





Are we out of the woods yet? Trends of environmental threats from marijuana cultivation in our public forests

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The Fisher (Pekania pennanti)



2009





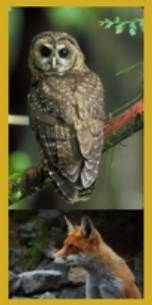


What Risks Does AR Pose?



Homeowner, Ranch, Farm or Illegal User Distributes AR.

Target species (rodents) consume the bait and die (1-10 days) or are sick and compromised.



Predator Eats Exposed Prey.

Predator is exposed to AR and either becomes sick or possibly dies from exposure.



Higher Predators Exposed.

Due to AR persistence in tissues, exposure continues up through the food-web.



Exposure Transferred to Scavengers, or Carrion Consumers.

Continued food-web contamination.



2009-2012

PLOS ONE

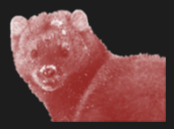
Anticoagulant Rodenticides on our Public and Community Lands: Spatial Distribution of Exposure and Poisoning of a Rare Forest Carnivore

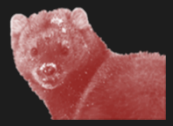
- Four fisher deaths
- 79% exposed
- 1.61 rodenticides
- Kit exposed

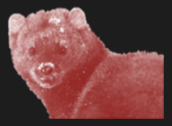




	N.CA	Sierras	All CA
2012 Paper — Exposure	72%	83%	79%
2012 Paper — Mortality	2	2	4
2015 Paper — Exposure	84%	86%	85%
2015 Paper — Mortality	5	4	9
Nov 2015- December 2018 — Exposure	82% (n= 17)	84% (n= 31)	83% (n= 48)
Nov 2015- December 2018 — Mortality	3	3	6








The Fisher Became the Canary in the Coal Mine

- Other Species?
- The Environment?
  - Water, Soil, Plants…..
- Humans?
  - Community Members
  - Law Enforcement




FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE
UCDAVIS
VETERINARY MEDICINE
Karen C. Drayer Wildlife Health Center
IERC
Integral Ecology Research Center
THE GREAT SEAL OF THE
HOOPA VALLEY TRIBE
TRINITY COUNTY
SHERIFF
CALIFORNIA
DEPARTMENT OF
FISH &
WILDLIFE





Cannabis Site Documentation Project



Integral Ecology Research Center

Documentation Objectives

- Establish a robust and safe protocol to document a site
- Water use and diversion amounts
- Mapping of area of cultivation
- Amount and types of pesticides & fertilizers
- Soil & water sampling
- Native and cannabis plant sampling

Numerous other variables





Mean Amount of Fertilizer and Toxicants **per** Cultivation Location

Soluble Fertilizer kgs (lbs)	1,268 lb
Liquid Fertilizer L (oz)	1,353 oz
Carbamates	48 oz
Organophosphates	82 oz
Pyrethroids	205 oz
Neonicotinoids	21 oz
Avermectins	90 oz
1st Gen ARs kgs (lbs)	17 lb
2nd Gen ARs	9 lb
Neurotoxicant Rodenticides	8.7 lb
Phosphides	4.4 lb

Amount of Fertilizer and Toxicants used State-wide Annually (projected)

Average per year: 356 locations discovered in CA

Soluble Fertilizer	731,224 lbs
Liquid Fertilizer L (oz)	491,280 oz
Carbamates	20,612 oz
Organophosphates	41,296 oz
Pyrethroids	125,312 oz
Neonicotinoids	7,582 oz
1st Gen ARs kgs (lbs)	6,444 lbs
2nd Gen ARs	3,916 lbs
Neurotoxicant Rodenticides	3,560 lbs
Phosphides	819 lbs

Is 6 gallons a day (the only published estimate)realistic for outdoor- trespass cultivation?



- Evapotranspiration
- Local climate
- Plant health

Not Likely

Current water use estimates for 2014-2015 sites

- Avg: of ~ 9 gallons per plant, per day



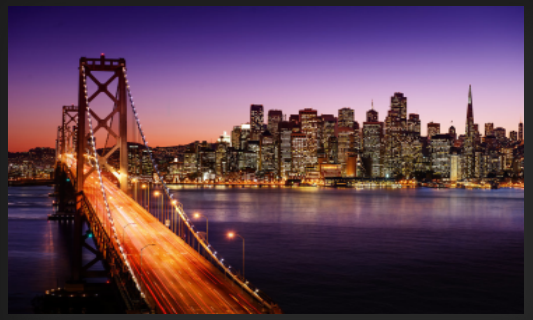




Estimation of Public Land Water Use: California

* **900 gallons per plant, full season**

2012: ~870,000 plants	=	**780 million gallons**
2013: ~500,000 plants	=	**450 million gallons**
2014: 500,000+ plants	=	**450 million gallons**
2015: 640,000 plants	=	**576 million gallons**
2016/17: 1,250,000+	=	**1.1 billion gallons**



Each Year: Amount of San Francisco households uses: **1- 2 months**

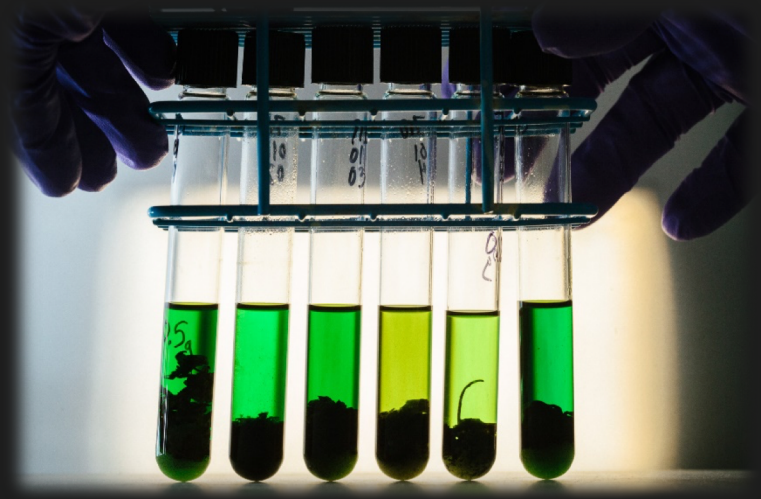

7 lines at 8 gallons per min. =
3,360 gallons per hour or
80,640 gallons per day
29.4 million gallons per year
IERC
Integral Ecology Research Center



Cannabis, Soil and Water Project Objectives

- Test for toxicants that pose both environmental & human health risks (73 different pesticides)
  - Soil
  - Water (plus nutrient loading)
  - Native vegetation & Cannabis





