Alternatives to Pesticides in the Park lands

(Pesticides= Pesticides and Herbicides)

Melinda MacNaughton, MS RDN-

-Dietitian, Masters in Nutrition Science

-Soil Advocate for Kiss The Ground

-Currently finishing coursework on Soil Microbiology by the foremost professor of soil biology, Dr Elaine Ingham at the Soil Food Web School

-El Granada Advocates member (local neighbors advocating for the protection of our environment and wildlife to keep our local climate resilient)

Expert Speaker Introductions

Sandy DeSimon, PhD
Audubon Starr Ranch Sanctuary
Director of Research, Education and Land Management
Chemical Free 4000 acre preserve, Orange County CA

Sarah Keiser, CEO
Wild Oat Hollow
Working to develop healthy fire ecosystems and climate resilient communities,
Sonoma CA

Megan Kaun, MS
Director of Sonoma Safe Ag and Safe Parks
Environmental Engineering and Hydrology
AB99

Is Glyphosate Used in Our Parks?

[1]

*YES along with eleven other Herbicides- SMC Parks

GGNRA and SMC Parks Integrated Pest Management (IPM) :

1. Includes manual methods, herbicides as a ‘tool’ to regularly spray invasive plants
2. SMC - minimal herbicide use/ spot spraying, **what is the definition? Who is monitoring this?**

What are our Concerns about Parks Usage?

1. Public Health
2. Reliance on continual use of glyphosate in addition to new fire breaks
3. Spraying and leaving contaminated plants to become fuel load
4. SOIL DEGRADATION, RUN OFF, DRIFT, WELLS & WATERSHED contamination
5. No policies to reduce Pesticides in Parks

What are motivations for municipal use of Pesticides?

1. Ease of Use
2. Lower cost

***But what are the costs to our**

Environment and Health?

Is Glyphosate Safe? FACTS

1. Lawsuits: 100,000 lawsuits 2020
2. 2015 WHO probable carcinogen
3. 2017 Prop 65 Warning: known carcinogen
4. Court order: 2020 EPA report: 93% of endangered species of plants and animals can be injured or killed
5. Court order: 2022 EPA ordered to withdraw **flawed assessment** of "glyphosate NOT likely a carcinogen"
6. Up to a 22 year half life (before it breaks down)
7. More than 750 products contain it.

HARM and Persistence Everywhere

Soil, Rain, Food, Drinking Water
Urine, Blood

Linked to cancer, NHL, ALS, linked to autoimmune disorders, celiac disease, depression and more

Affects frogs, bees, butterflies, earthworms and more

"ALL ANIMALS IN THE ANIMAL KINGDOM"

Pesticide breakdown by type, World, 1990 to 2020

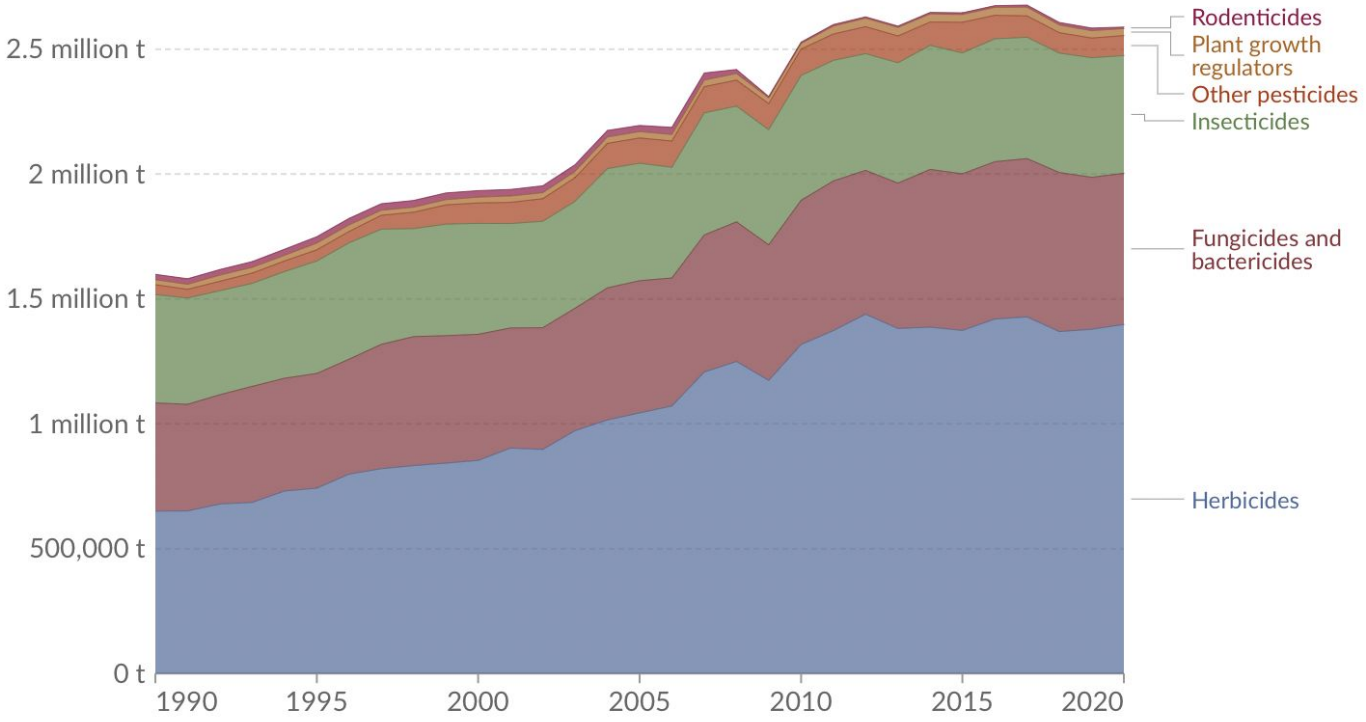
Pesticide use, broken down by product type, measured in tonnes of active ingredient.

