BRUSH, BURN, RETURN: RANGELAND HEALTH FOLLOWING CATASTROPHIC FIRES

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CALIFORNIA HAS A LONG HISTORY OF FIRE

- Native Americans used fire to maintain grasslands for hunting, oak tree germination and acorn production.

- Lightening strikes were a natural ignition of fires; created a mosaic of different age classes of brush with grasslands intermixed, creating natural fire breaks to minimize the spread of wildfire.

- With increasing human population encroaching into rangelands and their aversion to fire and smoke, the practice of burning decreased.

CALIFORNIA HAS SEEN ↑ IN CATASTROPHIC WILDFIRES OVER THE PAST 20 YEARS

WHY THE INCREASE?

- With settlers and ranching, control of brush to maintain grasslands for livestock became a common practice.
- Around the 1980's, most of the brush control came to a stop. Practice lost favor for many reason - permitting, thoughts that environmental impacts were large, costs, etc. Forty-five (45) years of reduced brush control.
- Increase of Human Development – Expansion into the Wildland Urban Interface (WUI).
- Lost was knowledge of ecosystem functions and how critical application of management tools, such as fire or mechanical treatment, is needed to maintain rangelands health.
- Lack of knowledge how grazing reduces fire severity, through management of fine and/or ladder fuels, in lightening strikes or man-caused ignition.
- Climate change!

WHY DO WE CARE?

- Shrublands ecosystems account for approximately 38% of California's burned areas from 2000-2020.
- There is relatively little research on management strategies to mitigate fire impacts in shrublands.
- The conversion of grasslands to shrublands threatens approximately 40% of grasslands globally, converting them to shrublands, reduction of biodiversity and rangeland health.
- Reduced food production, less resilient carbons sinks, less water yields, and reduced unique cultural uses.

METHODS

- To assess shrubland encroachment impacts, we examined vegetation types before and after catastrophic fires occurred.

- We assessed impacts from the largest California fires, selected largest in size (hectares) and most damage to structures (houses, building) according to California Department of Forestry and Fire.

METHODS (25 FIRES)

- Land cover characterized using National Land Cover Dataset (NLCD).
- Identified six classes: deciduous forest, evergreen forest, mixed forest, scrub/shrub, herbaceous, and developed lands.
- Three basic functional groups: Forest, Shrubland, Herbaceous.
- Conducted GIS analysis of the most devastating wildfires in California along with vegetation mapping from NLCD to plot vegetation community changes at the fire footprint scale post fire.
- Used Python 3 and PANDA Python Package to calculate percent of three land cover classification.