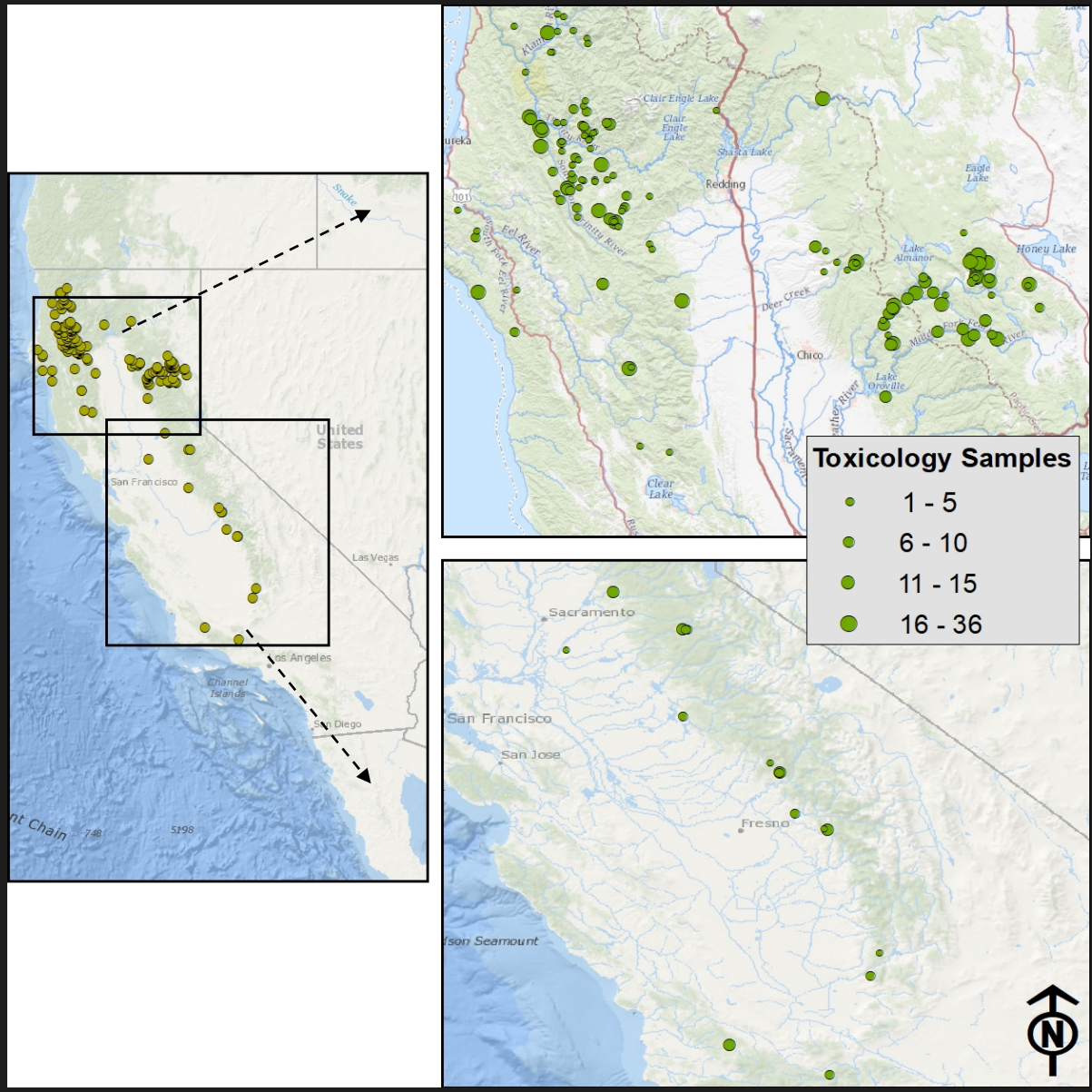
Toxicology Sampling, 2014-2018

165 sites

1,532 total samples

73 pesticide analytes

15 pesticides detected



Oldest positive sample after eradication: 1,080 days

Water

Detected pesticides: 7 of 44 complexes (16%)



Soil

Detected pesticides: 35 of 89 complexes (39%)



Plant

Detected pesticides: 27 of 73 complexes (37%)



Carbofuran

- Banned for ALL legal uses in the United States, Canada and the European Union.
- Banned for its high toxicity to humans and the environment.
- ¼ Teaspoon can kill an African Lion
- Brand names differ (Furan, QuFuran, Furadan etc..)







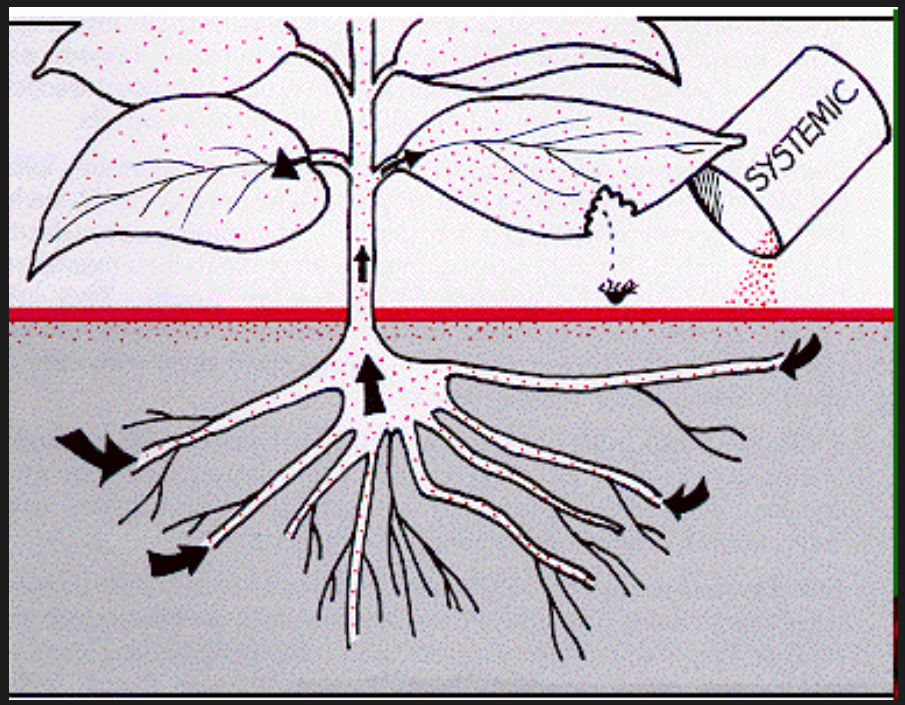




Mode of Action for Carbofuran & others..

