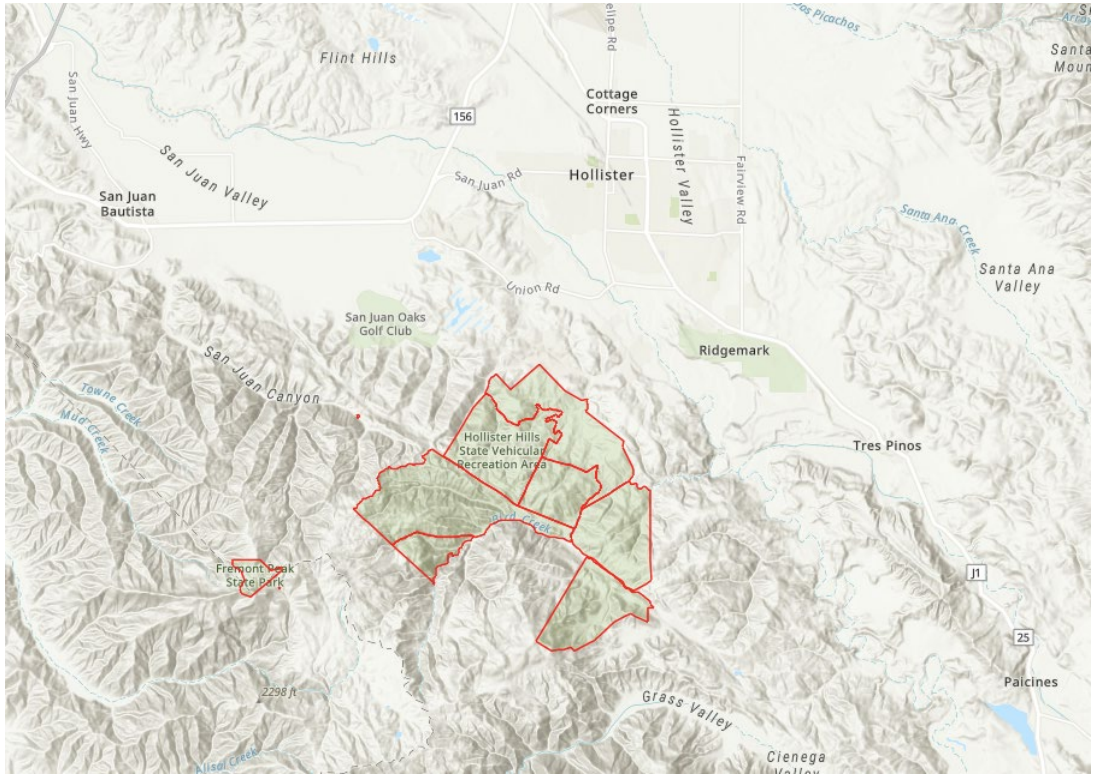
Hollister Hills SVRA

Landscape-scale Weed Management Projects

Nicolas Somilleda & Elijah Aldridge

Environmental Scientists



What is Hollister Hills SVRA?

Large scale weed management efforts taking place on a landscape level.

Project Examples:

- Park entrances
- Tracks
- Quarry
- Main Drag Corridors
- Cienega Road Right-of-Ways
- Grazing
- Fire