Our World in Data

- table
- chart

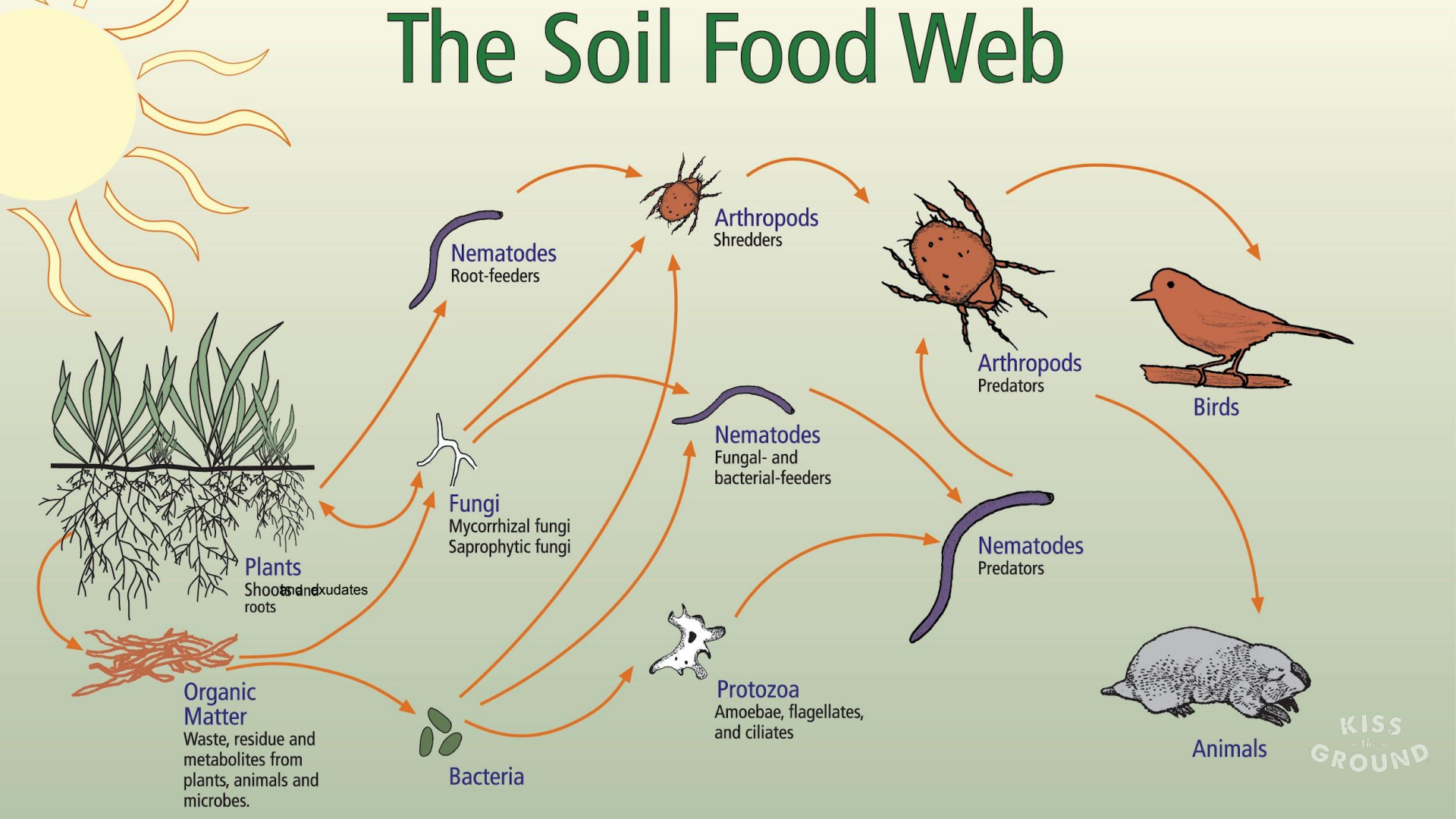
Edit countries and regions

Settings

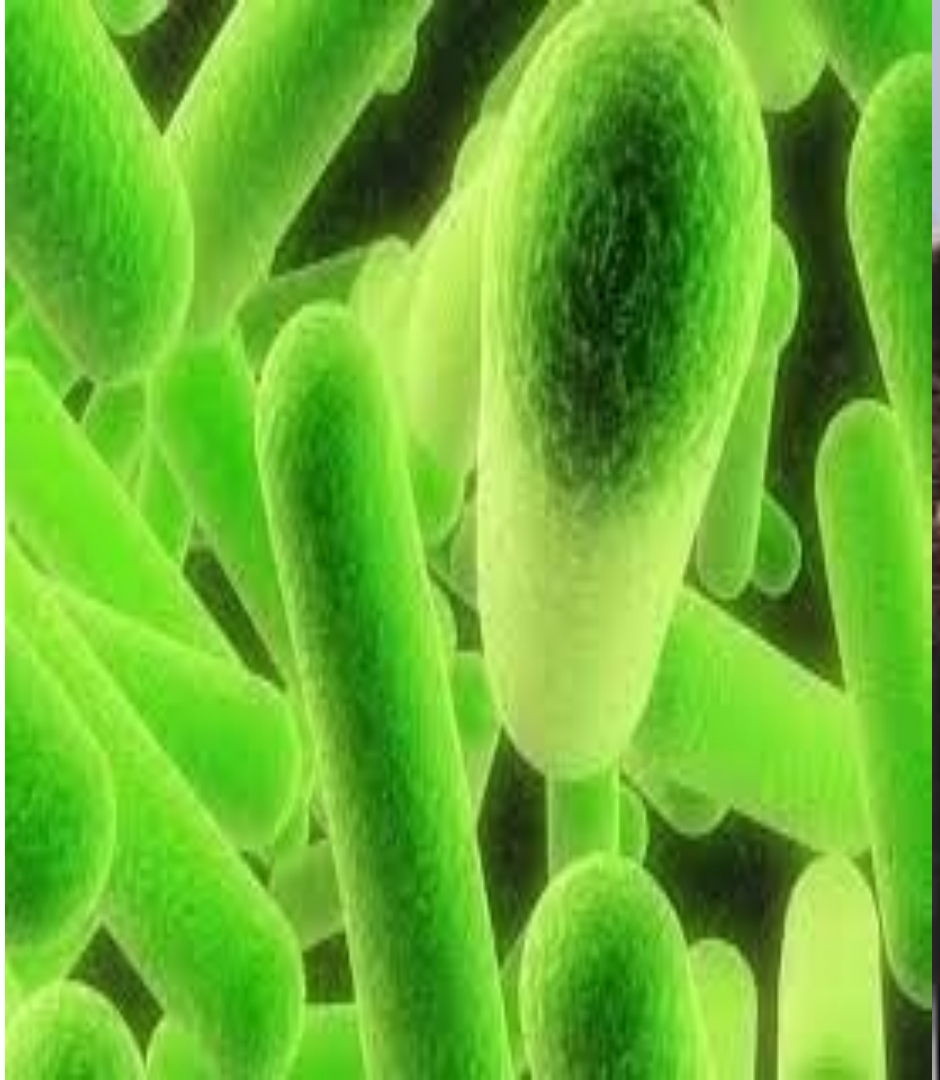


How Does Glyphosate Affect Climate Resilience?

The Soil Food Web



KISS the GROUND



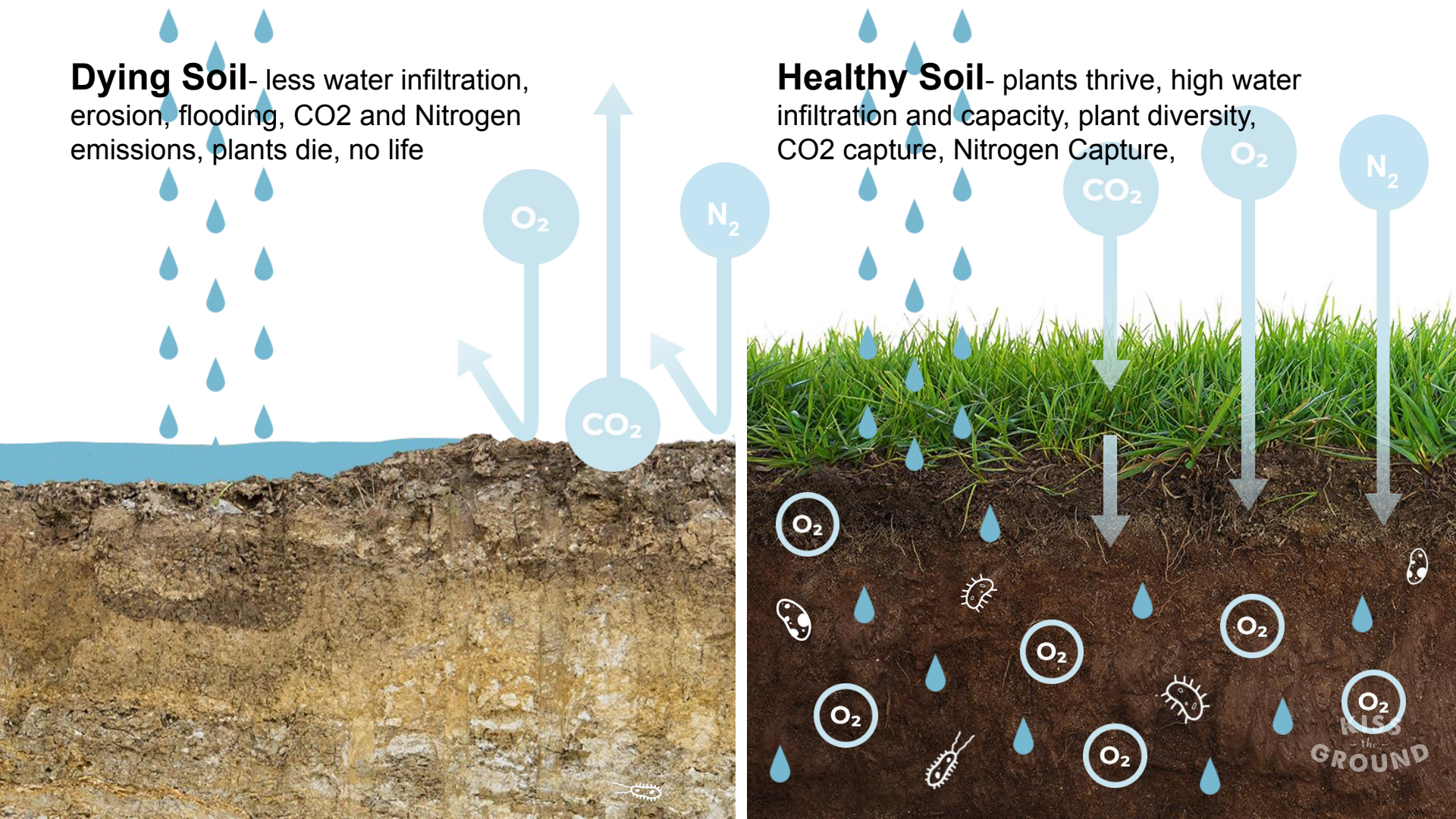
Fungi,bacteria,insects, worms,-support plant life and water retention