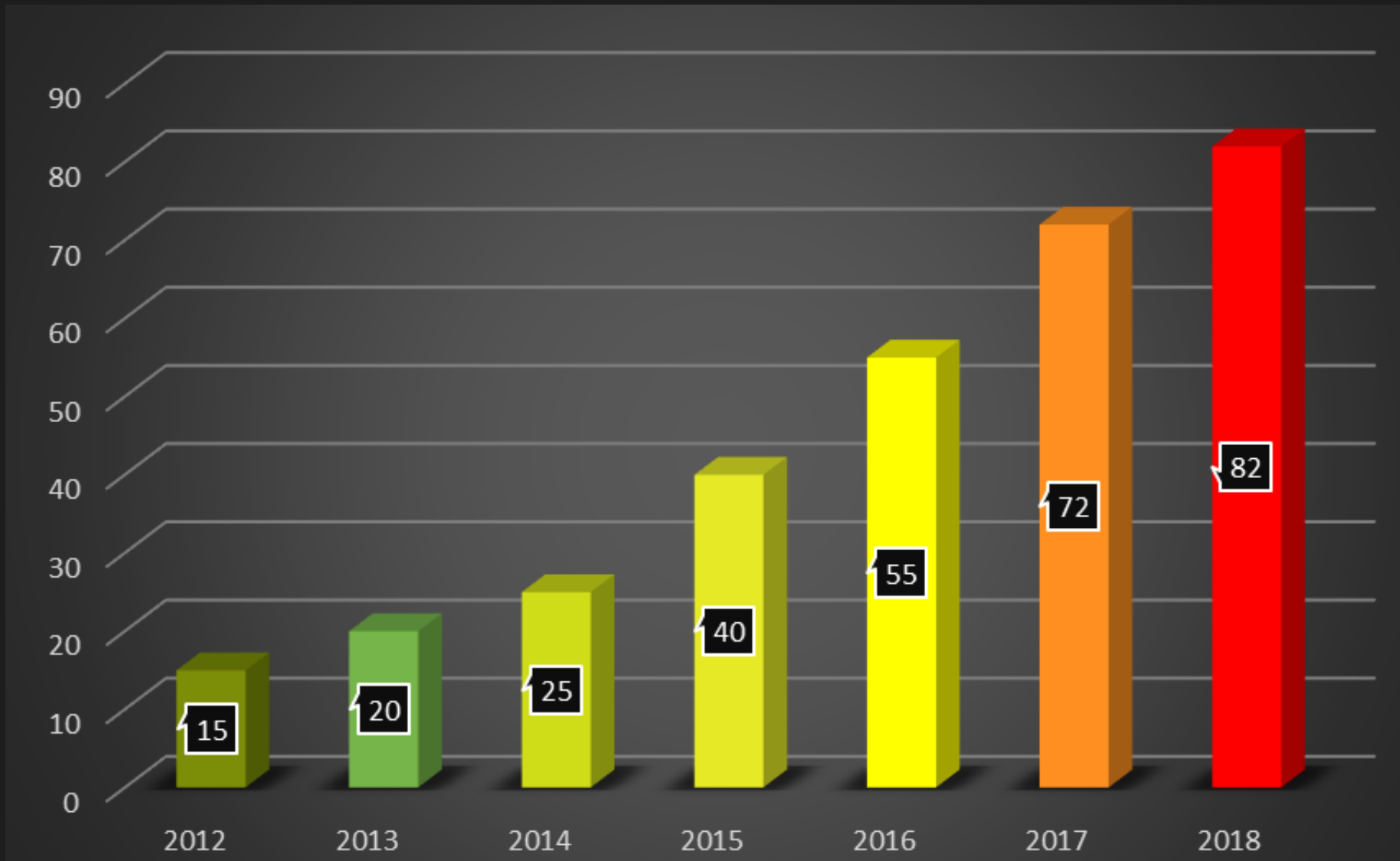


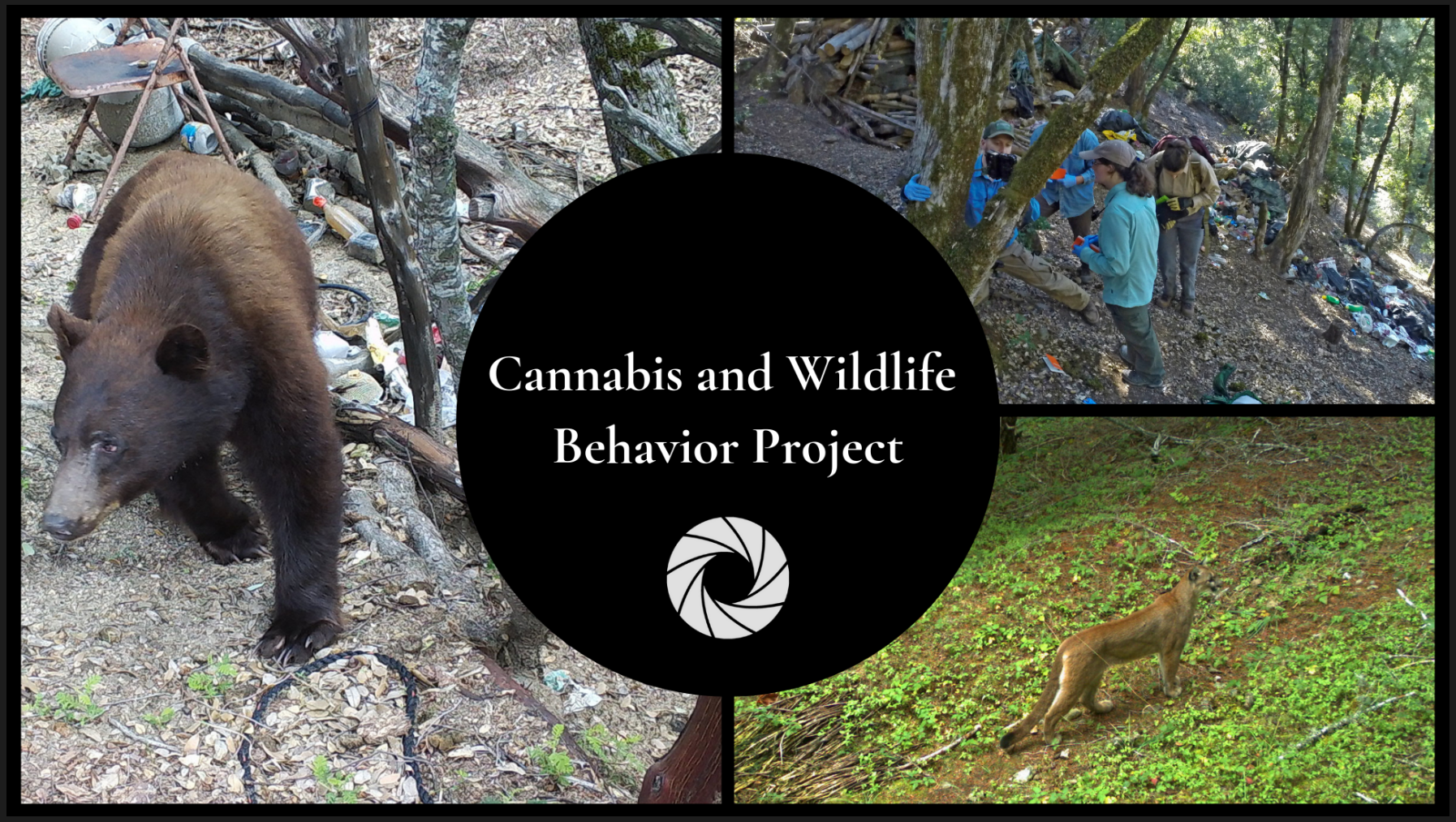






Percent of Sites in California where Carbofuran or Restricted Pesticides were Detected





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Cannabis and Wildlife Behavior Project

- Identify the wildlife species using these sites
- Are the animals using these sites at risk of pesticides?
    - Campsites
    - Trash dumps
    - Trails
- Monitor whether restoration efforts affect wildlife visitation




Integral Ecology Research Center
skCk 55°F 12°C
05-15-2018 13:08:36




Integral Ecology Research Center
ISKE 60°F 15°C
05-15-2018 13:18:27


Integral Ecology Research Center
ISKE 60°F 15°C
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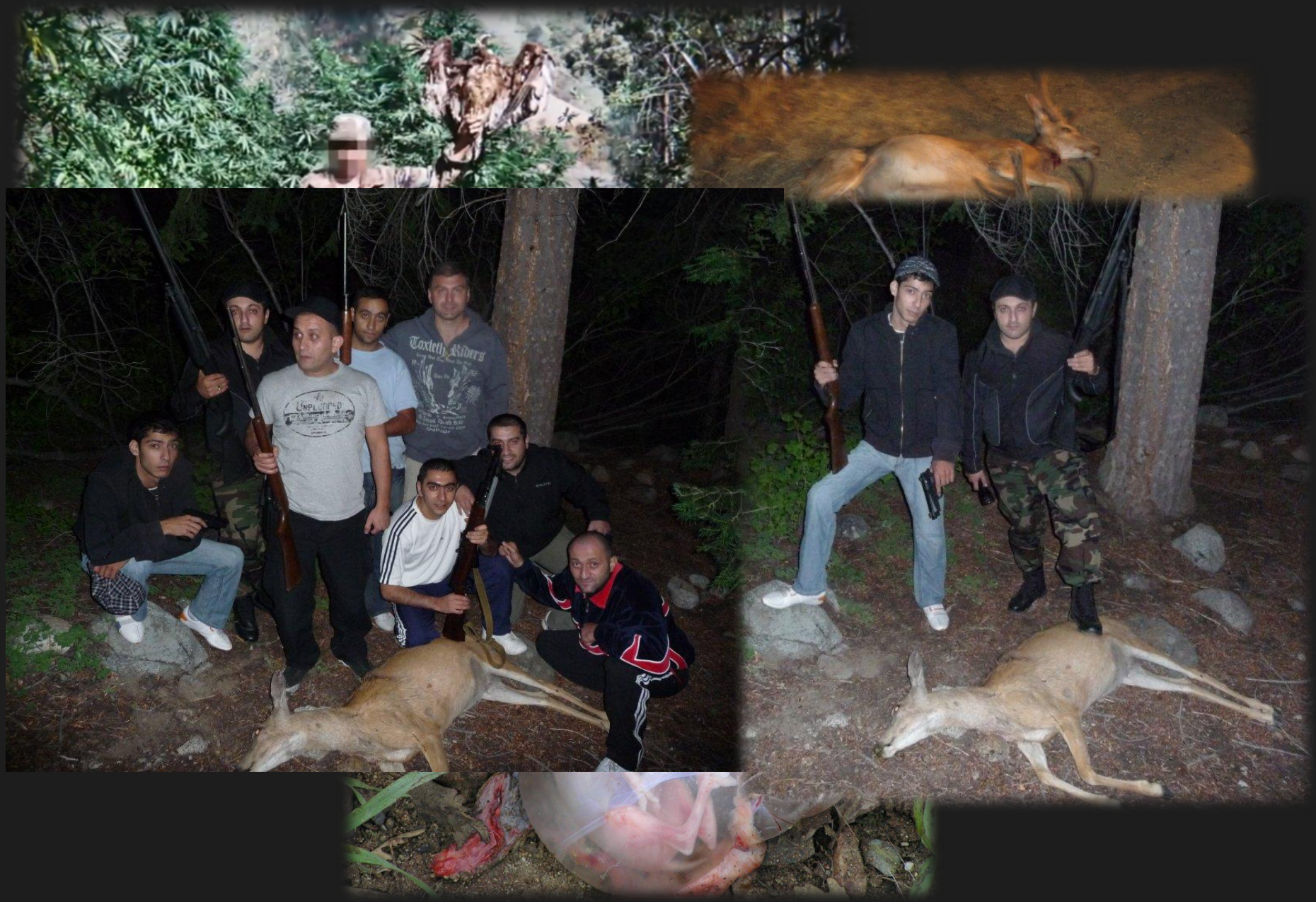
5℃
11/04/2014 10:30AM BRUSH14

Dead Wildlife Discovered at Grow Sites



Growers also Record the Wildlife they Poison or Poach



Number of Dead Wildlife Discovered

- Total of **90** dead animals discovered out of 85 sites.
- 46 of 85 (**54%**) locations we detected dead wildlife.