SUCCESSFUL CONTROL of INVASIVES

SUCCESSFUL CONTROL of INVASIVES

SUCCESSFUL CONTROL of INVASIVES

PROJECTS

PROJECTS

PROJECTS

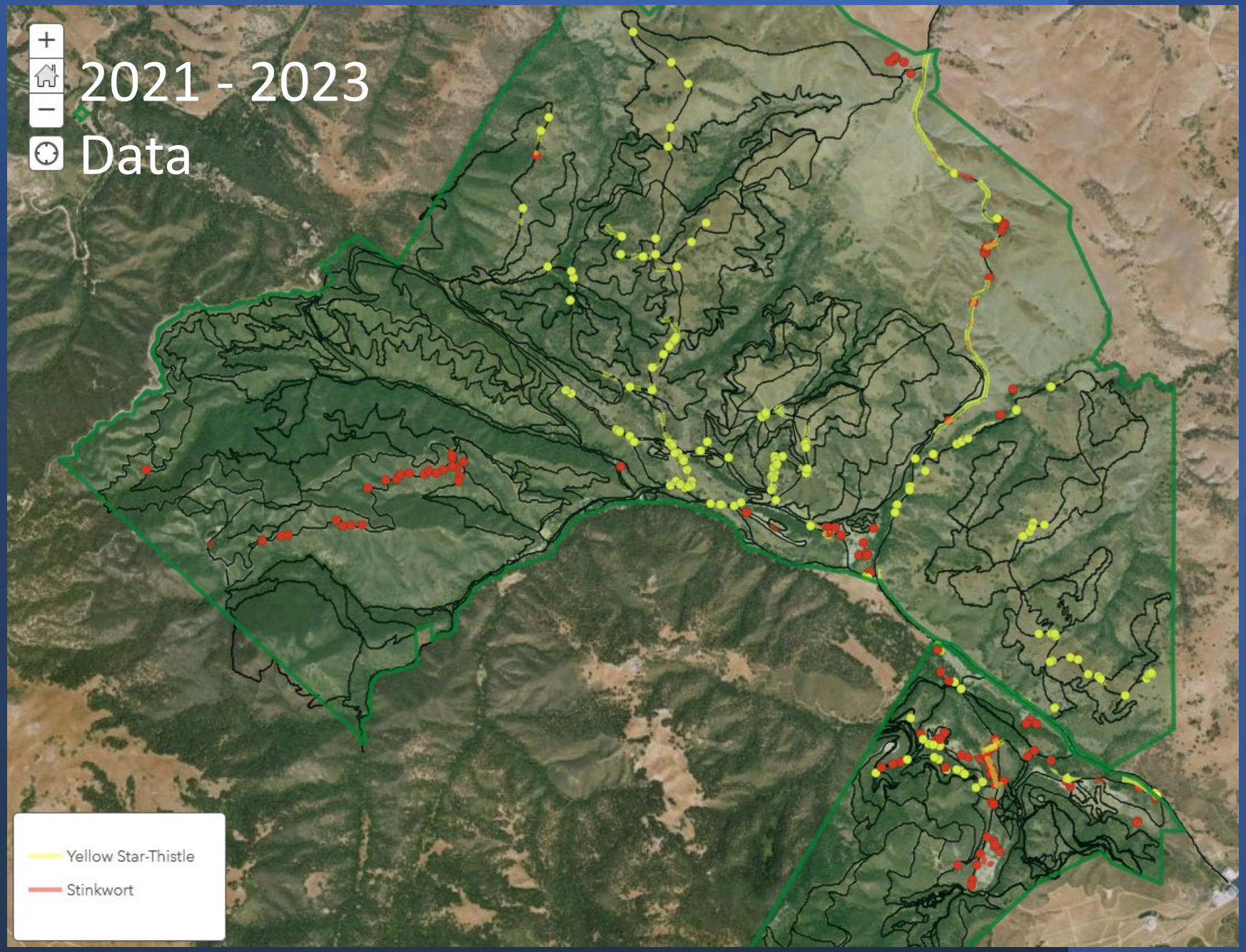

T.T. TRACK
MOTORCYCLES
OVER 10 yrs ONLY
TRACK DIRECTION IS
COUNTERCLOCKWISE

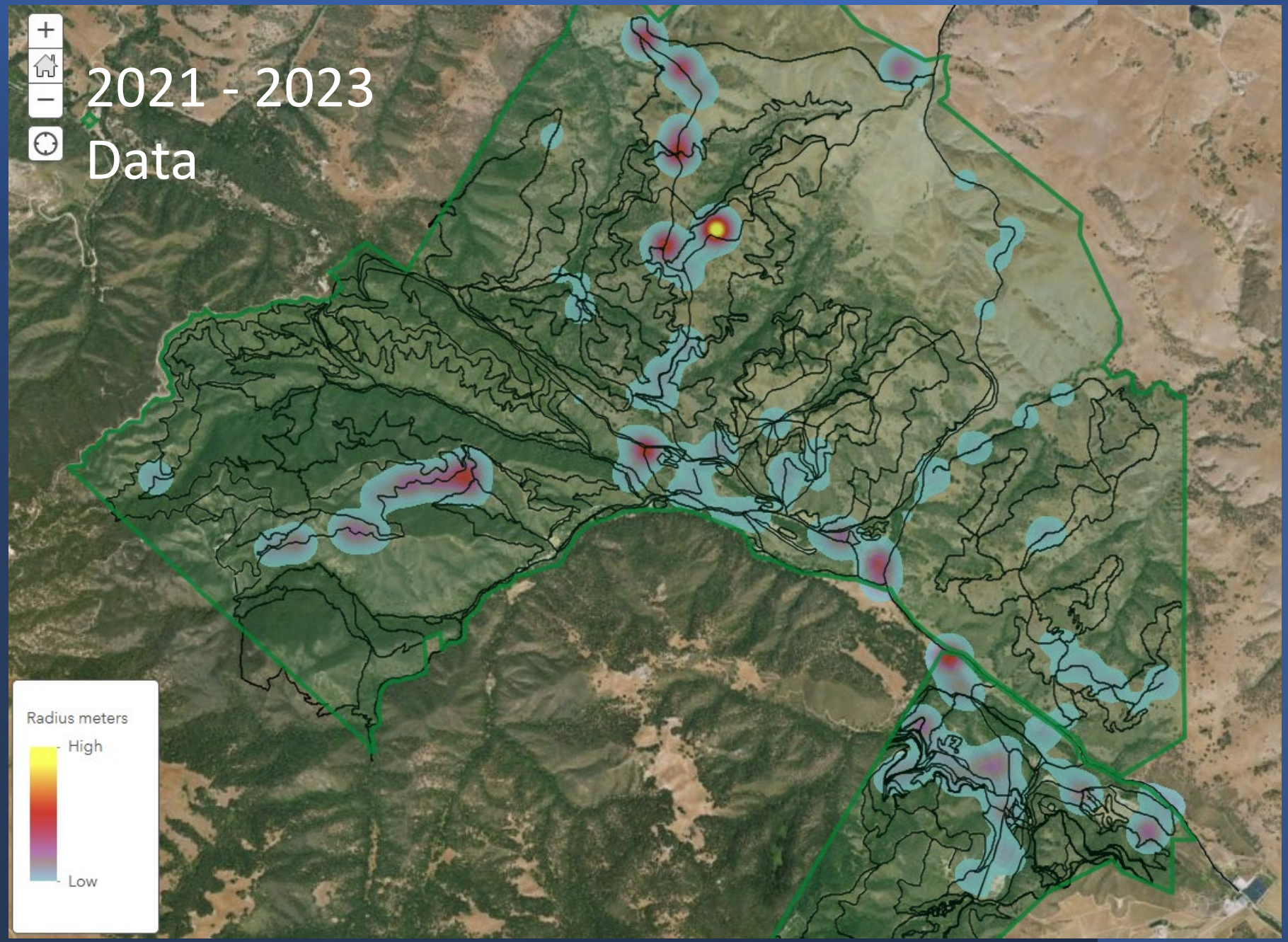

Hudner Ranch
4 X 4 Area

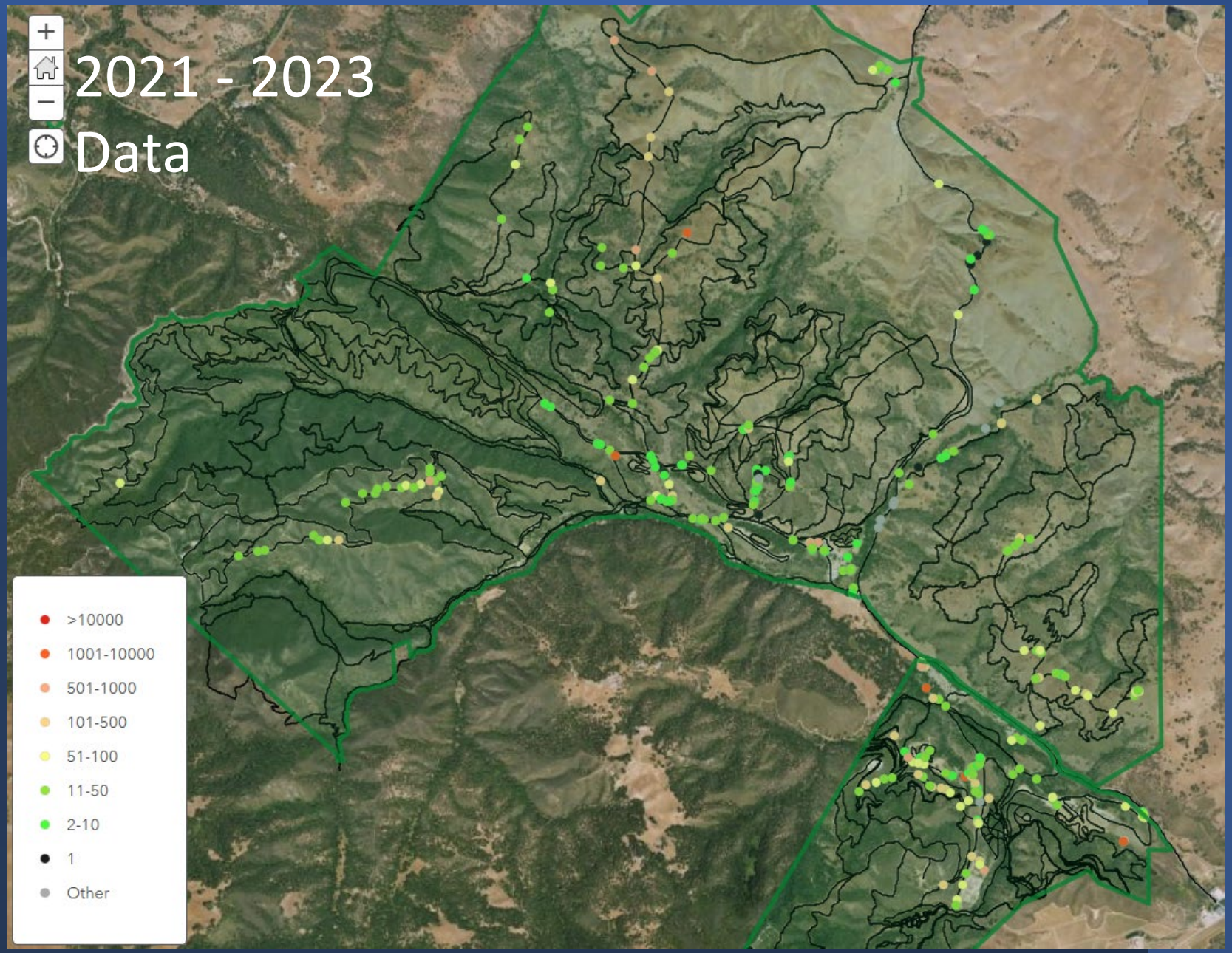
PROJECTS

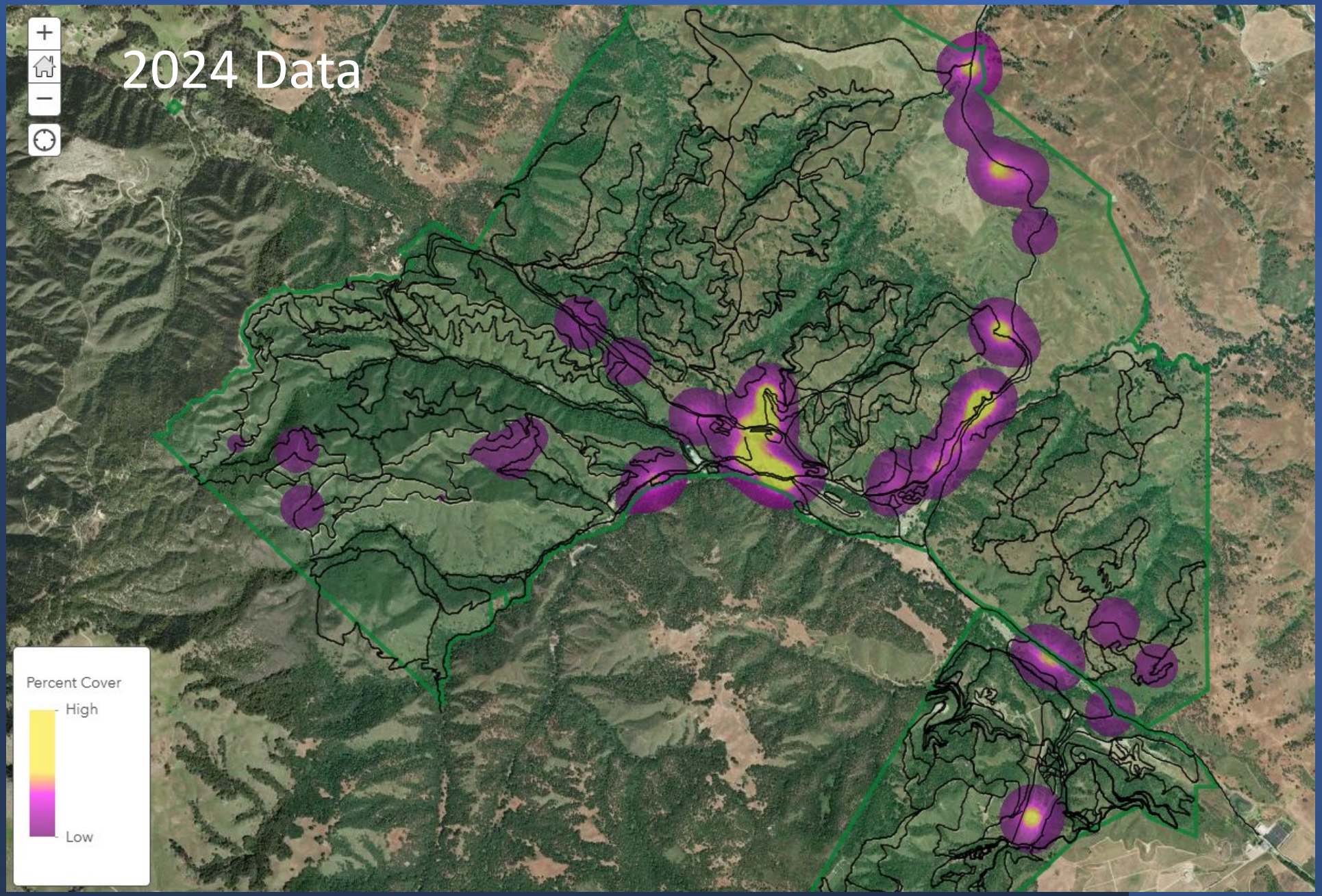
- 5-year plan:
  - Concentrate on the most visible, highly traveled, and most used areas of the park first.
  - Timely large scale brushing operation to get dense weed patches before they go to seed.
  - Large scale brushing operations to remove thatch to allow for herbicide spraying to take place.
  - Use pre-emergent herbicides broadcasted on all areas that were brushed before winter rains. Sometimes need to start in late summer to have enough time to cover all locations.
  - Follow up with spot spraying with post-emergent herbicides when weeds are just sprouting. Flush the seed bank. Get weeds when they are so small and don't require much product.
- Why: Reason why work is being done where it is being done.
  - Natural Vegetation and Landscape Barriers:
    - Narrow valleys, lower rancho/wood camp
    - Chaparral shrublands in sandstone outcrops within grasslands
    - Anchor points
    - Control points, tie into areas previously treated
  - Viewshed:
    - Parke entrances
    - Areas of the park visible from Cienega Road
    - Campgrounds
    - Main drag road of the park
  - Vector Sites:
    - Quarry
    - Staging Areas
    - Track Facilities, especially 4x4 areas, mud gets on 4x4s and transported throughout park.