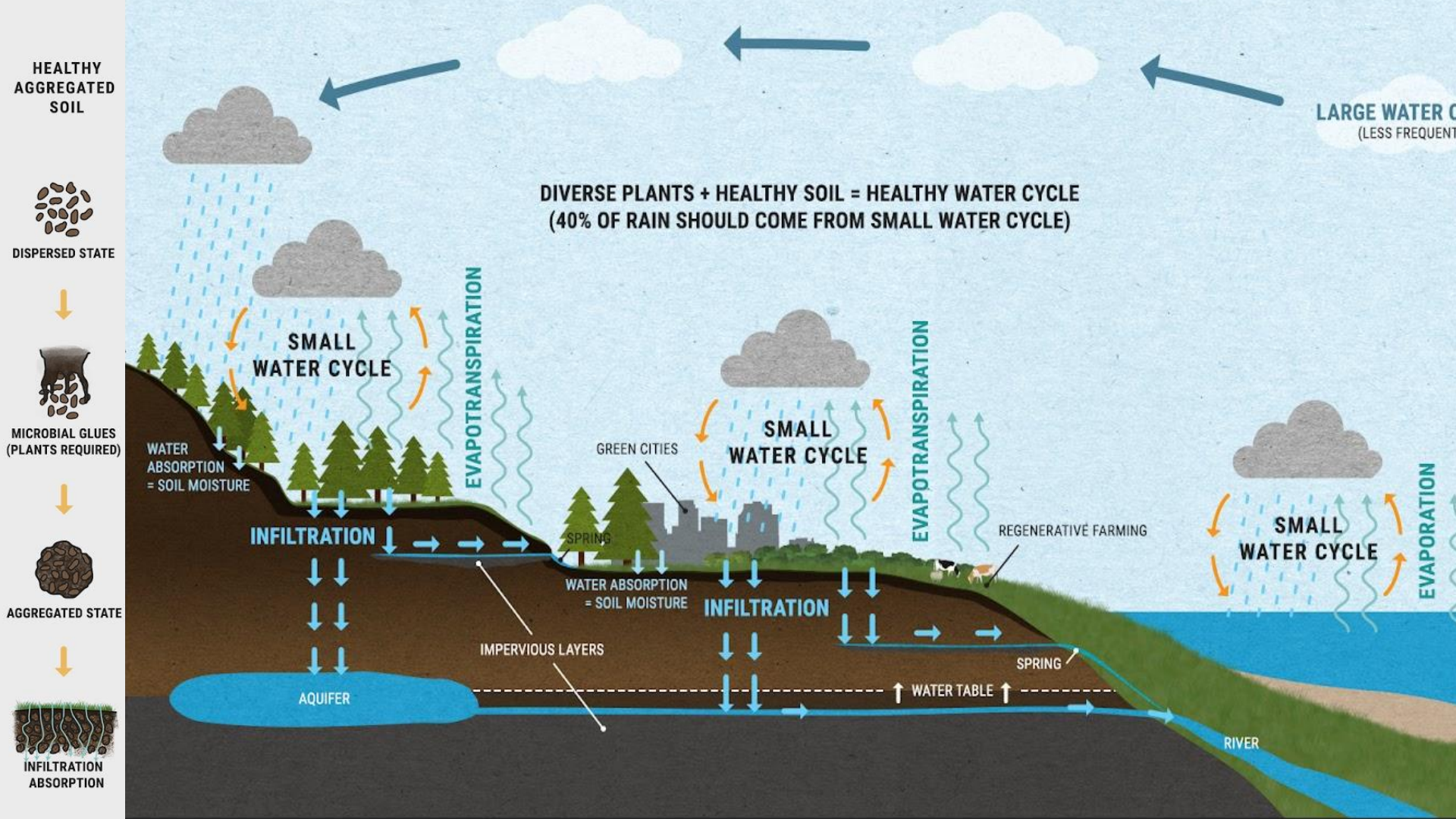
Mychorrizal Fungi Network (plants internet)

Glyphosate travels on this to affect non-target plants

Dying Soil- less water infiltration, erosion, flooding, CO2 and Nitrogen emissions, plants die, no life

Healthy Soil- plants thrive, high water infiltration and capacity, plant diversity, CO2 capture, Nitrogen Capture,




HEALTHY AGGREGATED SOIL
DISPERSED STATE
MICROBIAL GLUES (PLANTS REQUIRED)
AGGREGATED STATE
INFILTRATION ABSORPTION
DIVERSE PLANTS + HEALTHY SOIL = HEALTHY WATER CYCLE
(40% OF RAIN SHOULD COME FROM SMALL WATER CYCLE)
LARGE WATER C
(LESS FREQUENT
SMALL WATER CYCLE
EVAPOTRANSPIRATION
WATER ABSORPTION = SOIL MOISTURE
INFILTRATION
GREEN CITIES
SPRING
SMALL WATER CYCLE
EVAPOTRANSPIRATION
WATER ABSORPTION = SOIL MOISTURE
INFILTRATION
REGENERATIVE FARMING
SMALL WATER CYCLE
EVAPORATION
IMPERVIOUS LAYERS
SPRING
AQUIFER
WATER TABLE
RIVER

Alternative Techniques used in other cities and counties:
invasive plants

Drones for Mapping

Early Removal or Repeated Mowing

Weed Electrification

Organic Herbicides

Flame & Hot Steam

Remove Fuel ladder and plant ground cover

Grazing Goats

Specific Solutions to Specific Invasive Plants

Pampas Grass

Eucalyptus Stumps

Broom

Invasive Grasses

Exemplar Municipalities

1. **Irvine County** - drones to map, weed electrification, organics only, goats, beneficial insect release, -stopped using 100K gal/pesticides/yr with the help of Non-Toxic Neighborhoods (NTN)

   Won the 2019 IPM Achievement Award from the Department of Pesticide Regulation

2. **Sonoma City and County,** emergency use only, goats, organics, constantly working to reduce use to zero
3. **Audubon Starr Ranch Sanctuary**, completely chemical free
4. **Marin**, continually reduce, use organics, manual labor, grazing
5. **Malibu**, chemical free, volunteer with NPS

Exemplar Municipalities

1. *** Benicia**, organic herbicides, mulching, goats
2. **Woodside** and Open Space, chemical free, roadside-vinegar and neem oil, restore natives by planting and fertilizing soil blood and bone meal
3. **Burbank**- organics only, volunteer organizations, youth adopt a trail/park, weed competition/awards
4. **City of San Diego**, organics only (NTN)
5. **New York City**, organics only (NTN)
6. **Menlo Park, CA** herbicide free (Supervisor Mueller)
7. **Palo Alto**- manual, Pesticides only as last resort
8. ***Neighborhood programs for citizens**: Poison Free Malibu and Smart Yards-Marin, and GreenTown Los Altos, Woodside
9. **Indigenous Land** when not under govt influences, don't use chemicals on the land

Grants/Saving $

1. Measure K
2. EPA
3. Department of Pesticide Regulation
4. California 30x30
5. List of grant funders on SMC RCD website that they use. Should be able to apply it to fire mitigation and climate resiliency topics
6. Enlist Non-profits and more volunteers to help plant and remove invasives

*Non-Toxic Neighborhoods can do **trial pilots on site with alternatives** and get staff trained, they have access to grants to make this happen

Our Asks:

OUR ASKS: as citizens living near and using the parks

1. More specific and clear **Notifications posted**
2. **Transparency** and **Accountabliity of use**
3. **Consider Alternatives**
4. **Work with Local Communities and Volunteers**

We welcome peoples questions and concerns, please contact us: egadvocates@gmail.com

Sign up for updates on our website: www.egadvocates.org

References:

Linked Human Diseases

Exposure to glyphosate-based herbicides and risk for non-Hodgkin lymphoma: A meta-analysis and supporting evidence, Mutation Research - Reviews in Mutation Research, July–September 2019, https://www.sciencedirect.com/science/article/abs/pii/S1383574218300887
https://www.washington.edu/news/2019/02/13/uw-study-exposure-to-chemical-in-roundup-increases-risk-for-cancer/

Association of Lifetime Exposure to Glyphosate and Aminomethylphosphonic Acid (AMPA) with Liver Inflammation and Metabolic Syndrome at Young Adulthood: Findings from the CHAMACOS Study **Environmental Health Perspectives, Vol 131,**1 March 2023
https://ehp.niehs.nih.gov/doi/full/10.1289/EHP11721
https://publichealth.berkeley.edu/news-media/research-highlights/childhood-exposure-to-common-herbicide-may-increase-the-risk-of-disease-in-young-adulthood/#:~:text=New%20research%20from%20the%20UC,cardiovascular%20disease%20later%20in%20life

Environmental Pollution, Oxidative Stress and Thioretinaco Ozonide: Effects of Glyphosate, Fluoride and Electromagnetic Fields on Mitochondrial Dysfunction in Carcinogenesis, Atherogenesis and Aging *Annals of Clinical & Laboratory Science, vol. 50, no. 3, 2020*
http://www.annclinlabsci.org/content/50/3/408.full.pdf

Study Finds Significant Chemical Exposures in Women With Cancer
Clear link between PFAS, BPA exposures and a prior cancer diagnosis found in large national study.
By Laura Kurtzman | UCSF.edu | September 14, 2023
https://cancer.ucsf.edu/news/2023/09/17/study-finds-significant-chemical-exposures-in-women-with-cancer?utm_medium=email&utm_source=Cancer%20Insights&utm_campaign=October2023

Exposure to pesticides and pediatric Wilms' tumor. A meta-analysis on pre-conception and pregnancy parental exposure with an IARC/WHO commentary, Sage Journal, Oct 2022
https://journals.sagepub.com/doi/full/10.1177/09603271221136211?rfr_dat=cr_pub++0pubmed&url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org

References:

Linked Human Diseases

IARC Monographs Volume 112: evaluation of five organophosphate insecticides and herbicides, International Agency for Research on Cancer, World Health Organization https://www.iarc.who.int/wp-content/uploads/2018/07/MonographVolume112-1.pd

Toxic Effects of Glyphosate on the Nervous System: A Systematic Review International Journal of Molecutlar Science 2022 May https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9101768/#:~:text=Glyphosate%20also%20seems%20to%20exert,of%20behavioral%20and%20motor%20disorders.

