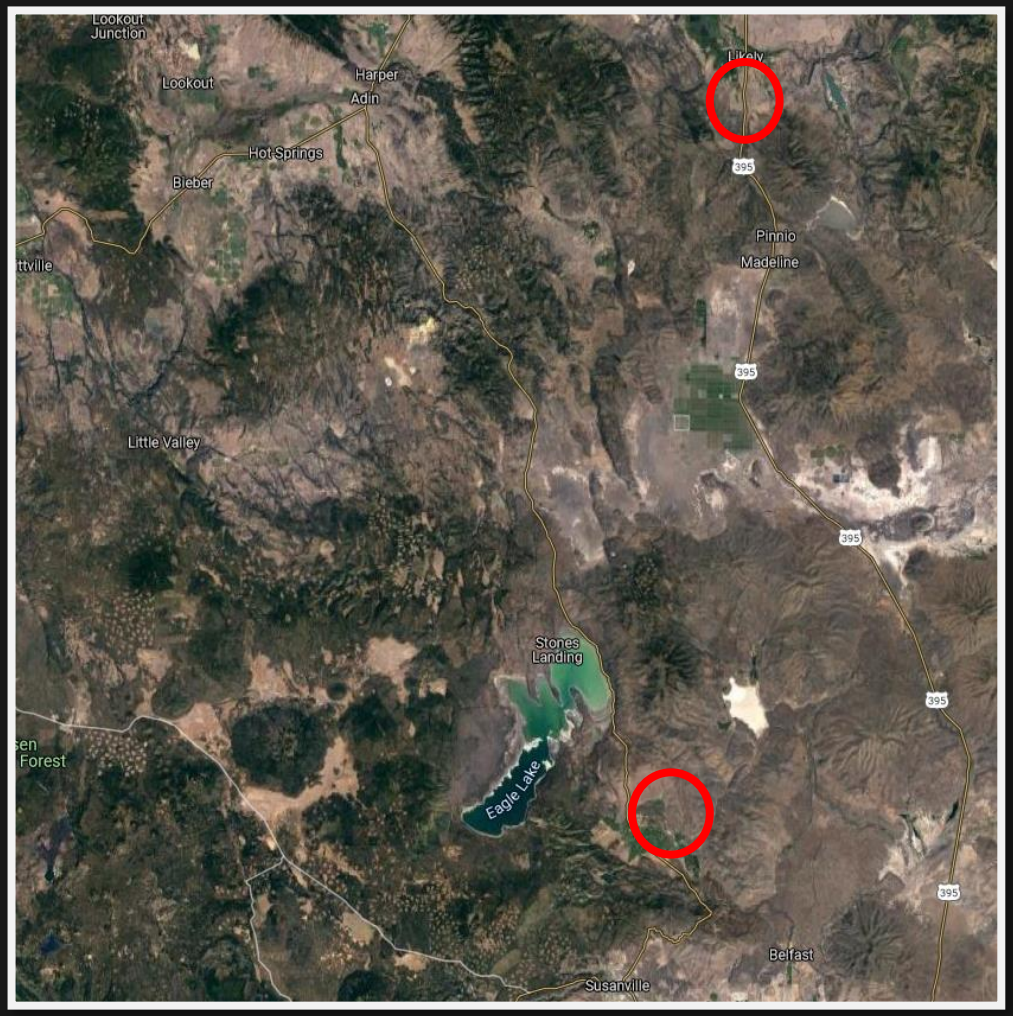

June 2019 - 31 MAT
Esplanade 7oz


June 2020 - 43 MAT
Esplanade 7oz +
Weathermax