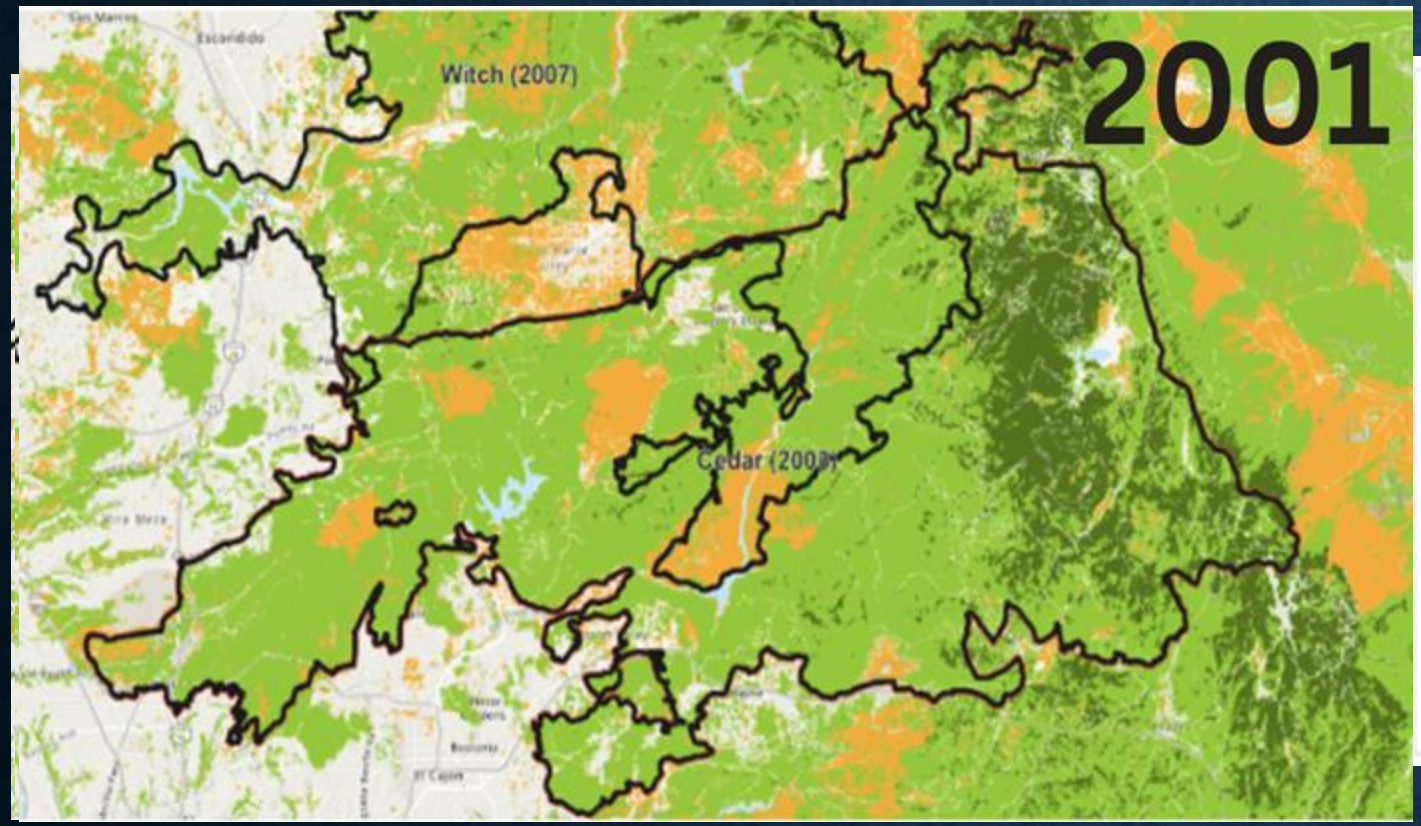
WILDFIRE	YEAR	SEASON	ACRES	STRUCTURES
August Complex	2021	Summer	1,032,626	935
Camp	2017	Fall	153,333	18,804
Caldor	2021	Summer	221,829	1,003
Carr	2018	Summer	229,645	1,614
Cedar	2003	Fall	273,241	2,820
Creek	2020	Fall	379,887	858
CZU Lightening Complex	2020	Summer	86,507	1,490
Dixie	2021	Summer	963,287	1,311
Glass	2020	Fall	67,483	1,520
Klamath Theater Complex	2008	Summer	192,034	0
LNU Lightning Complex	2020	Summer	363,212	1,491
Mendocino Complex	2018	Summer		280