    - High Use Areas
    - Frequently traveled road and trail corridors, arteries, main road

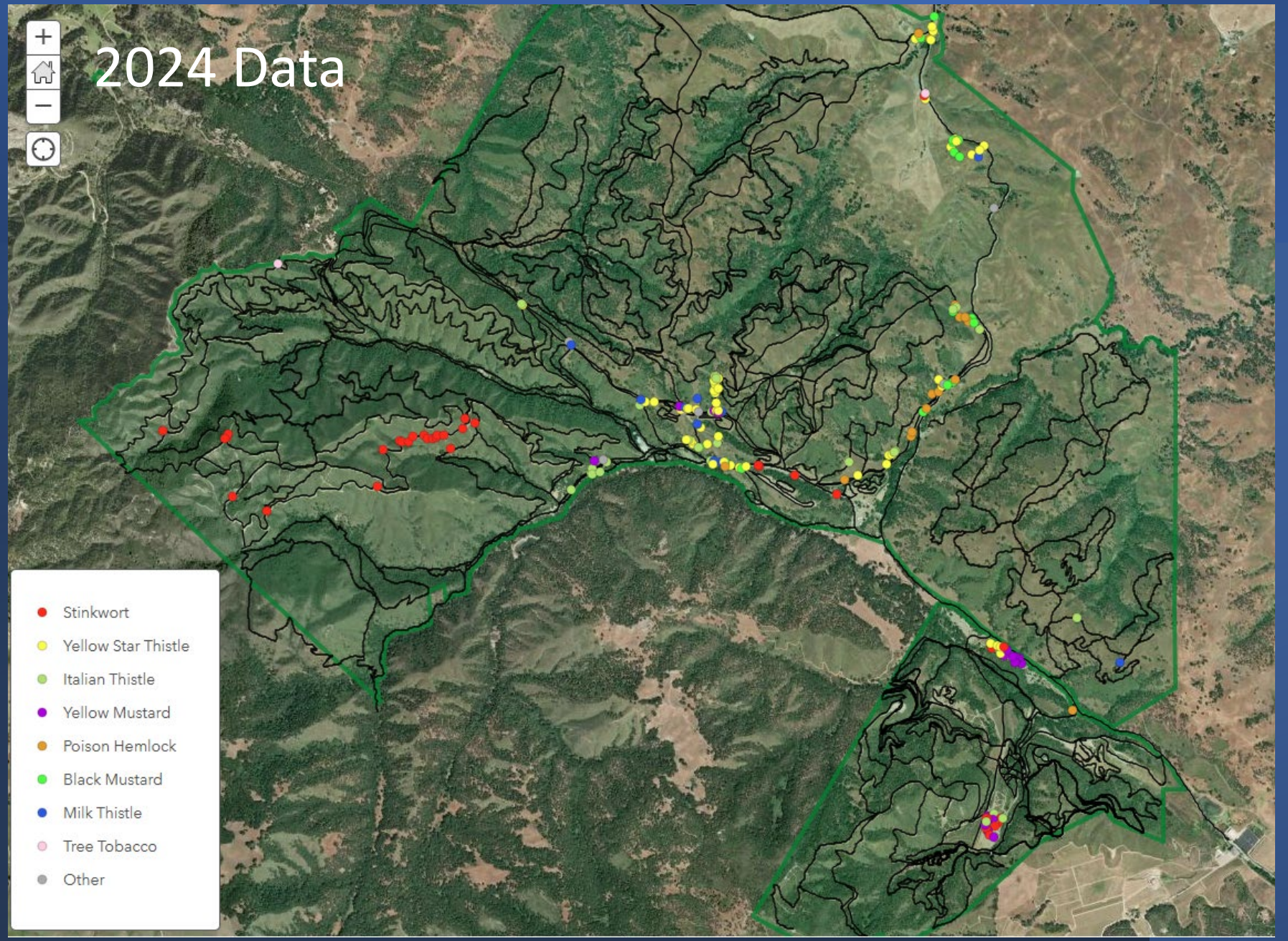
- Identify Treatment Locations
    - Starts with knowing where infestations are at.
    - Geospatial mapping tools (GPS points with pictures and notes)
    - Strategic Locations
        - Natural landscape barriers and other Boundaries
            - Grassland patches with chaparral shrublands
            - Riparian Corridors
            - Narrow Valleys
            - Watershed Boundaries (ridgelines and valleys)
            - Tie into previously treated areas
            - Paved Area
            - Road
        - Viewshed
            - Park Entrances
            - Main Drag
            - Tracks and Facilities
            - Hillsides and Boundaries Visible from the Road (Cienega Road)
        - Vector Location
            - Quarry
            - Staging Areas
            - Heavy Equipment Transport
            - Tracks
            - Main Road Corridors
            - County Road Right-of-Way
        - Right-of-Way (shared land)
            - WMA – MOU with County
- Set Priorities
    - In the case time does not permit
- Timing (Phase Out Work – Scheduling)
    - Early and often treatments
    - Intense weed whipping in swaths (4-8 works) for short durations of time, at key periods of time throughout the growing season.
    - Later tougher brushing of weed thatch patches to prep for pre-emergent
    - Spot spray in winter to get the most out of herbicide by being able knock down small sprouts
    - Repeated entries throughout the growing season