Sequential treatments Indaziflam

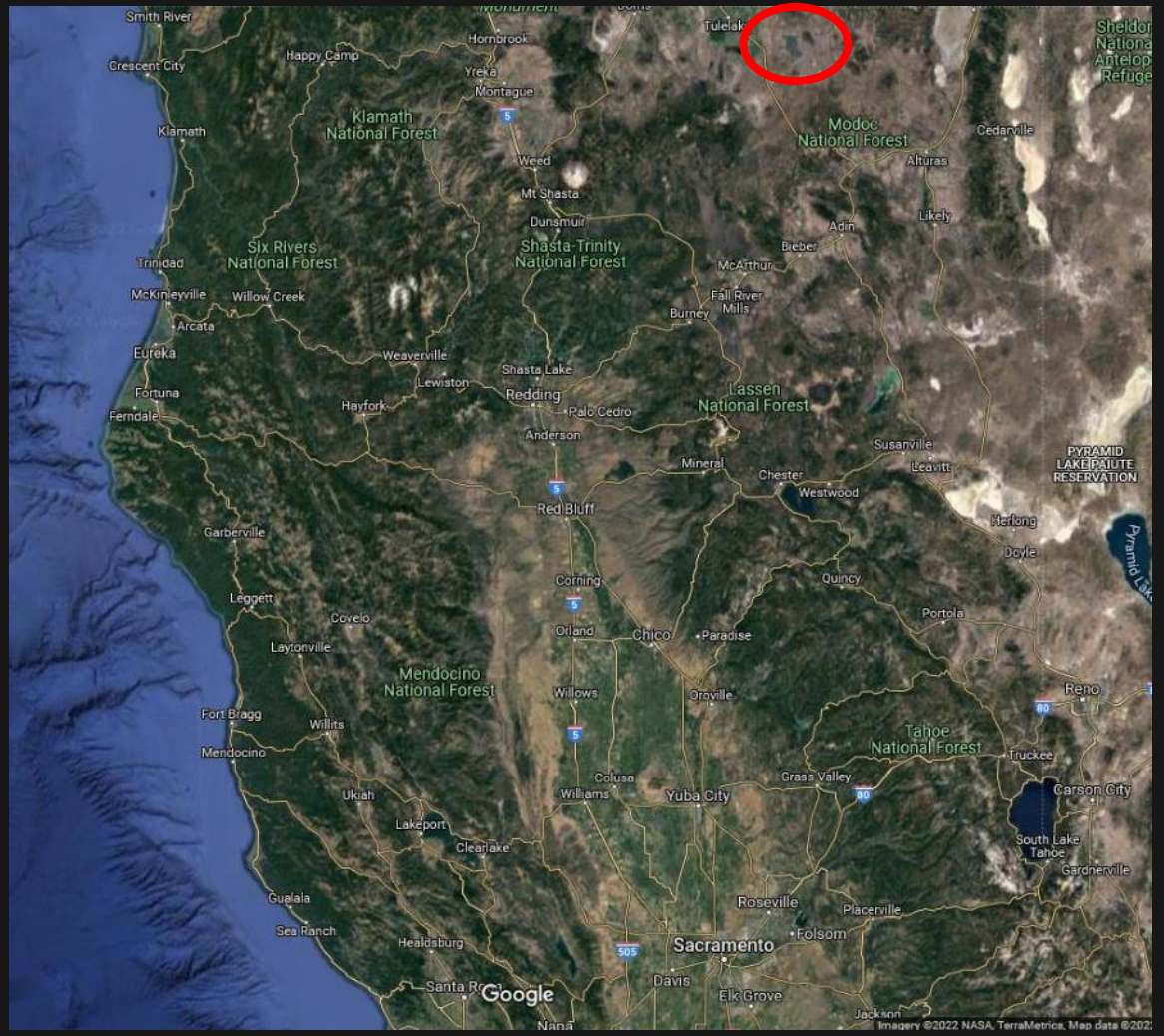
- Two locations 2020/2021
- One location 2021/2021