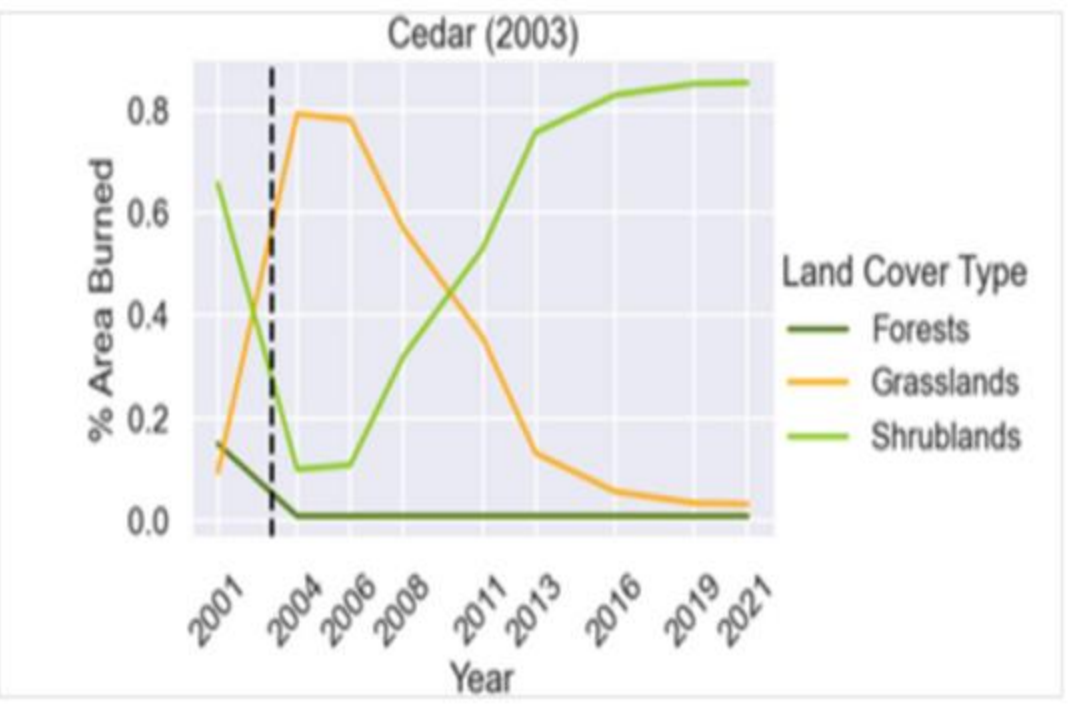
WILDFIRE	YEAR	SEASON	ACRES	STRUCTURES
Monument	2021	Summer	223,119	28
North Complex	2020	Summer	318,927	2,352
Nuns	2017	Fall	54,382	1,355
Rim	2013	Summer	257,308	112
River Complex	2021	Summer	199,355	122
Rush	2012	Summer	271,904	0
SCU Lightning	2020	Summer	396,615	225
Thomas	2017	Winter	281,887	1,063
Tubbs	2017	Fall	36,806	5,636
Valley	2015	Fall	76,065	1,955
Witch	2007	Fall	197,996	1,650
Woolsey	2018	Fall	96,947	1,643
Zaca	2007	Summer	240,201	1

RESULTS

- Data showed type conversion happened immediately post-wildfire, with grasses emerging first.
- With no management, after a period, depending on climate, shrublands quickly returned, becoming the dominate vegetation.
- The length of time vegetation shifts lasted varied, with grassland layer returned at or less previous levels while shrubland layer returned at or above previous layers.
- While shrubland and grassland layers fluctuate, datasets indicate forests were not recovering.
- California has experienced many more devastating wildfires since 2021, and though data from NLCD is lacking, we hypothesize that similar trends will continue.

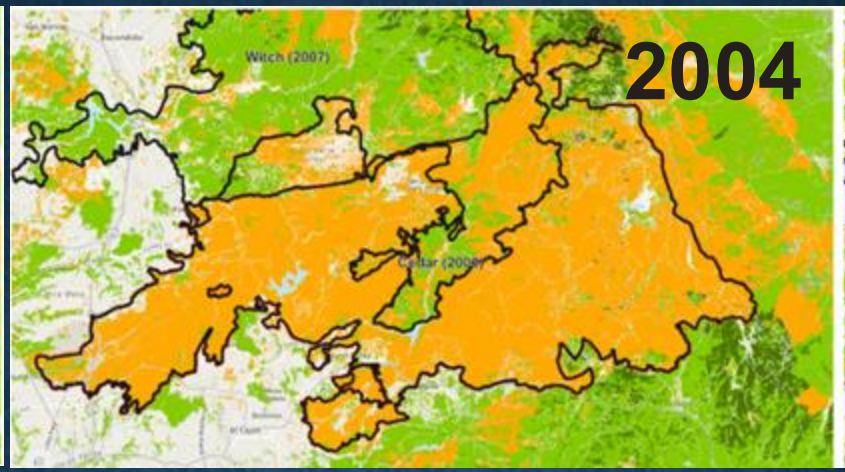
Cedar Fire (2003)