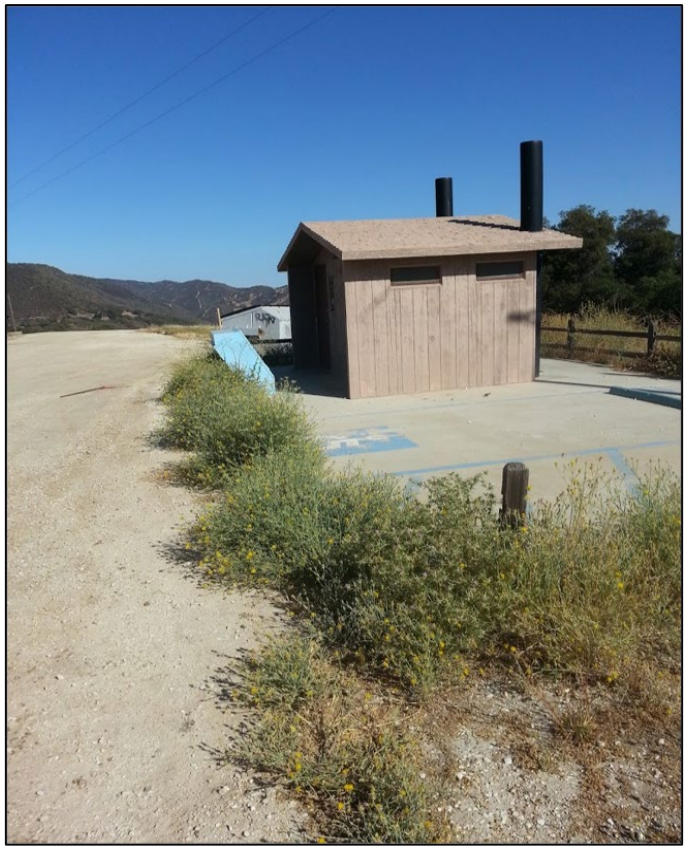

2021 - 2023
Data
Yellow Star-Thistle
Stinkwort


2021 - 2023
Data
Radius meters
High
Low


2021 - 2023
Data
>10000
1001-10000
501-1000
101-500
51-100
11-50
2-10
1
Other


2024 Data
Percent Cover
High
Low


2024 Data
Stinkwort
Yellow Star Thistle
Italian Thistle
Yellow Mustard
Poison Hemlock
Black Mustard
Milk Thistle
Tree Tobacco
Other



PRESENCE OF INVASIVE PLANTS

IMPACTS OF INVASIVE PLANT INFESTATIONS CAN BE SEEN THROUGHOUT THE ENTIRE PARK

Winter Weeds

Common Name: **Poison Hemlock**
Botanical Name: ***Conium maculatum***
Family: **Apiaceae**

Poison Hemlock

Flower

Plant Stem

Poison hemlock is a dicot and is a perennial herb that is NOT native to California; it was introduced elsewhere and naturalize in the wild. Poison hemlock is a weed that inhabits disturbed places and wetland-riparian communities. Occurs anywhere between 0 to 5000 feet in elevation. Cal-IPC classifies the statewide impact of poison hemlock as moderate.
This plant is **TOXIC**! Do **NOT** ingest!

Blooms: April through July

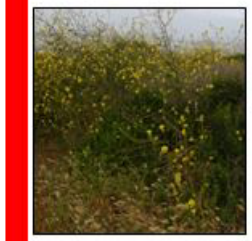
Description: Erect biennial to 3 m tall, with large triangular, dissected compound leaves and usually with purple-spotted o purple-streaked stems. Crushed foliage has a musty odor that often described as similar to mouse excrement. Poison hemloc contains piperidine alkaloids, and all plant parts are highly toxic humans and animals when ingested. Symptoms of poisoning appear soon after ingestion and include nervousness, trembling knuckling at the fetlock joints, uncoordinated gait, dilated pupil coldness of the limbs or body, weak and slow heartbeat, come and death from respiratory paralysis.

Location within Hollister Hills: Common along roadsides pastures, fields, ditches, riparian areas, cultivated fields, waste places, and other disturbed, other moist sites. Found all throughout Hollister Hills.

Immature Plant

Seed Pod

Common Name: **Black Mustard**
Botanical Name: ***Brassica nigra***
Family: **Brassicaceae**



Black Mustard

Flower

Plant

Black mustard is a dicot and is an annual herb that is NOT native to California; it was introduced elsewher and naturalized in the wild. Occurs anywhere betweer to 4921 feet in elevation. Cal-IPC classifies the statewi impact of this plant as moderate.

Blooms: April through August

Description: Erect winter annuals, with bright yellov 4-petaled flowers and linear seedpods (3/4 in) that ar erect or spreading. Stems coarse-haired. Can grow up 2-8 feet tall with basal leaves mostly have 1-2 pairs o distinct lateral lobes at the base, terminal lobe much larger than the lateral lobes. Upper stem leaves oblong linear, base tapered, margins entire to toothed or weal lobed. Black mustard has adapted to periodic fire.

Location within Hollister Hills: Common along roadsides, pastures, fields, ditches, riparian areas, cultivated fields, waste places, and other disturbed sit Found all throughout Hollister Hills.

Immature Plant

Seed Pod

Common Name: **Milk Thistle**
Botanical Name: ***Silybum marianum***
Family: **Asteraceae**

Milk Thistle

Thicket

Flower

Milk thistle is a dicot and an annual or perennial herb that is NO native to California; it was introduced elsewhere and naturalized the wild. Occurs anywhere between 0 to 1640 feet in elevation. C -IPC classifies the statewide impact of this plant as limited.

Blooms: April-July

Description: Erect winter/summer annual or biennial generally t 2 m tall, with white-variegated prickly leaves. Often occurs in den competitive stands. Seedlings are cotyledons broadly obovate, abo 1-1.5 cm long, thick, glabrous. First leaf pair alternate, elliptic-oblo mostly 1-2 cm long, margin prickly-toothed, nearly glabrous. The mature plants has stems that are branched, thick, hollow, ribbed lack wings or spines, and are sparsely hairy. Leaves coarsely pinnat lobed, prickly-toothed, ruffled, nearly glabrous. Upper surfaces shi green and conspicuously variegated with white. Basal leaves 15-7 cm long. Stem Leaves reduced, sessile, and clasping the stem at th base, often curved downward. Flower heads consist of numerou pink to purple disk flowers, base 2-6 cm in diameter, on long stalk Seeds are mostly lanceolate, 6-8 mm long, slightly flattened, mottl black and brown, with a yellowish ring at the apex. Pappus bristle numerous, minutely barbed, flat, mostly 15-20 mm long, fused at th base to form a ring, detach as a unit.