Number of Shot Wildlife 47





Number of Suspected Poisoning 24





Number of Confirmed Poisoning 19





Additional Notable Poisoning Cases

Two Separate Locations

- Location 1: One dead gray fox with nearby food items.
  - Nestled in the fox is a dead vulture.
- Location 2: One dead bear with nearby food items.
  - ≤ 2meters is a dead vulture.

NOTE: Many dead and dying flies. Positive for Carbofuran







Hunter Killed Game

Deer: 31 tested

Ruffed and sooty grouse: 5 tested

Band-tailed pigeon: 2 tested

Wild pig: 2 tested

Black bear: 2 tested

Mountain quail: 1 tested







MULE DEER FOUNDATION

Cannabis and Game Species Project

- One deer tested positive for rodenticide
- Mountain quail and black bear: **Positive.**

Is this now a Human Health Concern?







Northern Spotted and Barred Owl Project

AVIAN CONSERVATION & ECOLOGY

VOLUME 13, ISSUE 1, ARTICLE 2

Gabriel, M. W., L. V. Diller, J. P. Dumbacher, G. M. Wengert, J. M. Higley, R. H. Poppenga, and S. Mendia. 2018. Exposure to rodenticides in Northern Spotted and Barred Owls on remote forest lands in northwestern California: evidence of food web contamination. *Avian Conservation and Ecology* 13(1):2. https://doi.org/10.5751/ACE-01134-130102

Exposure to rodenticides in Northern Spotted and Barred Owls on remote forest lands in northwestern California: evidence of food web contamination

- N. Spotted Owls: 7 of 10 (70%)
- Barred Owls Tested: 84
  - 34 of 84 (40%) Positive for ≥ 1 AR



RESEARCH COMMUNICATIONS RESEARCH COMMUNICATIONS

Cannabis, an emerging agricultural crop, leads to deforestation and fragmentation

Ian J Wang[1*†], Jacob C Brenner[2], and Van Butsic[1†]

- Compared to commercial timberland clear cuts.
- Private grows proportionally created greater edge habitat than timber clear cuts.
- Clearcutting and habitat fragmentation was one of the driving factors for northern spotted owl's listing.

20



30

2	2	2
2	2	2
2	2	2
2	2	2
2	2	2

DEPUTY ILL AFTER POSSIBLE EXPOSURE TO BANNED PESTICIDE ON MARIJUANA GROW

July 23, 2018 | Kym Kemp | 65 comments

Press release from the Mendocino County Sheriff's Office:



> On Friday July 13th, Deputies from the Mendocino County Sheriff's Office Marijuana Eradication Team (C.O.M.M.E.T.) were assisting Wardens from the California Department of Fish and Wildlife with the service of a search warrant at a residence in the 13500 block of Kenny Creek Road in Branscomb. The purpose of the search warrant was to address a marijuana growing operation that involved suspected environmental crimes. These crimes included the illegal diversion of water for the purpose of cultivating. The growing operation was also thought to be illegal and unpermitted.

Pesticides Not Registered for Food Use in California

If a pesticide product does not have directions for use on a food crop, it cannot be used in cannabis cultivation. Examples of active ingredients that do not have food uses include:

- Aldicarb
- Carbofuran
- Chlordane
- Chlorfenapyr
- Coumaphos
- Daminozide
- DDVP (Dichlorvos)
- Etofenprox
- Fenoxycarb
- Imazalil
- Methyl parathion
- Mevinphos
- Paclobutrazol
- Propoxur
- Spiroxamine
- Thiacloprid

Is Metamidofos on this list?

California Restricted Materials

DPR designates certain pesticides as California restricted materials (3 CCR section 6400). A pesticide can be considered a restricted material for many reasons including designation as a federal Restricted Use Pesticide. Many of these products have product labels that clearly state "Restricted Use Pesticide." Consult your local CAC to determine whether a product is a restricted material. Examples of California restricted materials include:

- Abamectin
- Bifenthrin
- Brodifacoum
- Bromodiolone
- Cyfluthrin
- Difenacoum
- Difethialone
- Fipronil
- Naled

Pesticides on the Groundwater Protection List

Active ingredients that are on the Groundwater Protection List (3CCR section 6800) have chemical characteristics that make them likely to move into groundwater. Examples of active ingredients on the groundwater protection list include:

- Acephate
- Azoxystrobin
- Boscalid
- Carbaryl
- Chlorantraniliprole
- Diazinon
- Dimethoate
- Dimethomorph
- Ethoprop(hos)
- Fludioxonil
- Imidacloprid
- Malathion
- Metalaxyl
- Methiocarb
- Methomyl
- Myclobutanil
- Propiconazole
- Tebuconazole
- Thiamethoxam





Which one is contaminated with a systemic pesticide?

BOTH! With any systemic insecticide, visual cues alone will not tell you whether a plant is contaminated.

KRCR NEWS CHANNEL GET THE FACTS RIGHT

Trinity County Environmental Health: Pot grows infecting 108

by Courtney Kreider | Wednesday, December 20th 2017

2017

Trinity County Environmental Health issues a Public Service Announcement to consider filtering water below 108 creeks.

ACTION NEWS NOW Coverage you can count on!

MARIJUANA CULTIVATION CAUSES POSSIBLE PESTICIDE SPILL IN TRINITY RIVER



Trinity County Environmental Health removed US-banned pesticides during a search on Oct. 2 that were being used in the cultivation of marijuana.

Posted: Oct. 4, 2018 5:02 PM
Updated: Oct. 5, 2018 5:02 PM
Posted By: Stephanie Schmieding

2018

Trinity County Environmental Health quarantines a private cultivation site due to numerous banned pesticides detected.


CBSSF.COM


SUCCESS
SOLUTION
PROBLEM

Focus Areas to Offset Environmental Impacts

Enforcement
Disrupting sites

Interdiction
- Preventing establishment of sites.