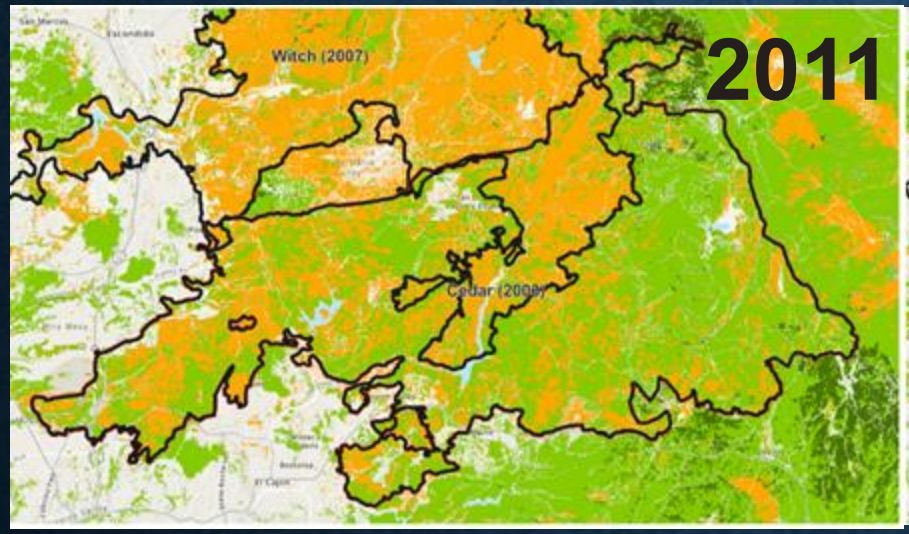


Cedar fire started October 2003, Fall. San Diego County. Burned for 2 weeks, 2,232 homes, killed 15 people. Cost: 1.3 Billion (2003 US).