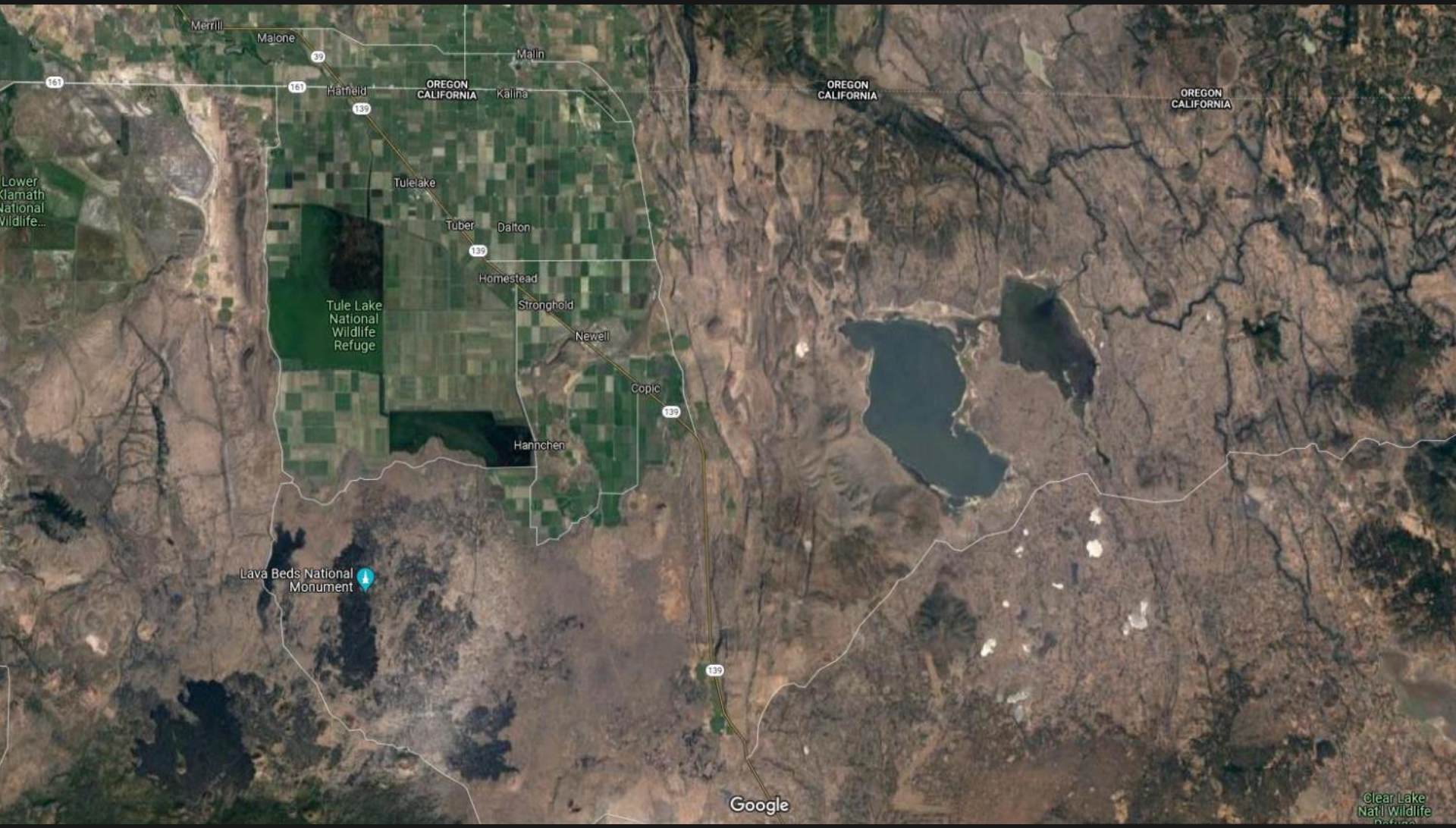
- Dry Winter-
  - Control Variable…
  - 60-70 percent control in indaziflam treatments
  - Better control in 2022