Myers, John Peterson, et al. "Concerns over Use of Glyphosate-Based Herbicides and Risks Associated with Exposures: A Consensus Statement - Environmental Health." *BioMed Central*, BioMed Central, 17 Feb. 2016, https://ehjournal.biomedcentral.com/articles/10.1186/s12940-016-0117-0

Harm to Endangered and All species and Pollinators

EPA: Two Most Widely Used Pesticides Likely Harm Majority of Endangered Species, Center for Biological Diversity, Nov 2021https://biologicaldiversity.org/w/news/press-releases/epa-two-most-widely-used-pesticides-likely-harm-majority-of-endangered-species-2021-11-15/?_gl=1*z1jk3u*_gcl_au*Mzc1MDkwMDA4LjE2OTc1NjU0Nzk

EPA Finds Glyphosate Is Likely to Injure or Kill 93% of Endangered Species, Center for Biological Diversity, Nov 2020 https://biologicaldiversity.org/w/news/press-releases/epa-finds-glyphosate-likely-injure-or-kill-93-endangered-species-2020-11-25/?_gl=1*1cgza9r*_gcl_au*Mzc1MDkwMDA4LjE2OTc1NjU0Nzk.

Roundup causes high levels of mortality following contact exposure in bumble bees, J. Appl. Ecol. 58 (2021) 1167–1176, https://doi.org/10.1111/1365- 2664.13867 https://besjournals.onlinelibrary.wiley.com/doi/10.1111/1365-2664.13867

GLYPHOSATE BASED HERBICIDES & THEIR IMPACT ON BEES' HEALTH, A report, Pesticide Action Network Europe https://www.pan-europe.info/sites/pan-europe.info/files/public/resources/briefings/Glyphosate%20based%20herbicides%20and%20their%20impact%20on%20bees%27%20health.pdf

Glyphosate is lethal and Cry toxins alter the development of the stingless bee Melipona Quadrifasciata, Environmental Pollution, Dec 2018 ,https://www.sciencedirect.com/science/article/abs/pii/S0269749118325478

Insect decline in the Anthropocene: Death by a thousand cuts, Proceedings of the National Academy of Sciences of the United States of America, Biological Sciences, Jan 2021 https://www.pnas.org/doi/full/10.1073/pnas.2023989118

Modern 'Sixth Mass Extinction' Event Will Be Worse Than First Predicted: Report, Forbes, Jul 2023 https://www.forbes.com/sites/grrlscientist/2023/07/19/modern-sixth-mass-extinction-event-will-be-worse-than-first-predicted/?sh=28d0e9344ab6

Pervasiveness and Persistence in the Environment

Study Finds Glyphosate in More Than Half of All Sampled Florida Manateesm Center for Biologicalm March 2021. https://biologicaldiversity.org/w/news/press-releases/study-finds-glyphosate-in-more-than-half-of-all-sampled-florida-manatees-2021-03-19/?_gl=1*ajdkn5*_gcl_au*Mzc1MDkwMDA4LjE2OTc1NjU0Nzk.

Glyphosate and its degradation product AMPA occur frequently and widely in U.S. soils, surface water, groundwater, and precipitation, Journal of the American Water Resources Association, April 2014
https://pubs.usgs.gov/publication/70046159

Glyhosate and atrazine in rainfall and soils in agroproductive areas of the pampas region in Argentina, Science Direct, Dec 2018 https://www.sciencedirect.com/science/article/abs/pii/S0048969718326184?via%3Dihub

Threats to Water Resources, National Park Service July 2023
https://www.nps.gov/seki/learn/nature/threats.htm

Pesticides, Our World Data, 1990 to 2020
https://ourworldindata.org/pesticides

Glyphosate degradation as a soil health indicator for heavy metal polluted soils, Soil Biology and Biochemistry, July 2005 https://www.sciencedirect.com/science/article/abs/pii/S0038071704004560

To Save The Planet, Apply Poison, Earth Island Journal, May 2019
https://www.earthisland.org/journal/index.php/articles/entry/save-the-planet-apply-poison/

Soil Degradation

Herbicide Glyphosate: Toxicity and Microbial Degradation, Int J Environ Res Public Health, May 2020 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7602795/#:~:text=Glyphosate%20strongly%20disrupts%20soil%20biology,environmental%20concern%20(Figure%201).

Glyphosate decreases mycorrhizal colonization and affects plant-soil feedback, Science of the Total Environment, Nov 2018 https://www.sciencedirect.com/science/article/pii/S0048969718320345

Adverse impacts of Roundup on soil bacteria, soil chemistry and mycorrhizal fungi during restoration of a Colorado grassland, Applied Soil Ecology, May 2023 https://www.sciencedirect.com/science/article/pii/S0929139322003948

Glyphosate reduces spore viability and root colonization of arbuscular mycorrhizal fungi, Applied Soil Ecology, 2013 https://www.sciencedirect.com/science/article/abs/pii/S0929139312002466

Relevance of glyphosate transfer to non-target plants via the rhizosphere, Journal of Plant Diseases and Protection, 2006, https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=8729f01d6e1b6a964ca6f1a175d6f9684f08f2c2

Effects of the herbicide glyphosate on non-target plant native species from Chaco forest (Argentina), Ecotoxicology and Environmental Safety, Oct 2017**https://www.sciencedirect.com/science/article/abs/pii/S0147651317303846**

The effects of glyphosate-based herbicide formulations on *Lemna minor,* a non-target species, Aquatic Toxicology, Apr 2019 https://www.sciencedirect.com/science/article/abs/pii/S0166445X18310440

Ecosystem consequences of herbicides: the role of microbiome, Trends in Ecology and Evolution, Jan 2023 https://beyondpesticides.org/dailynewsblog/2022/11/explosion-of-weed-killer-use-destroys-soil-life-and-ecosystems-paper-finds/

Lawsuits: Bayer-Monsanto

UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT, NATURAL RESOURCES DEFENSE COUNCIL; PESTICIDE ACTION NETWORK NORTH AMERICA, VS US ENVIRONMENTAL PROTECTION AGENCY, Jan 2022
https://cdn.ca9.uscourts.gov/datastore/opinions/2022/06/17/20-70787.pdf

Weeding Through the Thorney Debate on Glyphosate: **How will your park agency kill weeds when glyphosate is banned?** Jan 2020
https://www.nrpa.org/parks-recreation-magazine/2020/february/weeding-through-the-thorny-debate-on-glyphosate/

Where is Glyphosate Banned? Wisner WB Baum, May 2023
https://www.wisnerbaum.com/toxic-tort-law/monsanto-roundup-lawsuit/where-is-glyphosate-banned-/

What you need to know about a popular weed killer's alleged link to cancer, PBS news hour, Apr 2019
https://www.pbs.org/newshour/health/what-you-need-to-know-about-a-popular-weed-killers-alleged-link-to-cancer

Land Management Without Chemicals

Audubon Starr Ranch Sanctuary

Mid Coast Council

October 2023

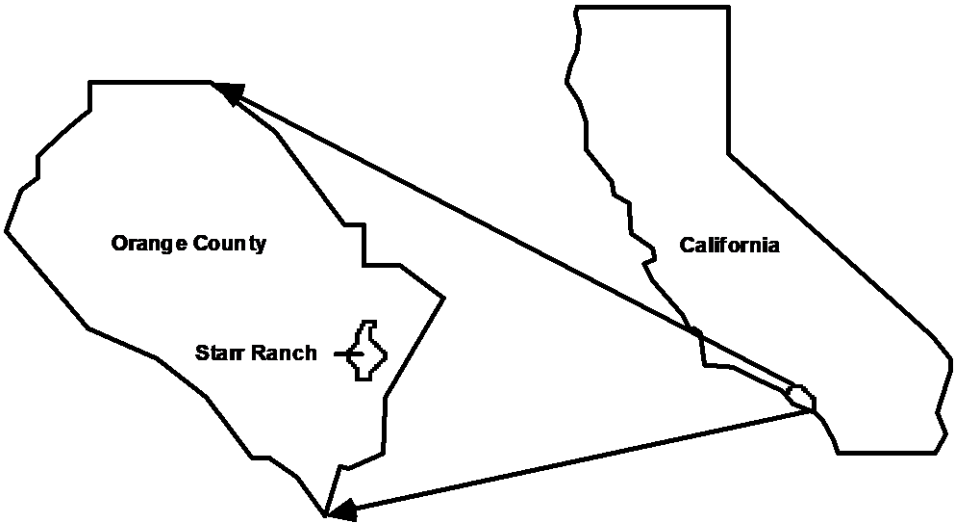
Sandra A. DeSimone
Director Research, Education and Land Management