Location within Hollister Hills: Disturbed sites, roadsides pastures, fields, agronomic crops, waste places, orchards, and tra margins in chaparral and woodlands. Grows best in fertile soils Found all throughout Hollister Hills SVRA.

Seedling

Leaf

Seeds

Common Name: **Yellow Star Thistle**
Botanical Name: ***Centaurea solstitialis***
Family: **Asteraceae**

Yellow star thistle

Yellow star thistle is a dicot and an annual herb that is NOT native to California; it was introduced elsewhere and naturalized in the wild. Occur anywhere between 0 to 4265 feet in elevation. Cal-IPC classifies the statew impact of this plant as high. The California Department of Food and Agriculture classifies Italian thistle as a Noxious Weed List C: Control required in nurseries, not required elsewhere.

Blooms: June through December

Description: Simple to bushy winter annuals with spiny yellow-flowered heads and wiry stems that can grow to 2 m tall. Plants are highly competiti and typically develop dense, impenetrable stands that displace desirable vegetation. Foliage grayish to bluish green, densely covered with fine whit cottony hairs that hide most of the stiff thick hairs and minute glandular do Seedlings are cotyledons 6-9 mm long, 3-5 mm wide. Later, rosette leave typically deeply lobed near to the mid-vein, often appear ruffled, lobes mos acute, with toothed to wavy margins. Terminal lobe nearly triangular to lanceolate. Both upper and lower surfaces usually densely covered with fin cottony hairs and stiff thick hairs. Flower heads are round to ovoid, spiny, solitary to stem tips, consist of numerous yellow disk flowers. Central spir of main phyllaries 10-25 mm long, stout, yellowish to straw-colored throughout. Lateral spines typically in 2-3 pairs at the base of the central spine. Mature plants can produce nearly 75,000 seeds. Produces 2 types o seeds, both glabrous, mostly 2-3 mm long, base broad. Outer ring of seed dull dark brown, often speckled with tan, lack pappus bristles, often remain heads. Inner seeds glossy, gray to tan to mottled cream-colored and tan, wi slender white pappus bristles 2-5 mm long.

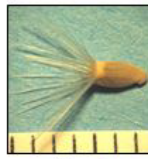
Thicket

Location within Hollister Hills: Common along open disturbed sites open hillsides, grassland, rangeland, open woodlands, fields, pastures, roadsides, and waste places. Found all throughout Hollister Hills SVRA.

Flowers

Immature Plant

Stem



Seed

Weed Alert!
Stinkwort

Stinkwort
(Dittrichia graveolens)

Mature Size Waist

Description

- Annual plant to 3 ft. tall
- Branched from base of plant with a "Christmas tree" growth form when young
- Small, 1/3-2/3 in. wide, daisy-like flowers with yellow outer petals and yellow to reddish interiors
- Narrow grey-green leaves are 1-4 i long with serrated edges
- Leaves partially clasp the stalk
- Sticky with a strong camphor aroma plant can cause skin irritation
- Reproduces by seed
- Spread by roads and construction materials
- Native to western Europe, the Mediterranean region, and southwe Asia

Bloom Period Sep - Dec

Habitat Roadsides, pastures, riparian

2-Minute Removal Pull

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These cards were adapted from a design by National Park Se

Summer Weeds

Vector Campgrounds (highly disturbed areas)

Weed Infestations in Campgrounds

Weed Vector Trails & Tracks (highly traveled – transport mechanism)


Weed Infestations at Tracks

Weed Vector

Off-roading (mud with weed seeds)

Weed Infestations on Trails

Weed Infestations on Trails

Weed Vectors

STAGING AREAS

Weed Vector

QUARRY MATERIALS (contaminated rock and aggregate gets used around park

Weeds Spread in Quarry Materials

Added Pressures

OFF-TRAIL RIDING

Added Pressures

WILD BOAR

INTEGRATED WEED MANAGEMENT PROGRAM

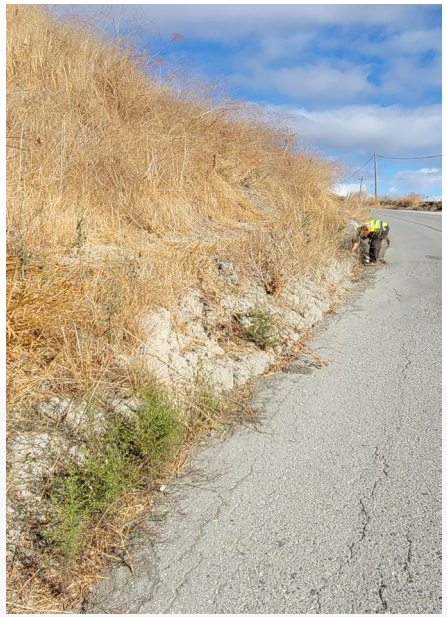
- (Timing) Early Detection / Rapid Treatment
- (Timing) Planned & Coordinated Effort
- Repeat Treatments within the Same Season
- Manage High Visible Areas
- Anchor Points
- Weed Mapping: Web Maps – ArcGis Online
- Partnerships: Weed Management Area (WMA) MOU

- Techniques and Practices
  - Training and Safety
    - Staff is trained early and often
    - Most senior and experienced staff apply herbicide and lead brushing efforts
    - Practical field training by working with staff in the field
    - Emphasis on safety and proper use of PPE
    - Yearly and seasonal refresher training
    - Organized and clean storage locations for equipment and herbicide
    - Safe mixing and handling practices
  - Mapping
    - Survey 123
    - Show maps and attribute fields, and interface screenshots
  - Timing
    - Show cycle with timeli
  - Phasing, scheduling, planning
    - Have a 5-year plan
    - Make time for it on the schedule
    - Be prepared, have things in place, have equipment service ready, have staff ready and trained
    - Make a yearly treatment and monitoring calendar
    - Reconnaissance, know where your weeds are at, have a plan of attack, hit the same locations until objectives achieved, don't get stretched thin, set priorities.