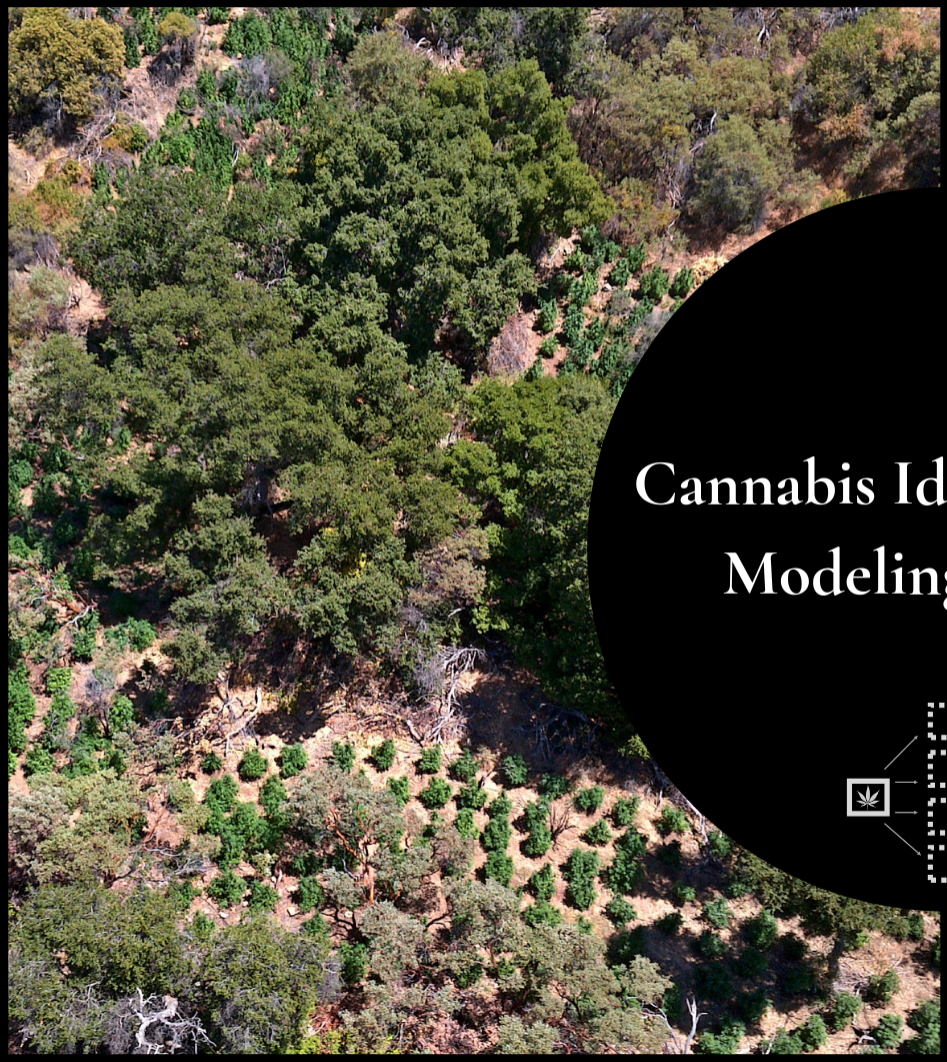
Removal
- Removing sites

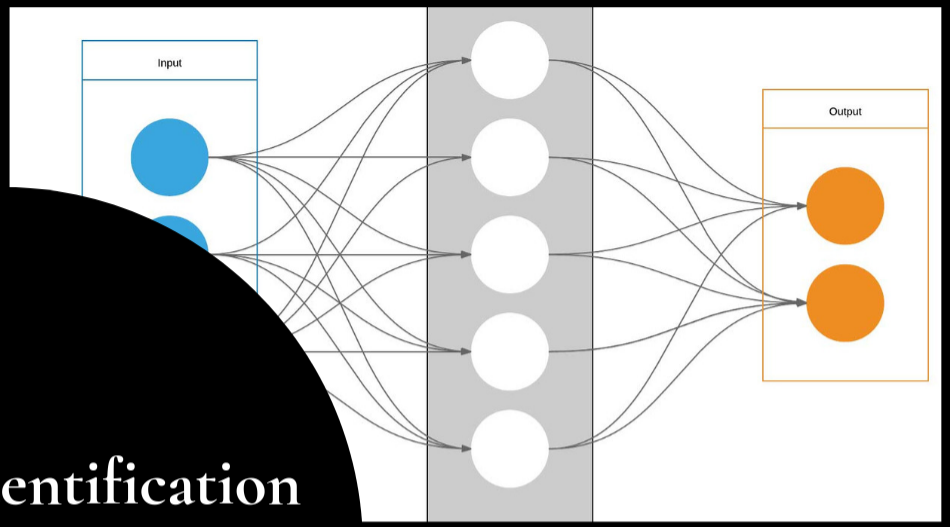


You need to know where sites are to be successfull

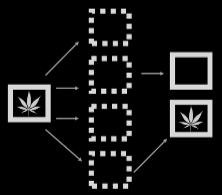
- Caveat: Law Enforcement does not detect all sites
- Eradicated sites: Of those found, only 10-20% are reclaimed







Cannabis Identification Modeling Project





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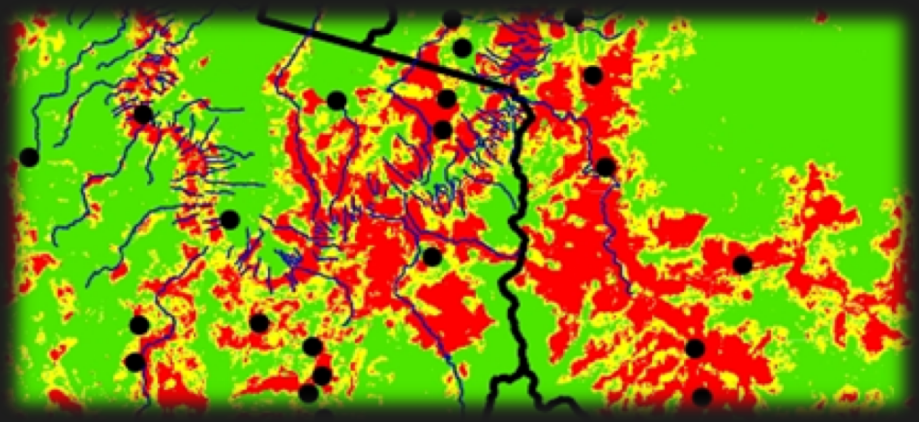
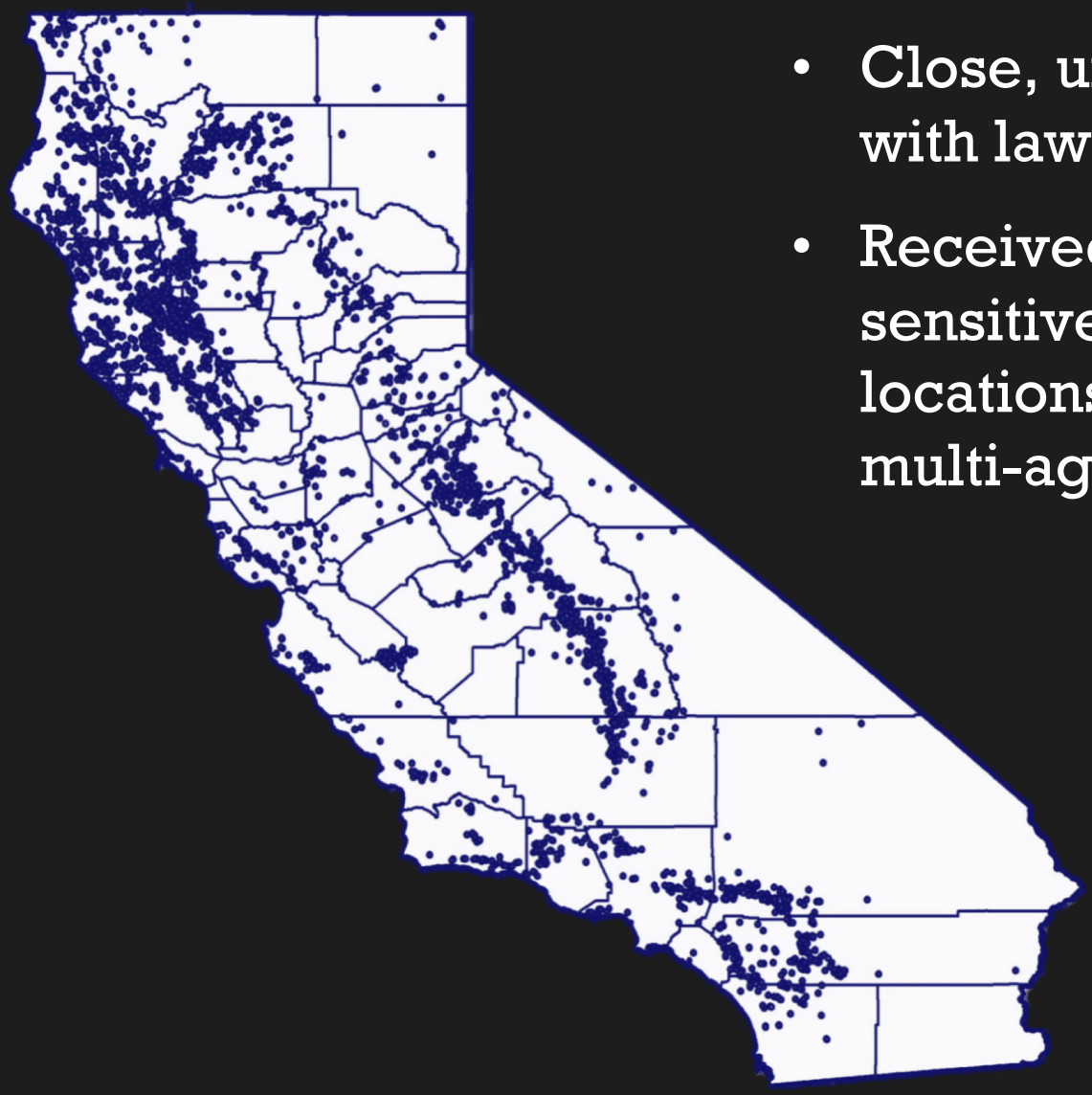
MAXENT (maximum entropy) modeling