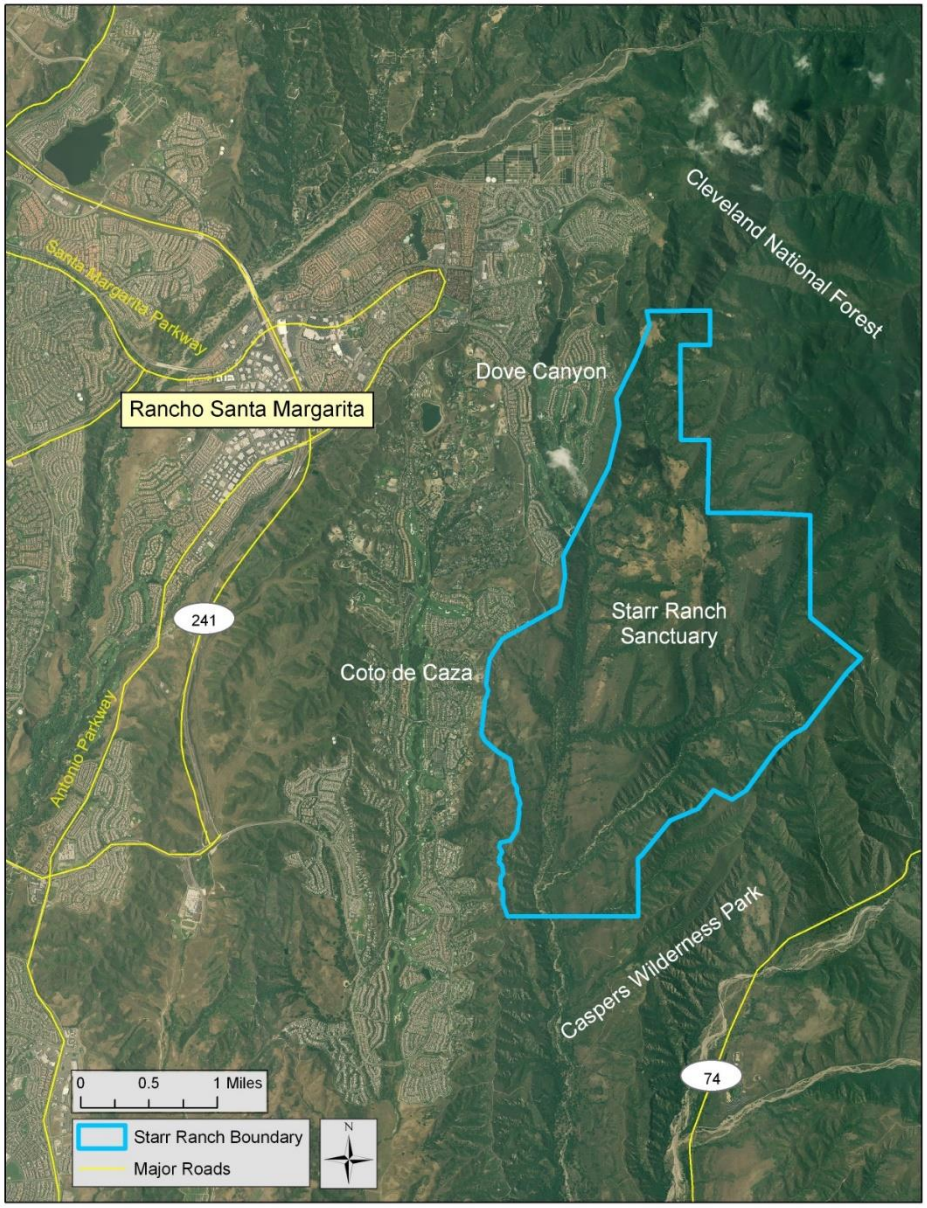
Audubon CALIFORNIA

Starr Ranch Vegetation

Habitat Types

- Oak Woodland
- Coastal Sage Scrub
- Riparian Woodland
- Grassland
- Chaparral


Orange County
California
Starr Ranch


Cleveland National Forest
Santa Margarita Parkway
Dove Canyon
Rancho Santa Margarita
241
Starr Ranch
Sanctuary
Coto de Caza
Antonio Parkway
Caspers Wilderness Park
74
0
0.5
1 Miles
Starr Ranch Boundary
Major Roads
N

Starr Ranch Land Management

- ***Influenced practice on 200,000 acres preserved land - Ventura to San Diego Counties (visitation and solicited advice)***
- ***"cutting edge" (U.S. Fish and Wildlife Service)***

Audubon CALIFORNIA

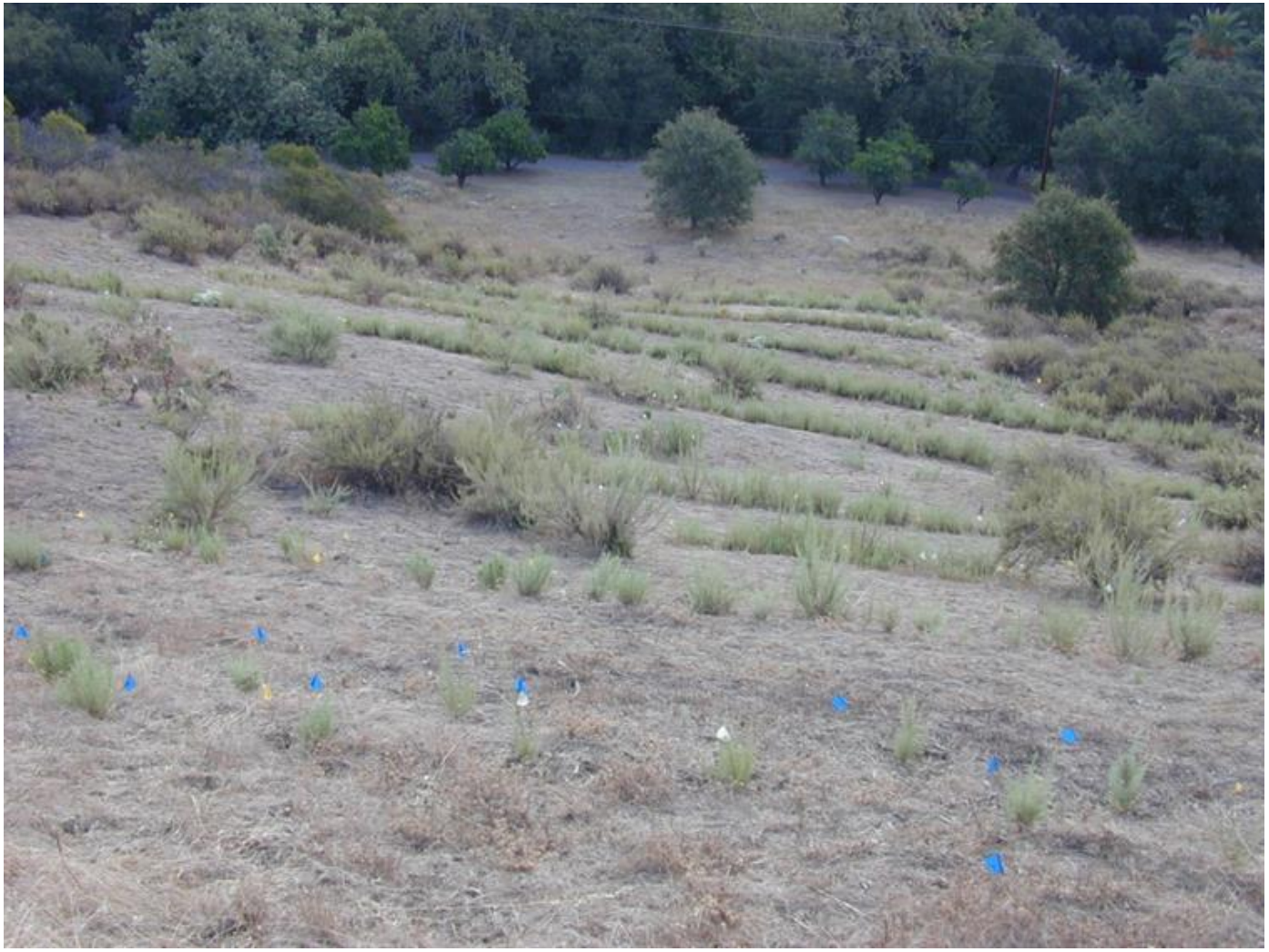
Research Land Management Education

Research **Land Management** **Education**

Innovation ***Integration*** ***Sustainability***

Innovation: Land Management

Strip Planting ***No chemicals*** ***Adaptive Management***



UPLANDS: TOP STARR RANCH SEVEN (ALWAYS REMOVE)

CYNCAR (artichoke thistle)

CIRVUL (bull thistle)

PLALAN (English plantain)

Helminthotheca echioides (Ox-Tongue)

Oxalis pes-caprae (sourgrass))

Salsola tragus (tumbleweed)

Aegilops spp. (barbed goatgrass)


#28m
PP 1
03/29/01

3 "*P*"s of Nonchemical Land Management:
Persistence Patience Perseverance

January

Sun	*Mon*	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*
	1 NEW 15 10 1 4	**2**	**3**	**4**	**6**	**6**
7	**8** NEW 30 9 21	**9**	**10**	**11**	**12**	**13**
14	**15** NEW14 11 *7	**16**	**17**	**18**	**19**	**20**
21	**22** New 15 17S 5	**23**	**24**	**25**	**26**	**27**
28	**29** NEW 30 10 1 4	**30**	**31**			

2018

Two Fundamental and Interrelated Land Management Practices

1. ***Non-chemical Weed Control***
2. ***Accept Some Non-natives in "Hybrid Ecosystems"***

* **Hybrid ecosystem: nonnatives and natives**

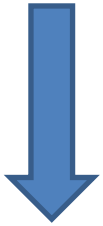
Novel ecosystem: nonnative dominated (from disturbance)

Initial phases of a new nonnative introduction

Go for it! (remove) Early Detection

Established nonnative populations

Does the **established nonnative have positive or neutral effects on observable wildlife**: **songbirds and small mammals** ?