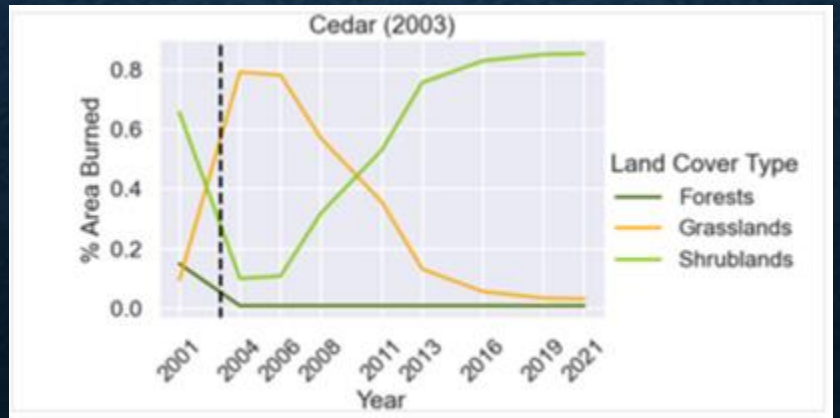

Witch (2007)
2001

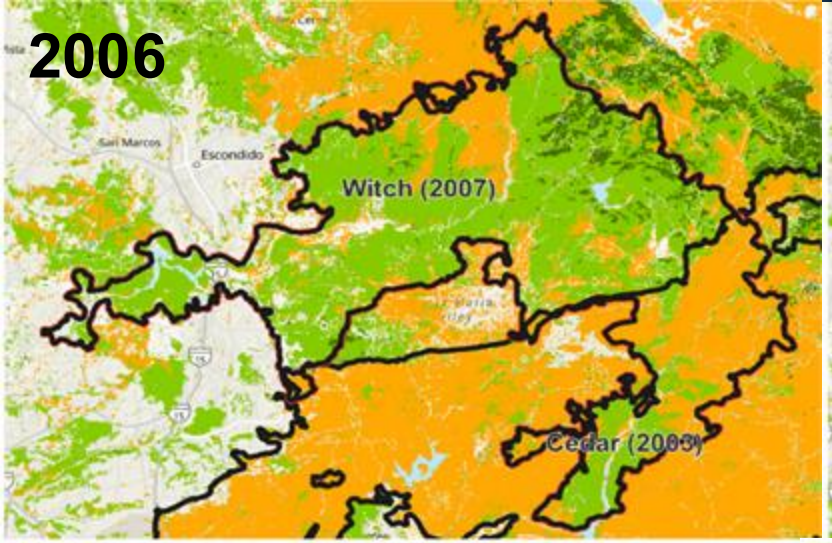

Witch (2007)
2004

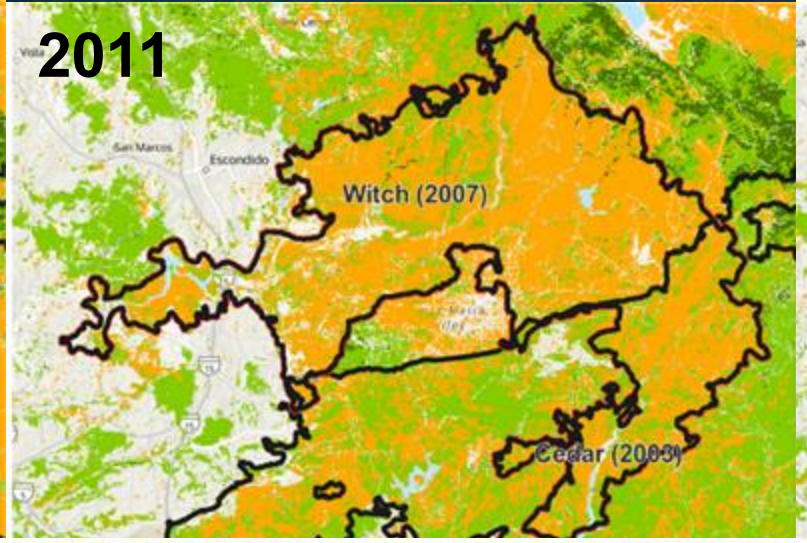

Witch (2007)
2006

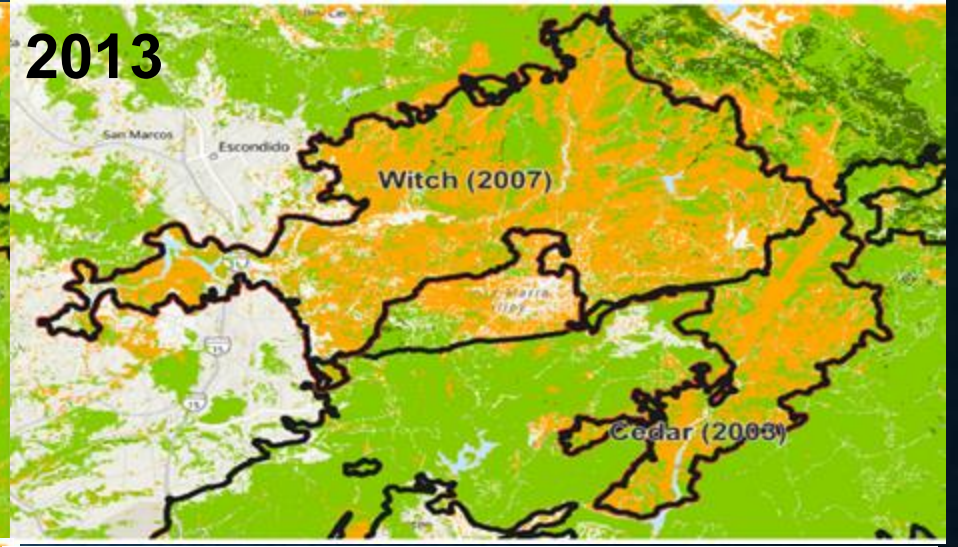

Witch (2007)
2011