INVASIVE PLANT CONTROL METHODS

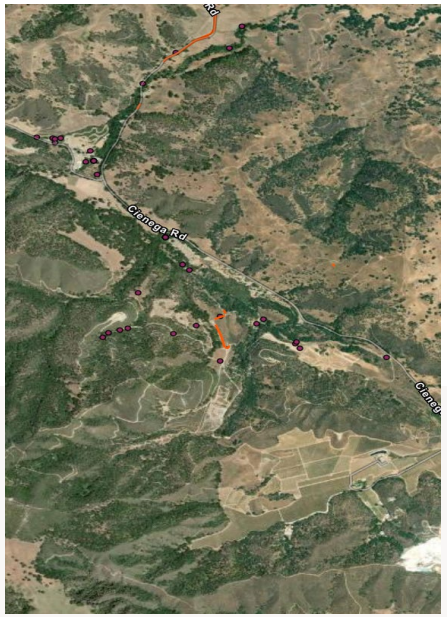
EARLY DETECTION RAPID TREATMENT

TIMELY BRUSHING



MANUAL REMOVAL

HERBICIDE TREATMENT



WEED MAPPING

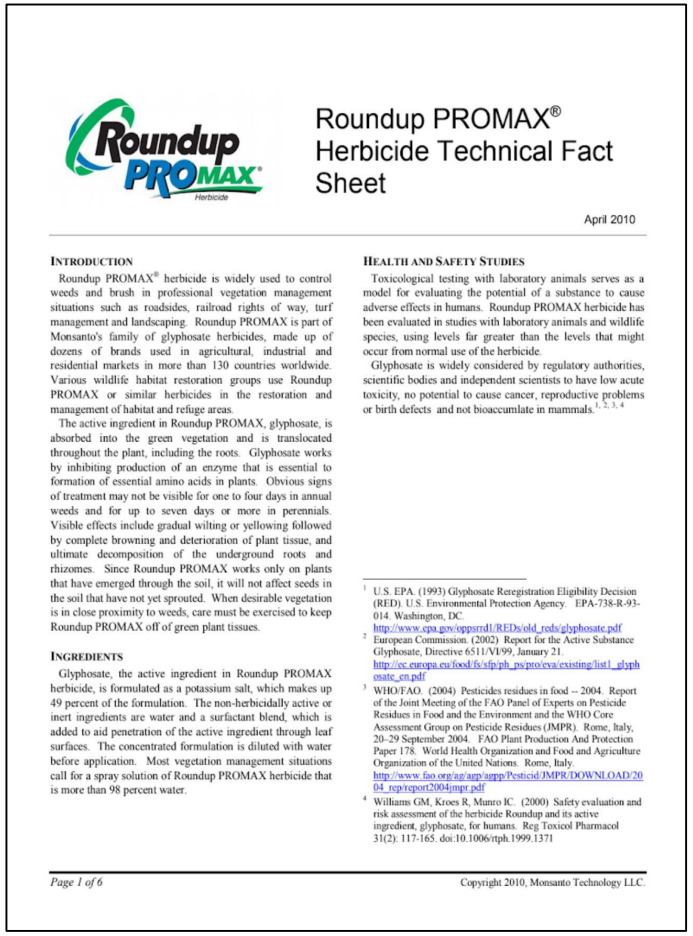
Brushing Techniques

- Weed whip down to the knub in large groups working in swaths.
- Weed whip saw heads to cut thick weed thatch.
- Large tractor mowing for multiple seasons in the same fields, before seed, and repeated times in the same season.
- Low mowing.

Spraying Techniques

- Spray after brushing
- Early season spot spraying
- Mid-summer combination spraying
- Late summer Pre-emergent herbicides
- High-pressure spraying
- Boom spraying
- Dye

Non-Selective Herbicides



Roundup PROMAX®
Herbicide Technical Fact Sheet

April 2010

INTRODUCTION

Roundup PROMAX® herbicide is widely used to control weeds and brush in professional vegetation management situations such as roadsides, railroad rights of way, turf management and landscaping. Roundup PROMAX is part of Monsanto's family of glyphosate herbicides, made up of dozens of brands used in agricultural, industrial and residential markets in more than 130 countries worldwide. Various wildlife habitat restoration groups use Roundup PROMAX or similar herbicides in the restoration and management of habitat and refuge areas.

The active ingredient in Roundup PROMAX, glyphosate, is absorbed into the green vegetation and is translocated throughout the plant, including the roots. Glyphosate works by inhibiting production of an enzyme that is essential to formation of essential amino acids in plants. Obvious signs of treatment may not be visible for one to four days in annual weeds and for up to seven days or more in perennials. Visible effects include gradual wilting or yellowing followed by complete browning and deterioration of plant tissue, and ultimate decomposition of the underground roots and rhizomes. Since Roundup PROMAX works only on plants that have emerged through the soil, it will not affect seeds in the soil that have not yet sprouted. When desirable vegetation is in close proximity to weeds, care must be exercised to keep Roundup PROMAX off of green plant tissues.

INGREDIENTS

Glyphosate, the active ingredient in Roundup PROMAX herbicide, is formulated as a potassium salt, which makes up 49 percent of the formulation. The non-herbicidally active or inert ingredients are water and a surfactant blend, which is added to aid penetration of the active ingredient through leaf surfaces. The concentrated formulation is diluted with water before application. Most vegetation management situations call for a spray solution of Roundup PROMAX herbicide that is more than 98 percent water.

HEALTH AND SAFETY STUDIES

Toxicological testing with laboratory animals serves as a model for evaluating the potential of a substance to cause adverse effects in humans. Roundup PROMAX herbicide has been evaluated in studies with laboratory animals and wildlife species, using levels far greater than the levels that might occur from normal use of the herbicide.

Glyphosate is widely considered by regulatory authorities, scientific bodies and independent scientists to have low acute toxicity, no potential to cause cancer, reproductive problems or birth defects and not bioaccumulate in mammals.[1, 2, 3, 4]

[1] U.S. EPA. (1993) Glyphosate Reregistration Eligibility Decision (RED). U.S. Environmental Protection Agency. EPA-738-R-93-014. Washington, DC. http://www.epa.gov/oppsrrd1/REDs/old_reds/glyphosate.pdf

[2] European Commission. (2002) Report for the Active Substance Glyphosate, Directive 6511/VI/99, January 21. http://ec.europa.eu/food/fs/sfp/ph_ps/pro/eva/existing/list1_glyphosate_en.pdf

[3] WHO/FAO. (2004) Pesticides residues in food -- 2004. Report of the Joint Meeting of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and the WHO Core Assessment Group on Pesticide Residues (JMPR). Rome, Italy, 20–29 September 2004. FAO Plant Production And Protection Paper 178. World Health Organization and Food and Agriculture Organization of the United Nations. Rome, Italy. http://www.fao.org/ag/agp/agpp/Pesticid/JMPR/DOWNLOAD/2004_rep/report2004jmpr.pdf

[4] Williams GM, Kroes R, Munro IC. (2000) Safety evaluation and risk assessment of the herbicide Roundup and its active ingredient, glyphosate, for humans. Reg Toxicol Pharmacol 31(2): 117-165. doi:10.1006/rtph.1999.1371

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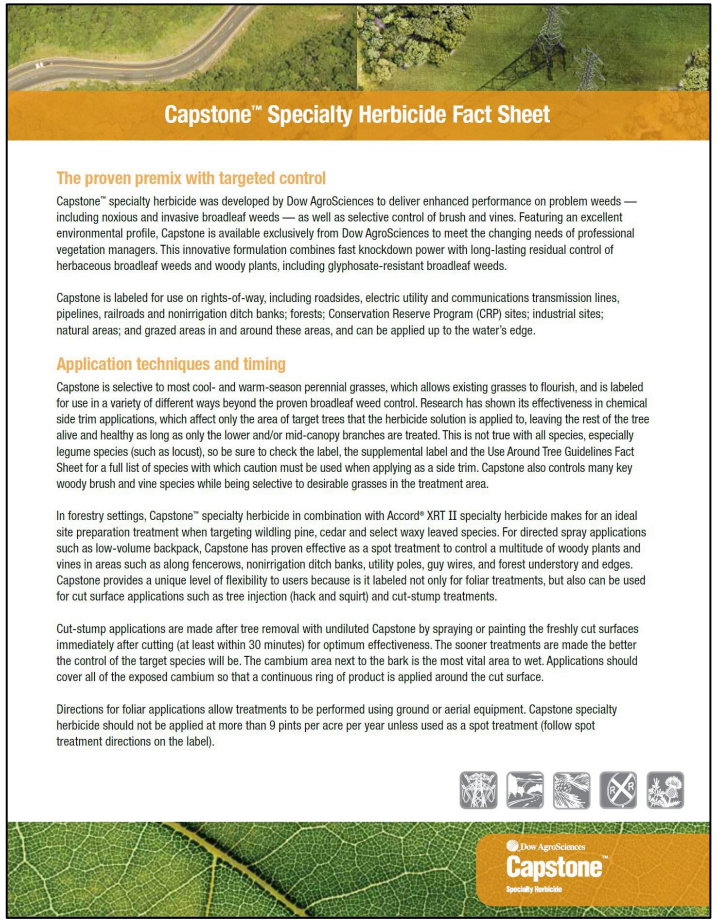
- Post-emergent
- Rain Ready
- With surfactant

Use Around Water

Selective Herbicides

Kill Weeds NOT Grass or Forbes



Capstone™ Specialty Herbicide Fact Sheet

The proven premix with targeted control

Capstone™ specialty herbicide was developed by Dow AgroSciences to deliver enhanced performance on problem weeds — including noxious and invasive broadleaf weeds — as well as selective control of brush and vines. Featuring an excellent environmental profile, Capstone is available exclusively from Dow AgroSciences to meet the changing needs of professional vegetation managers. This innovative formulation combines fast knockdown power with long-lasting residual control of herbaceous broadleaf weeds and woody plants, including glyphosate-resistant broadleaf weeds.