Hybrid Ecosystem

Hybrid Ecosystem Decision Making

Coastal Sage Scrub Restoration


Baseline season one


End season one


Season two

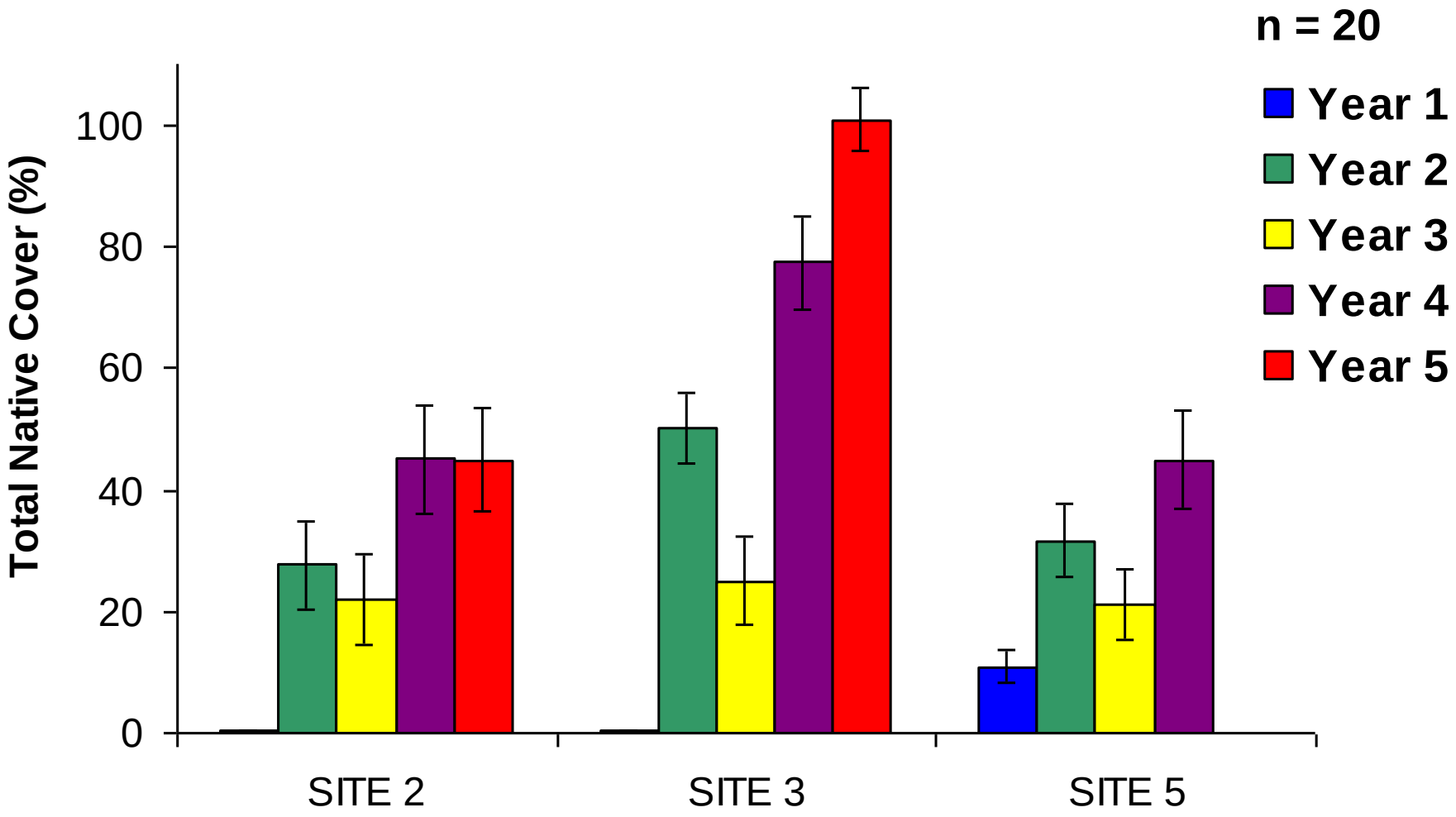

Season seven

Nonnative annual grass control ⟶ dicot eruption

Strategy: Accept Nonnative Annual Grasses

<u>Strategy</u>: Target nonnative dicot (forb, non grass) invasives,
Leave nonnative annual grasses,
Monitor effects on native plants and wildlife

Total Native Cover in Buffers Between Strips



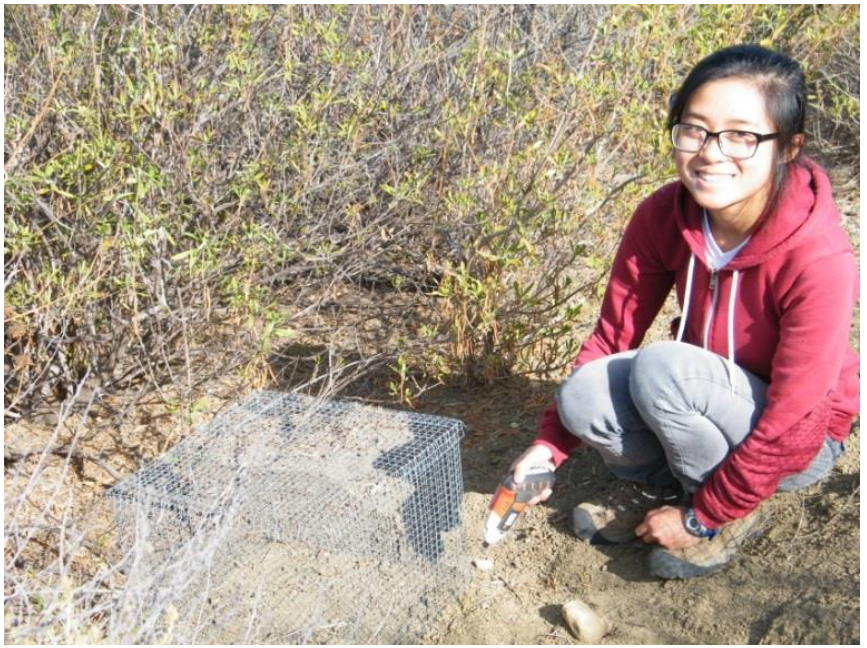
No nonnative annual grass control

DeSimone Ecological Restoration 2011.

Annual grasses disappear over time in restoration sites
Mechanism: annual grasses “disappear”?

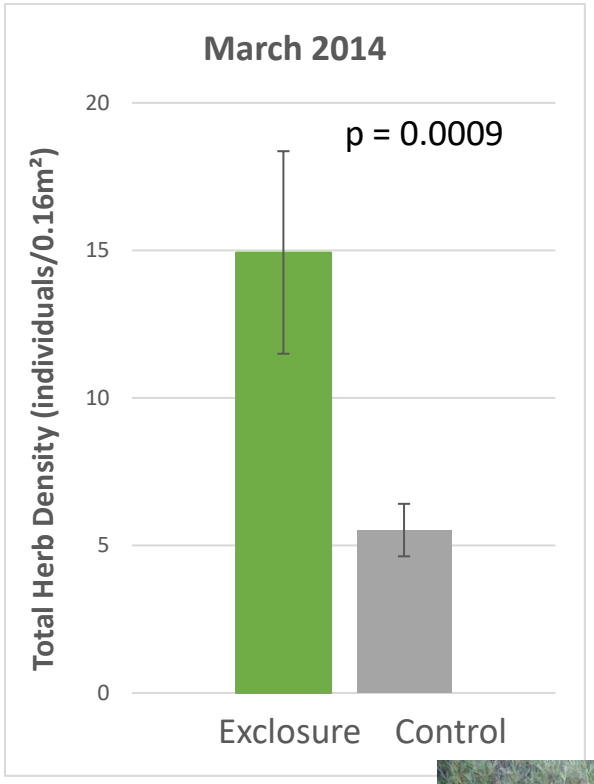
Is there an effect of herbivores on nonnative grasses in buffers?