Clear Lake National Wildlife Refuge

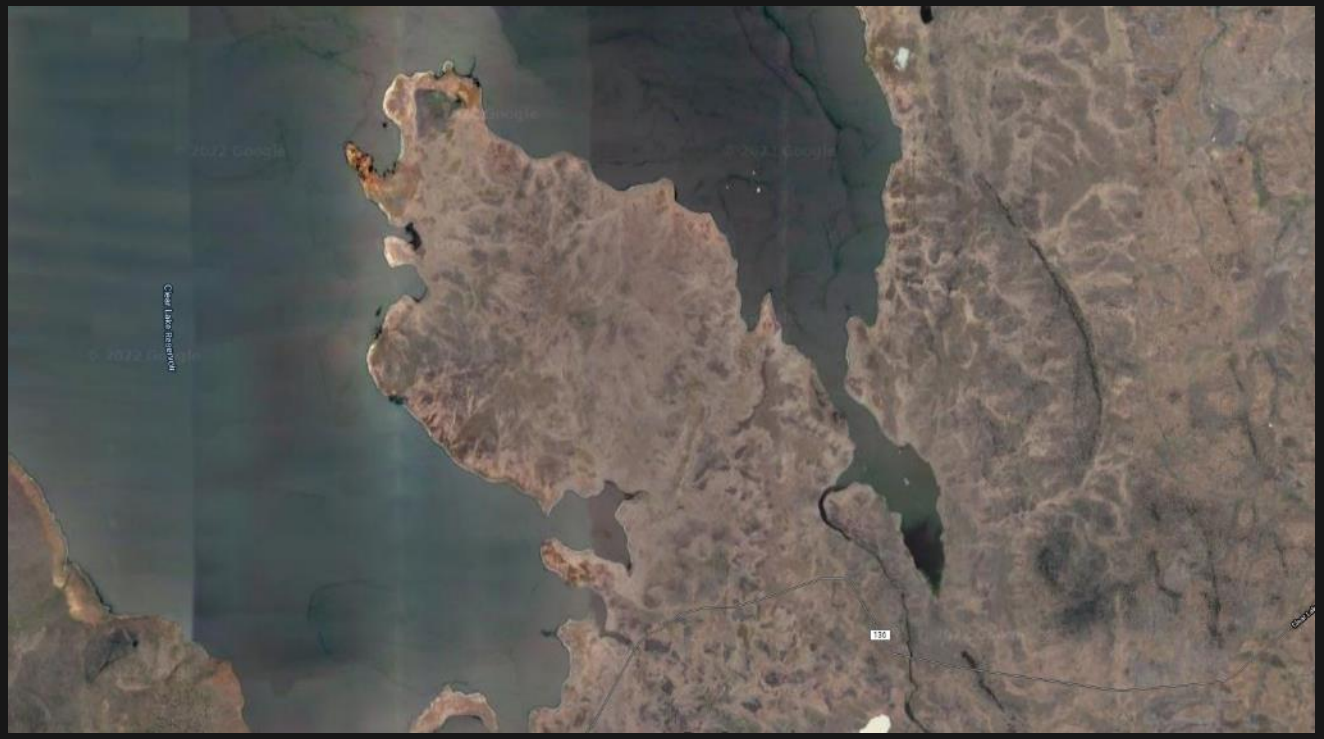
- Sage grouse
  - Declining populations
  - Invasive annuals
- Large Priority




Merrill
Malone
Malin
Hatfield
OREGON
CALIFORNIA
Kalina
OREGON
CALIFORNIA
OREGON
CALIFORNIA
Lower
Klamath
National
Wildlife...
Tulelake
Tuber
Dalton
Homestead
Tule Lake
National
Wildlife
Refuge
Stronghold
Newell
Copic
Hannchen
Lava Beds National
Monument
Google
Clear Lake
Nat'l Wildlife

2019-Walked site

- Seemed to be some perennials!



Clear Lake

- 2019 Fire Break
  - Rimsulfuron + Indaziflam
  - Post


Questions?
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