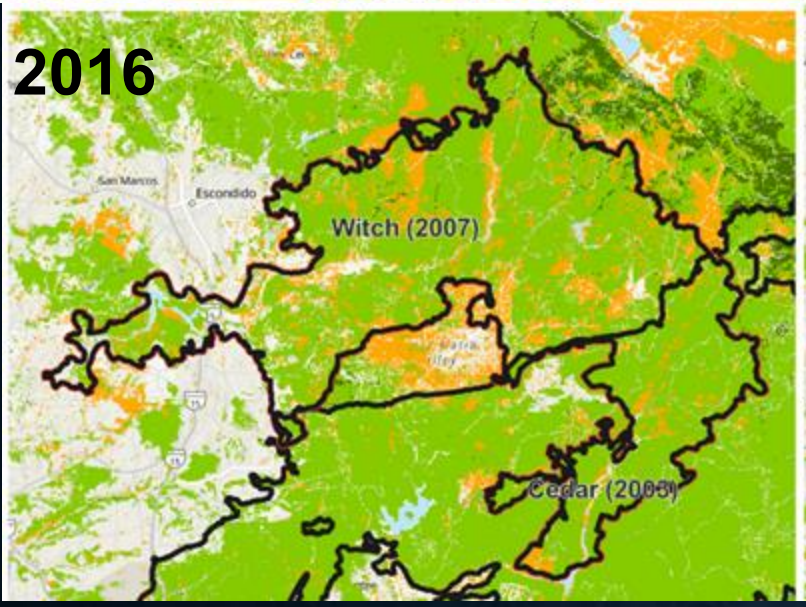

Witch (2007)
2013

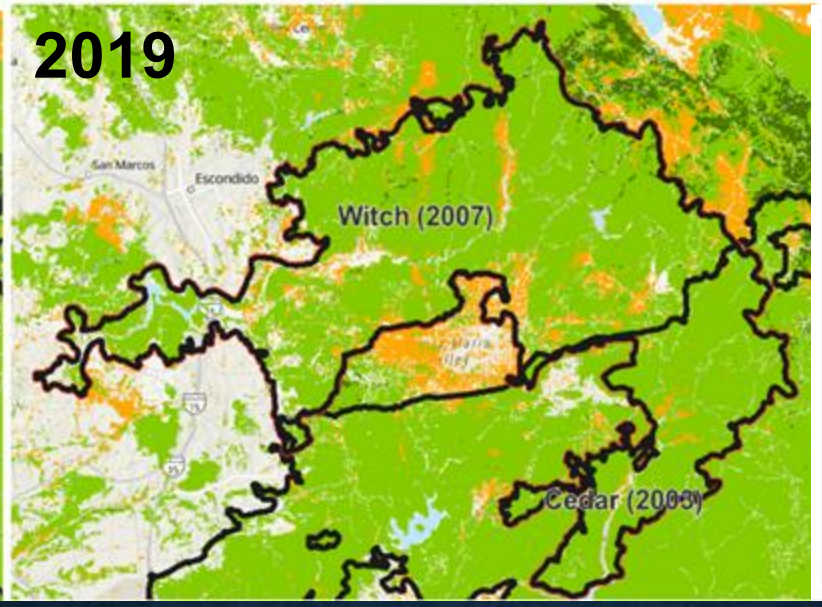

Cedar (2003)
% Area Burned
0.0
0.2
0.4
0.6
0.8
2001
2004
2006
2008
2011
2013
2016
2019
2021
Year
Land Cover Type
Forests
Grasslands
Shrublands