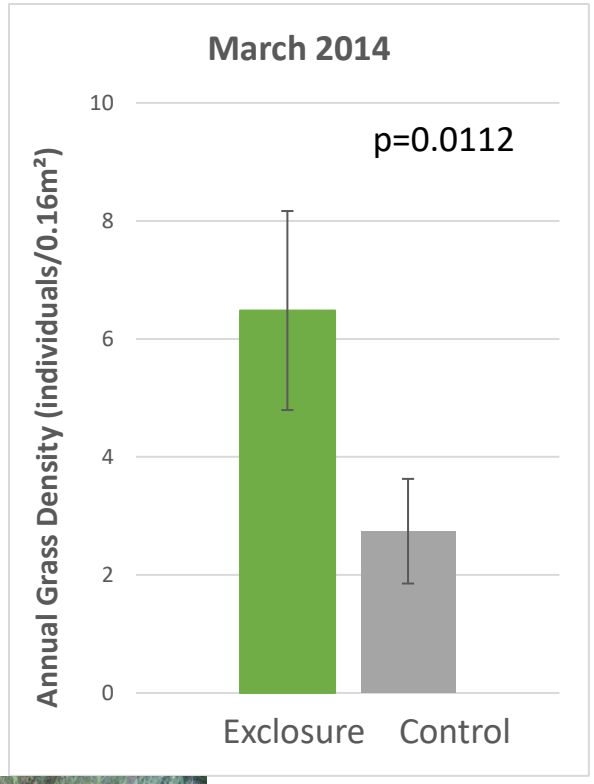
Exclosure Experiment: cages in unplanted buffers between planted shrub strips



Exclosure Experiment: Results

March 2014



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04-09-2015 23:32

Conclusions (CSS Restoration):

- **Neutral effects nonnative annual grasses on wildlife = “accept”**
- **Hybrid ecosystem ⇨ native shrub-dominated**
- **Mechanism (the process): herbivory (rodents, birds, rabbits)**

Conclusions (general)

1. With persistence and diligence, a non-chemical approach to invasive species control can be efficient and effective.

2. Monitoring is ongoing

Hybrid ecosystem concepts have

stimulated us to view nonnative species through a new lens

reduce workload while also

accomplishing goal – habitat for birds and other wildlife.

Invasive Olive Control

Tarp stumps heavy (12 mil) black plastic with long margins secured by trench in place 2-5 years. Check end season.

Stump grinder (Bobcat cultivator removed stumps)

Costs

(varies with season)

$500 - $800 per acre

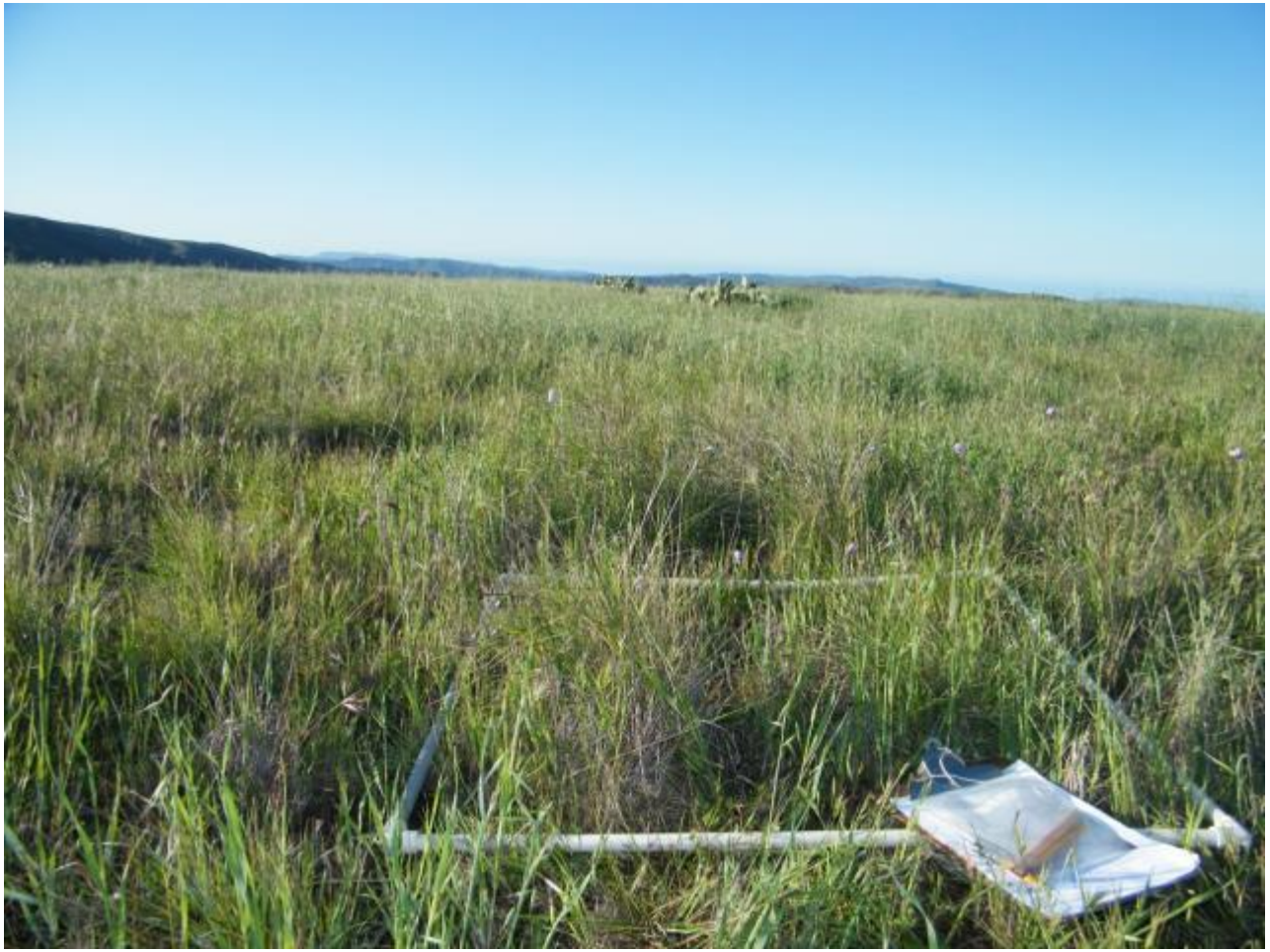
- **Costs based on $20/hour/person**
- **Actual Starr Ranch costs: ± $250,000/yr for staff who live on site**

Funding: NRCS, USFWS, OCTA, foundations, private donors

- **Cut the tarping material (i.e. 12 mil black plastic), adding about 10% to the longest width by the longest length of the stump or clump of stumps**
- **Secure the tarp over the stump or around the clump footprint with landscape staples, washer pins or rocks**
- **Backfill the trench and cover the stump or clump with onsite organic debris**
- **Tarps must remain in place at least one year to be effective and may need to be reapplied the following season**
- **Tarped stumps should be monitored at the end of the growing season at minimum**
- **After stump is killed (2-5 years) remove black plastic from site**

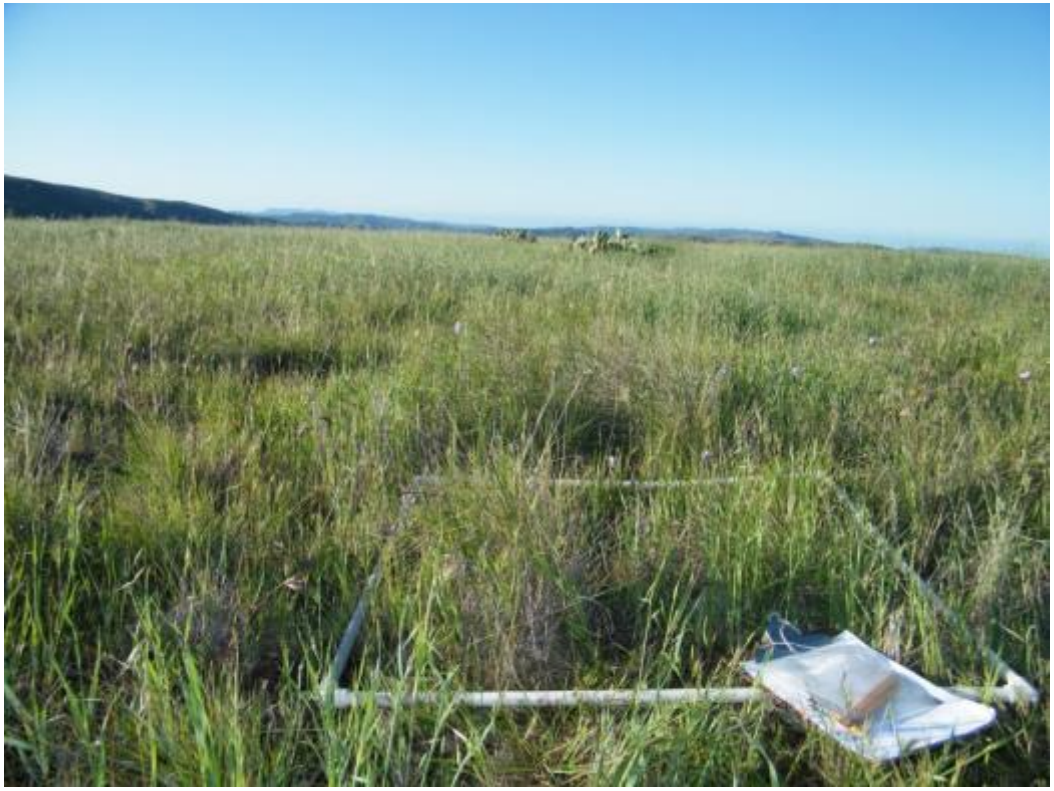
Hybrid Ecosystem Decision Making

Natural Needlegrass Grassland Enhancement



Conclusions (natural grasslands):