- Use data to predict grow activity within sensitive species' habitats
- Use landscape features that growers might choose
- Identify the habitat areas for these species most at risk
- Overlay risk maps with habitat maps for these species



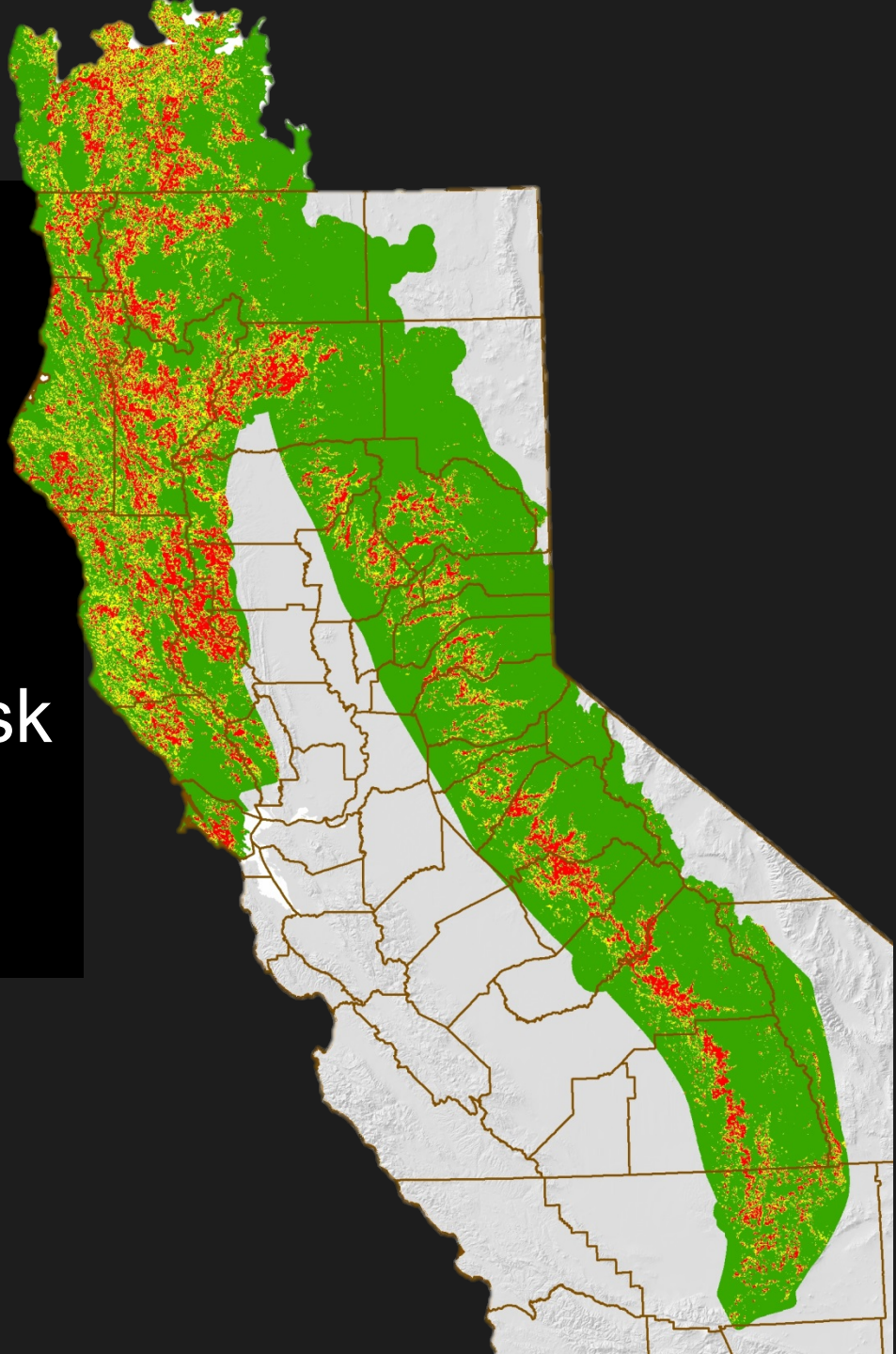
How can we achieve this without knowing the full extent of impact?



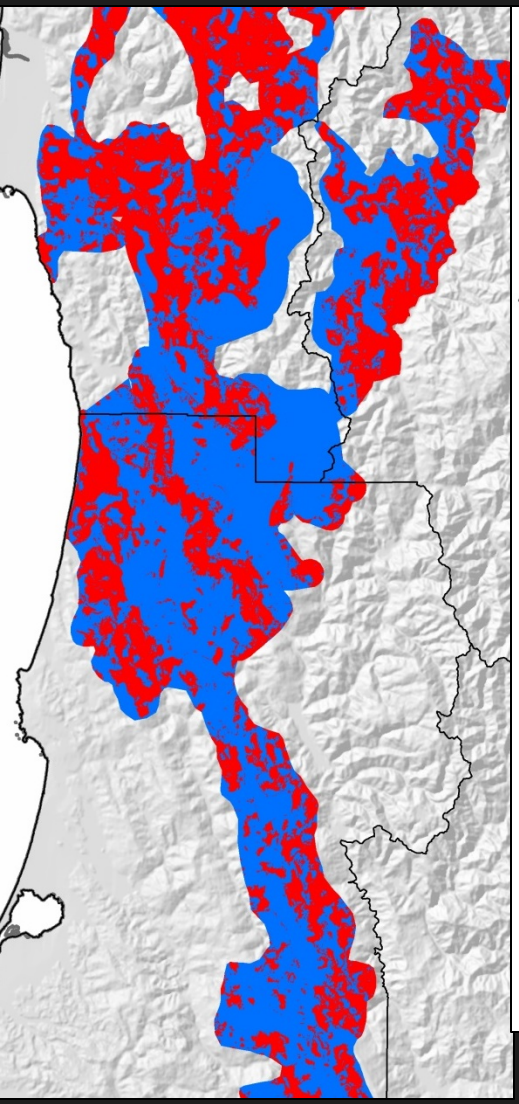
- Close, unique collaboration with law enforcement
- Received law-enforcement sensitive data on grow site locations (2004 – 2018) from a multi-agency collaborative.

Map resulting from final model

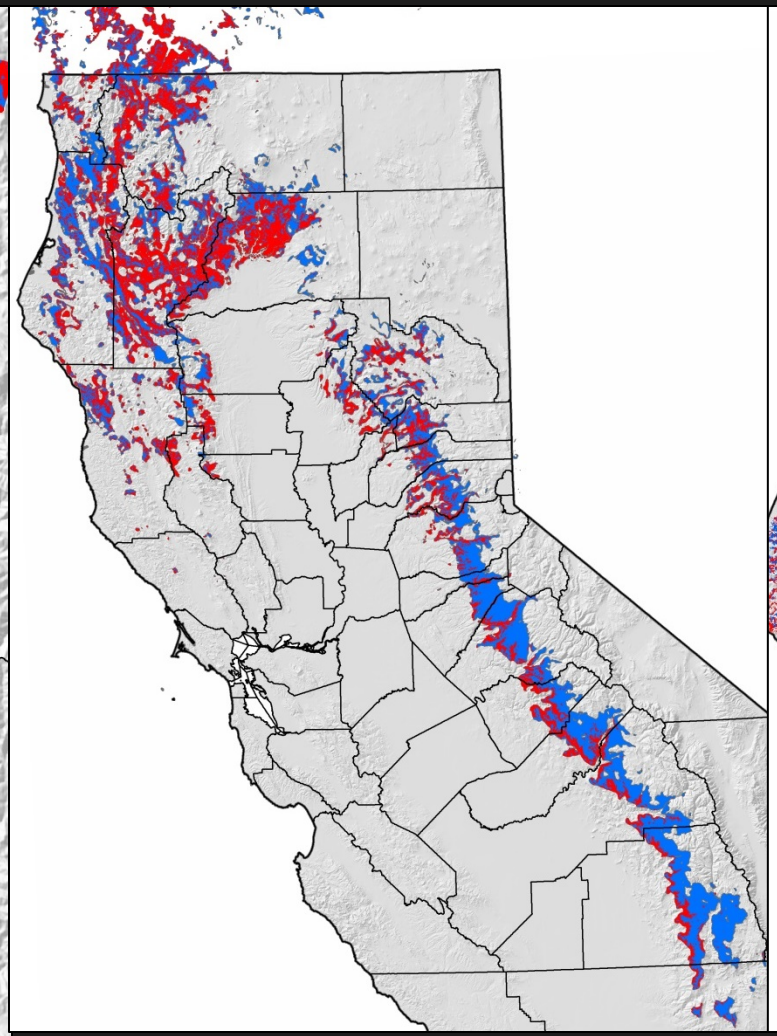
Red = MJ high risk
Yellow = MJ moderate risk
Green = MJ low risk