Capstone is labeled for use on rights-of-way, including roadsides, electric utility and communications transmission lines, pipelines, railroads and nonirrigation ditch banks; forests; Conservation Reserve Program (CRP) sites; industrial sites; natural areas; and grazed areas in and around these areas, and can be applied up to the water's edge.

Application techniques and timing

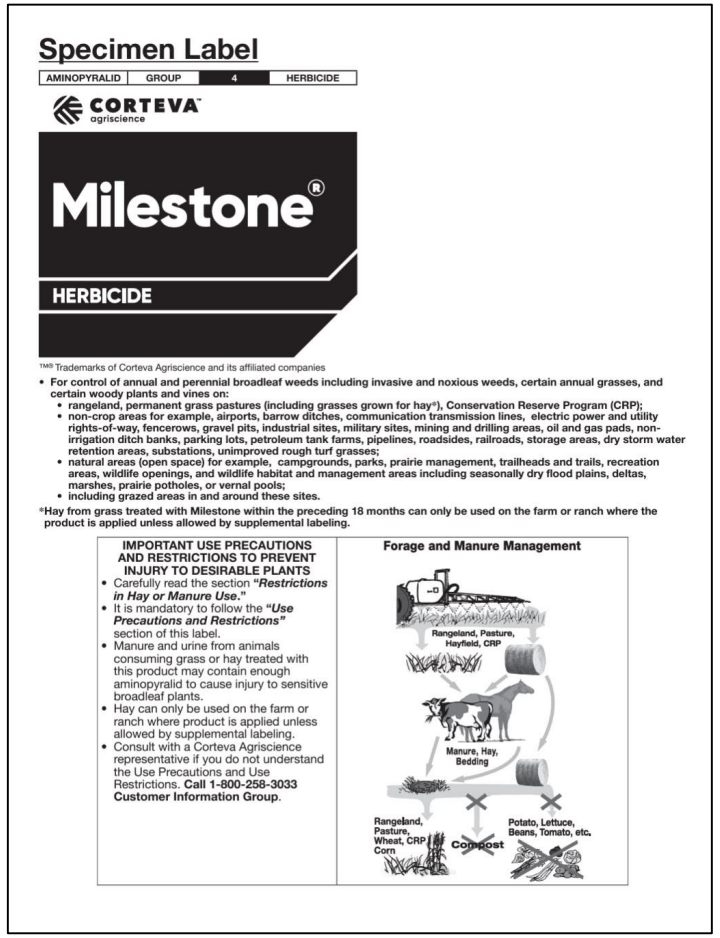
Capstone is selective to most cool- and warm-season perennial grasses, which allows existing grasses to flourish, and is labeled for use in a variety of different ways beyond the proven broadleaf weed control. Research has shown its effectiveness in chemical side trim applications, which affect only the area of target trees that the herbicide solution is applied to, leaving the rest of the tree alive and healthy as long as only the lower and/or mid-canopy branches are treated. This is not true with all species, especially legume species (such as locust), so be sure to check the label, the supplemental label and the Use Around Tree Guidelines Fact Sheet for a full list of species with which caution must be used when applying as a side trim. Capstone also controls many key woody brush and vine species while being selective to desirable grasses in the treatment area.

In forestry settings, Capstone™ specialty herbicide in combination with Accord® XRT II specialty herbicide makes for an ideal site preparation treatment when targeting wildling pine, cedar and select waxy leaved species. For directed spray applications such as low-volume backpack, Capstone has proven effective as a spot treatment to control a multitude of woody plants and vines in areas such as along fencerows, nonirrigation ditch banks, utility poles, guy wires, and forest understory and edges. Capstone provides a unique level of flexibility to users because is it labeled not only for foliar treatments, but also can be used for cut surface applications such as tree injection (hack and squirt) and cut-stump treatments.

Cut-stump applications are made after tree removal with undiluted Capstone by spraying or painting the freshly cut surfaces immediately after cutting (at least within 30 minutes) for optimum effectiveness. The sooner treatments are made the better the control of the target species will be. The cambium area next to the bark is the most vital area to wet. Applications should cover all of the exposed cambium so that a continuous ring of product is applied around the cut surface.

Directions for foliar applications allow treatments to be performed using ground or aerial equipment. Capstone specialty herbicide should not be applied at more than 9 pints per acre per year unless used as a spot treatment (follow spot treatment directions on the label).

Dow AgroSciences Capstone™ Specialty Herbicide



Specimen Label

AMINOPYRALID	GROUP	4	HERBICIDE

CORTEVA™ agriscience

Milestone®

HERBICIDE

™® Trademarks of Corteva Agriscience and its affiliated companies

- **For control of annual and perennial broadleaf weeds including invasive and noxious weeds, certain annual grasses, and certain woody plants and vines on:**
  - **rangeland, permanent grass pastures (including grasses grown for hay*), Conservation Reserve Program (CRP);**
  - **non-crop areas for example, airports, barrow ditches, communication transmission lines, electric power and utility rights-of-way, fencerows, gravel pits, industrial sites, military sites, mining and drilling areas, oil and gas pads, non-irrigation ditch banks, parking lots, petroleum tank farms, pipelines, roadsides, railroads, storage areas, dry storm water retention areas, substations, unimproved rough turf grasses;**
  - **natural areas (open space) for example, campgrounds, parks, prairie management, trailheads and trails, recreation areas, wildlife openings, and wildlife habitat and management areas including seasonally dry flood plains, deltas, marshes, prairie potholes, or vernal pools;**
  - **including grazed areas in and around these sites.**

***Hay from grass treated with Milestone within the preceding 18 months can only be used on the farm or ranch where the product is applied unless allowed by supplemental labeling.**