- **Neutral effects non-native annual grasses on songbirds = “accept”**
- **Negative effects annual grasses on native bunchgrass = monitor and test management options (mowing)**



Sarah Keiser
The Holistic Herder

Using hooved animals and collaboration to build healthy fire ecosystems & climate resilient communities

wildoathollow.com

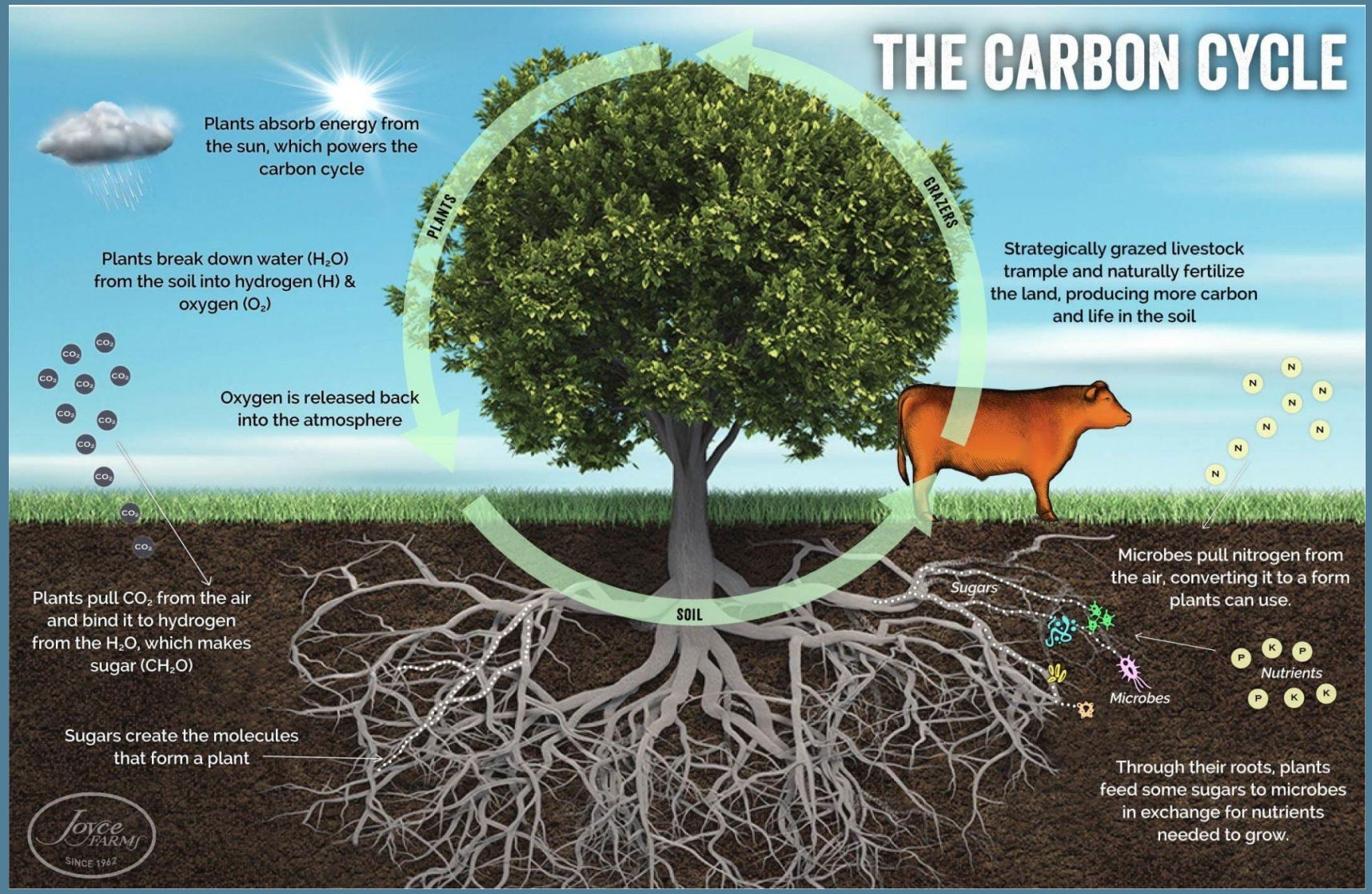
Changing how we do things, rather than what we do

- Transitioning our perspective of annual vegetative growth from a burden to a resource
- Empowering strong, resilient communities through collaboration
- Understanding land stewardship and wildfires do not stop at property lines
- Changing our relationship to fire and healthy fire ecosystems
- Provide training and job opportunities to young graziers to serve local communities - valuing the work
- Environmental stewardship through grazing ruminants

Why is Grazing an Effective Tool?

- Aerates the soil & increases water absorption
- Reduction or elimination of invasive non-native plants
- Reduction of ladders fuels, to provide a landscape where fires are healthy rather than devastating
- Creates a zone that stops wildfires, or where fire fighters can fight a wildfire
- Engaging residents & communities in public vegetation management
- Hydrating grazed zones with respiration, manure and urine
- Carbon cycling - increasing our carbon sequestration
- Increased soil organic matter (SOM)

Carbon Cycling



Current Projects

Sustainable

PUBLIC LAND MANAGEMENT

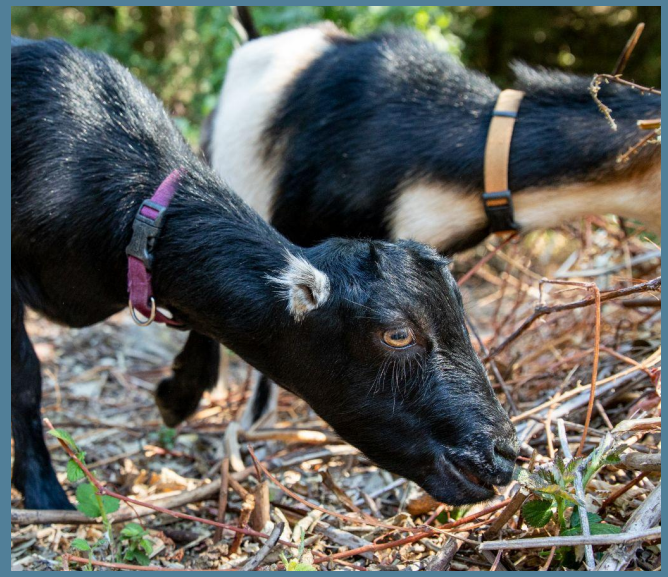
Coordinates and deploys the recommendations of local land steward consultants on public & private working landscapes and is centered on creating a replicable design for subsequent broad-scale adoption by wildfire prone regions of the West.

GOALS

- Develop collaborative relationships between municipalities & private landowners to reduce the ongoing cost of vegetation management
- Supporting municipalities and public land manager in the deployment of land stewardship methods
- Documenting and highlighting the success and key learnings for fire resilient communities and public lands
- Provide educational opportunities and ongoing support to public land managers, municipality leaders & communities in fire prone regions

Implementing holistic, ecological and fiscally sustainable land management plans to create healthy fire ecosystems using grazing ruminants.

Transitioning our vegetation from a burden to a resource



City of Petaluma park management and IPM development

The City of Petaluma, Petaluma City Parks and Wild Oat Hollow developed a Petaluma City Parks Grazing Program, a first-of-its-kind sustainable grazing plan for vegetation management and ecological regeneration for all open space parks in the City of Petaluma including Oak Hill, Mansion Knolls, Westridge, Country Club & Arroyo Open Space across 46 acres.

GOALS

- ➔ Increase residents and community members interest in vegetation management
- ➔ Support the city in its goal of carbon neutrality by 2030 (Cool Cities)
- ➔ Develop a new IPM with tools that reduce synthetic chemical applications and create healthy communities and public lands
- ➔ Holistic and long term solutions for vegetation management
- ➔ Create a long term, strategic view on land stewardship that reduces carbon output, increases carbon sequestration, engages residents and beautifies city park and public lands

Sonoma County developing a more resilient and carbon neutral County

The goal of the project is to assess the total grazable acreage in Sonoma County and work with landowners and managers to better manage these lands to achieve climate mitigation and conservation goals.

GOALS

- ➔ This project creates climate-resilient communities and ecosystems, through a University of California Cooperative Extension (UCCE) & Wild Oat Hollow led effort that educates landowners and managers on vegetation management tool(s) to assist with fuels reduction and ecological enhancement on private and public lands, especially in the Wildlands Urban Interface (WUI).
- ➔ UCCE will work with organizations focused on youth, high school agriculture programs, and the Santa Rosa Junior College to train individuals interested in providing fuel management services, principally grazing.

Private landowners & public land managers are creating a sustainable way forward in a time of new policy implementation and climate change; through grazing collaboration, strategic planning and big vision.

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