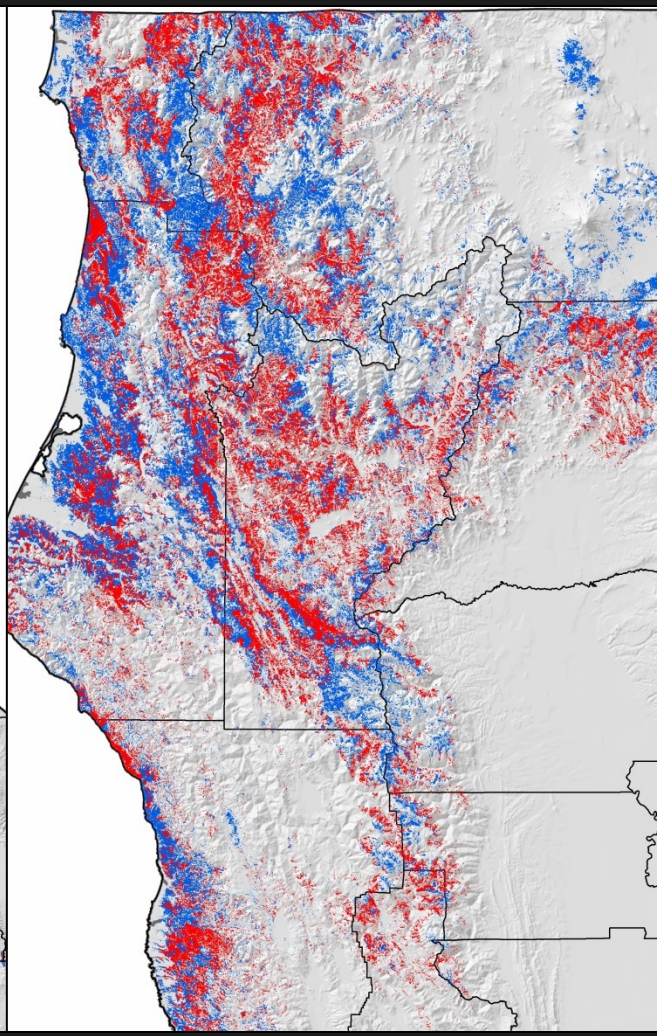
Risks to Sensitive Species



Humboldt Marten



Pacific Fisher

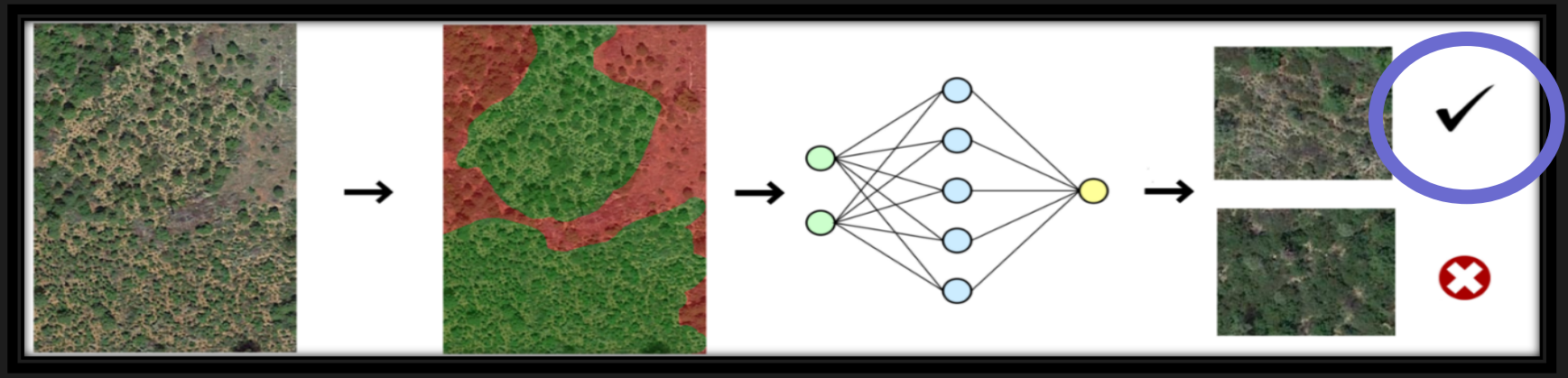


Northern Spotted Owl

High Quality Habitat

High-Moderate Risk of MJ

Detection Modeling:
Machine Learning



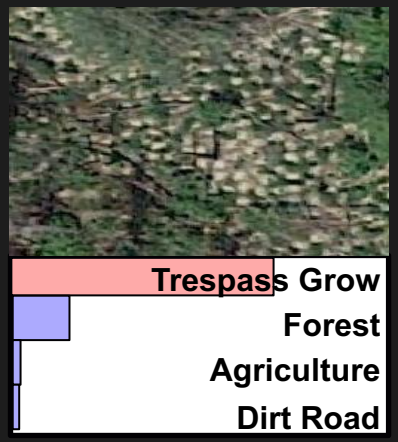
High quality aerial imagery
6in. resolution

Training images

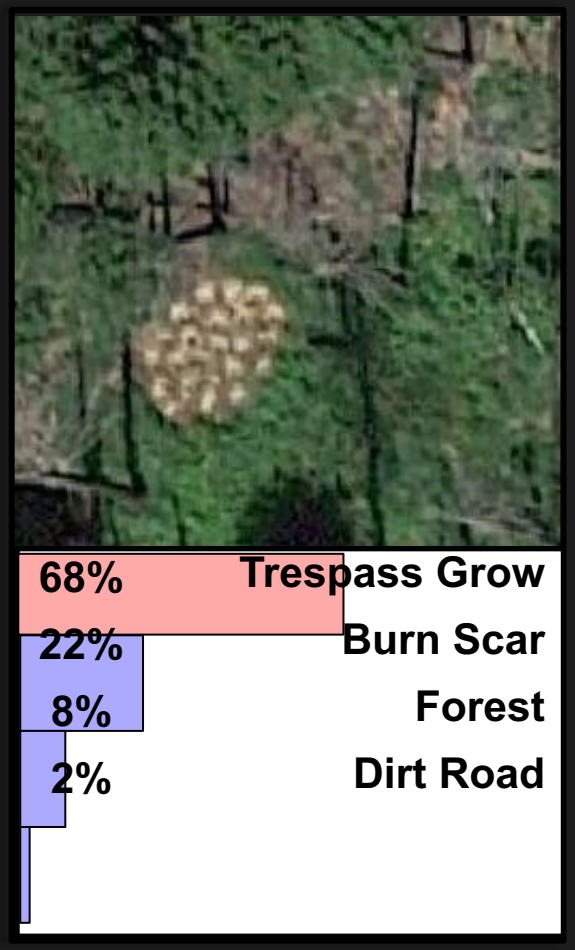
- Forest
- Dirt road
- Recent forest fire
- **Recent grows**
- **Historic grows**
- etc.