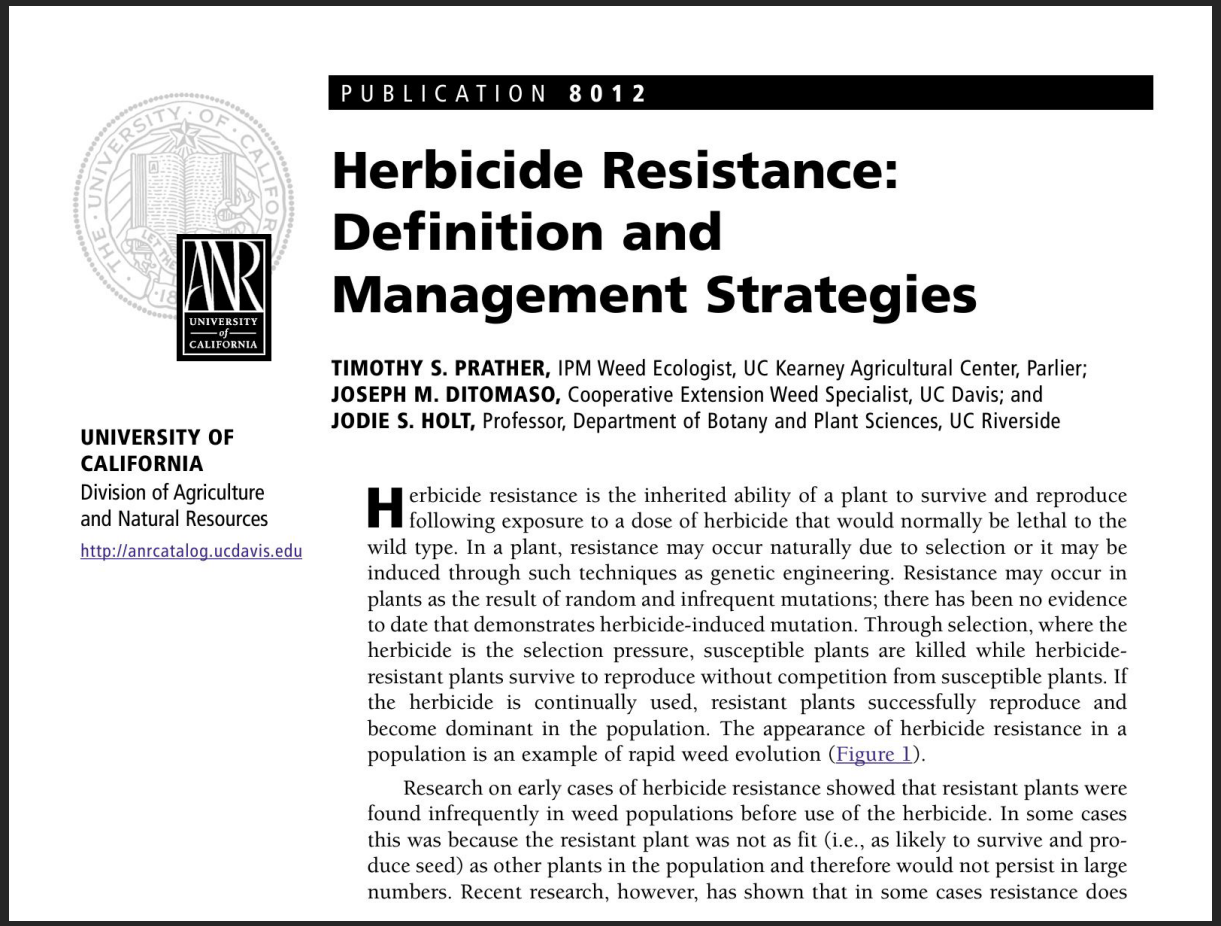
IMPORTANT USE PRECAUTIONS AND RESTRICTIONS TO PREVENT INJURY TO DESIRABLE PLANTS

- Carefully read the section ***"Restrictions in Hay or Manure Use."***
- It is mandatory to follow the ***"Use Precautions and Restrictions"*** section of this label.
- Manure and urine from animals consuming grass or hay treated with this product may contain enough aminopyralid to cause injury to sensitive broadleaf plants.
- Hay can only be used on the farm or ranch where product is applied unless allowed by supplemental labeling.
- Consult with a Corteva Agriscience representative if you do not understand the Use Precautions and Use Restrictions. **Call 1-800-258-3033 Customer Information Group.**

Forage and Manure Management

- Pre-emergent
- Can mix with Roundup

Most Flexible



PUBLICATION **8012**

Herbicide Resistance: Definition and Management Strategies

TIMOTHY S. PRATHER, IPM Weed Ecologist, UC Kearney Agricultural Center, Parlier;
JOSEPH M. DITOMASO, Cooperative Extension Weed Specialist, UC Davis; and
JODIE S. HOLT, Professor, Department of Botany and Plant Sciences, UC Riverside

UNIVERSITY OF CALIFORNIA
Division of Agriculture and Natural Resources
http://anrcatalog.ucdavis.edu

Herbicide resistance is the inherited ability of a plant to survive and reproduce following exposure to a dose of herbicide that would normally be lethal to the wild type. In a plant, resistance may occur naturally due to selection or it may be induced through such techniques as genetic engineering. Resistance may occur in plants as the result of random and infrequent mutations; there has been no evidence to date that demonstrates herbicide-induced mutation. Through selection, where the herbicide is the selection pressure, susceptible plants are killed while herbicide-resistant plants survive to reproduce without competition from susceptible plants. If the herbicide is continually used, resistant plants successfully reproduce and become dominant in the population. The appearance of herbicide resistance in a population is an example of rapid weed evolution (Figure 1).

Research on early cases of herbicide resistance showed that resistant plants were found infrequently in weed populations before use of the herbicide. In some cases this was because the resistant plant was not as fit (i.e., as likely to survive and produce seed) as other plants in the population and therefore would not persist in large numbers. Recent research, however, has shown that in some cases resistance does

Herbicide Resistance

Definition: Target plant survives and reproduces even after exposure to herbicide.

Resistance Management Guidelines:

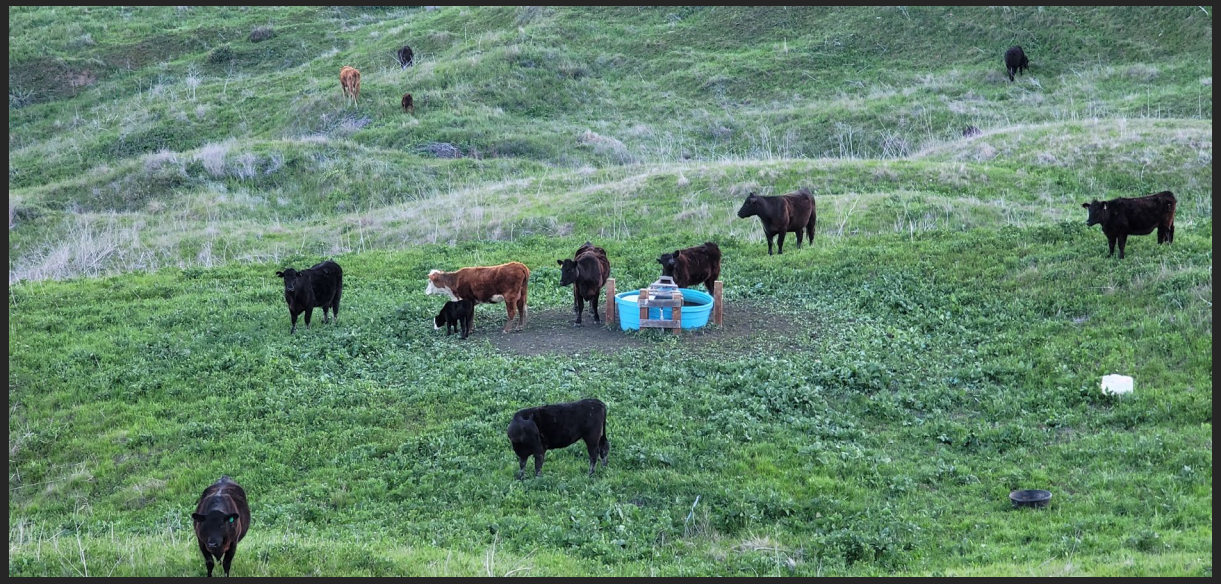
- Let areas rest (Cycle years)
- A combination of different management techniques at the same site.
- No more than 1 entry per year with certain herbicides
- Use correct dosages

High Pressure Weed Sprayer

Boom Sprayer

Manual Removal Techniques

- Pull and bag, all stinkwort and weed weeds have gone to seed
- Late season pulling of previously treated sites
- Isolated locations
- Small patches
- Large groups at one location



CATTLE GRAZING

- Seasonal
- Trample and graze on weeds
- Keep populations subdued and with a mosaic presence
- Rotational grazing: high intensity low duration within paddocks or smaller pen
- YST Populations persist into the summer
    - So intense weed whipping of isolated patches have been targeted and timely brushed.

Prescribed Fire Management Program

- Period of Growth
- Building Capacity
- Improvement and Development
- CalFire Relationship/Local Operating Agreements
- Projects
  - Burn plans in place to burn grasslands that are infested with YST.
  - Kill plants needs good timing, sometimes a logistical and planning challenge.
  - Repeated fires needed for success.

GOAT GRAZING