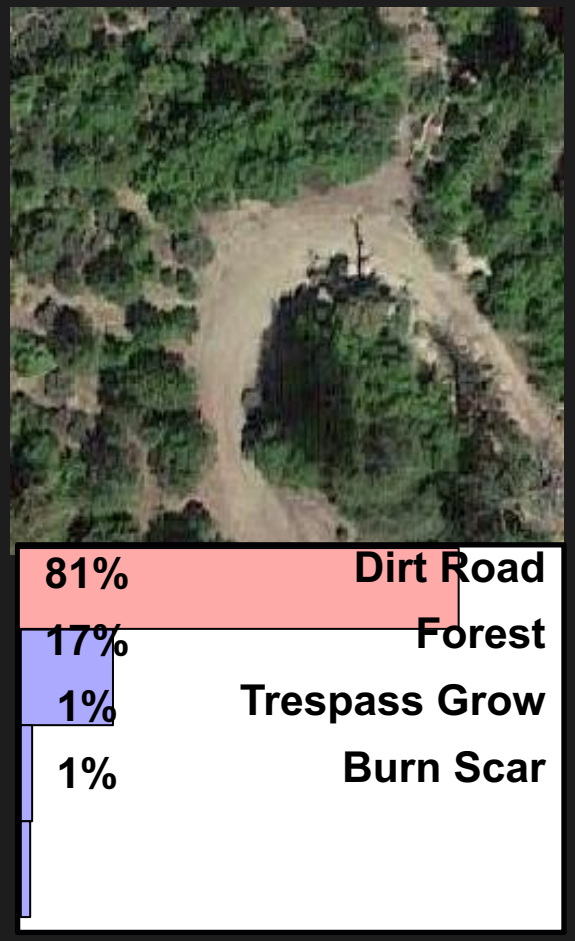
Network training
500+ images
500+ images
500+ images
500+ images
500+ images

Automated classification
50,000 + images



Funding:


68%
Trespass Grow
22%
Burn Scar
8%
Forest
2%
Dirt Road


81%
Dirt Road
17%
Forest
1%
Trespass Grow
1%
Burn Scar

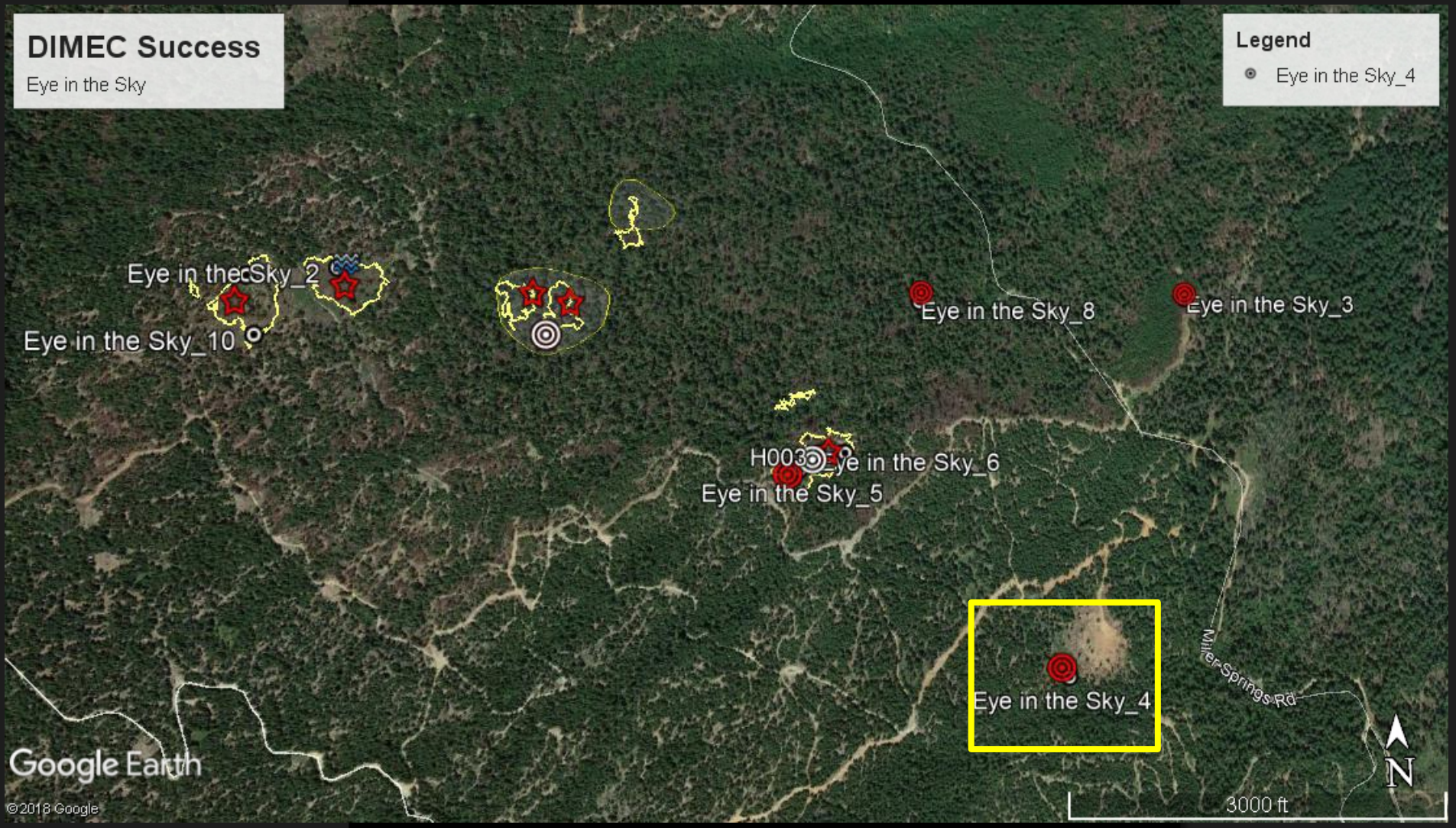
SUCCESSES

- Progress to date:
  - Model has detected 19 positive grow complexes
  - **Many were previously undetected by LE**
  - Generated 85 additional hits that still need validation



One of 9 total plots in the EyenSky Complex discovered by the DIMEC model.

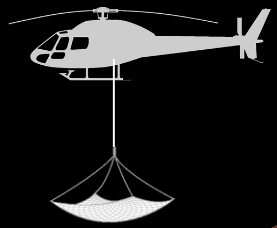
- Removed 4,950 lbs of infrastructure
- Removed over 34,000ft of pipe
- Active 2015-2017
- Estimated 41,000 plant grow







Cannabis Reclamation and Restoration Project



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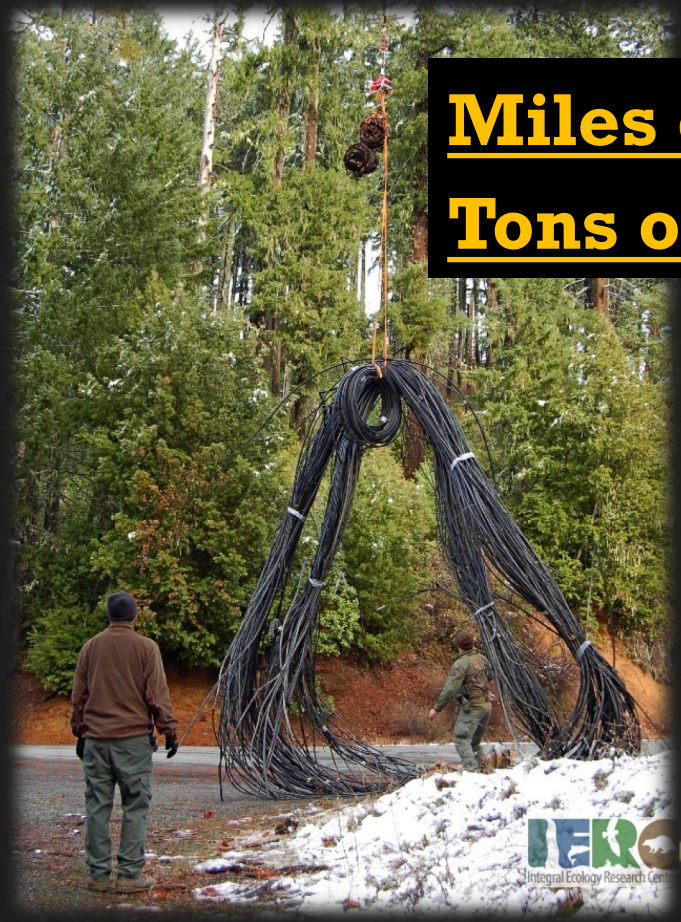
Data clearly show that if you reclaim a site, growers do not reoccupy that location.

- 2014-2019: Reclaimed **205** grow sites =

0% Reoccupation



Miles of Pipe: 31.4 miles

Tons of Trash: 24 tons





Thank You & Questions?







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www.IERCecology.org

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