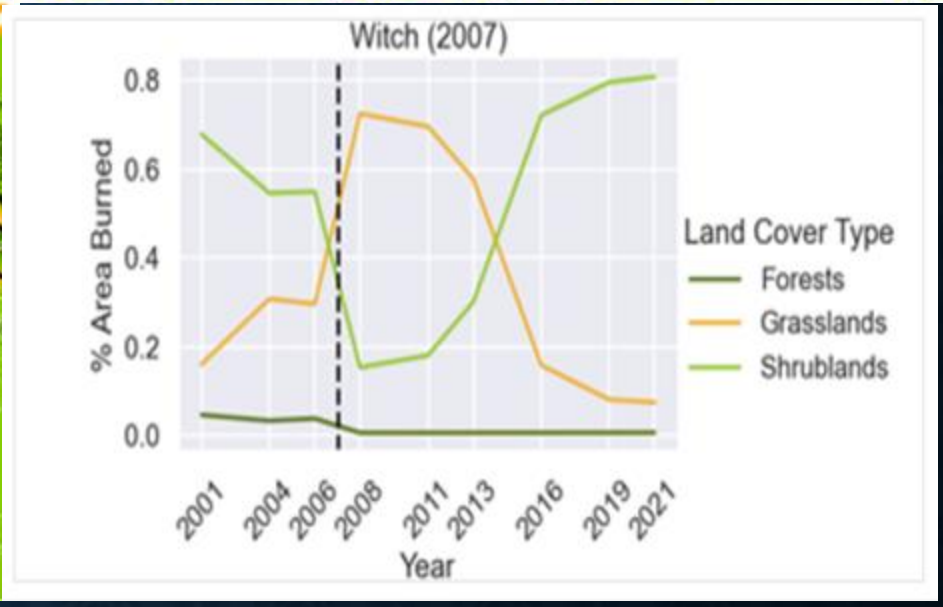

2006
San Marcos
Escondido
Witch (2007)
Cedar (2003)


2011
San Marcos
Escondido
Witch (2007)
Cedar (2003)

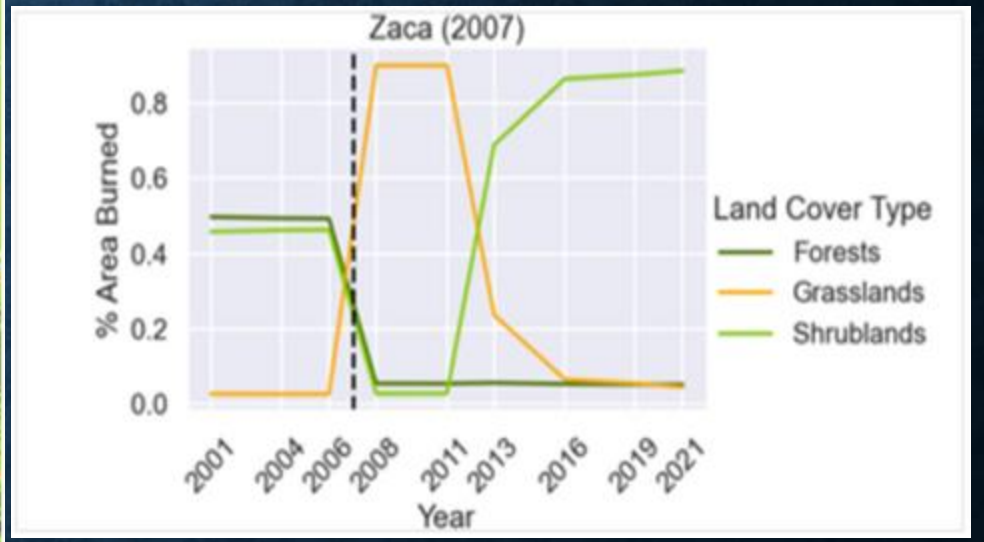

2013
San Marcos
Escondido
Witch (2007)
Cedar (2003)


2016
San Marcos
Escondido
Witch (2007)
Cedar (2003)


2019
San Marcos
Escondido
Witch (2007)
Cedar (2003)


Witch (2007)
% Area Burned
0.0
0.2
0.4
0.6
0.8
2001
2004
2006
2008
2011
2013
2016
2019
2021
Year
Land Cover Type
Forests
Grasslands
Shrublands

Zaca Fire (2007)



Zaca fire started 2007, Summer. Santa Barbara County. Burned for 2 months.
Cost: 120 M (2017 US).

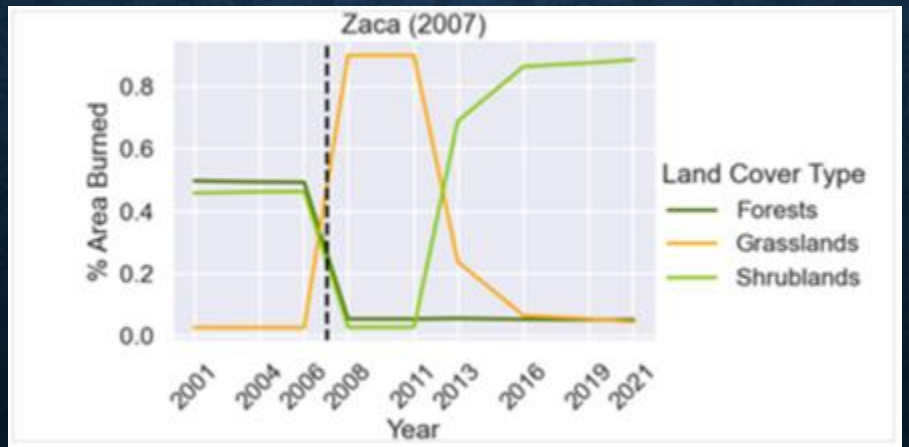

2006
Zaca (2007)


2011
Zaca (2007)


2013
Zaca (2007)


2016
Zaca (2007)


2019
Zaca (2007)


Zaca (2007)
% Area Burned
0.0
0.2
0.4
0.6
0.8
2001
2004
2006
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2016
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Year
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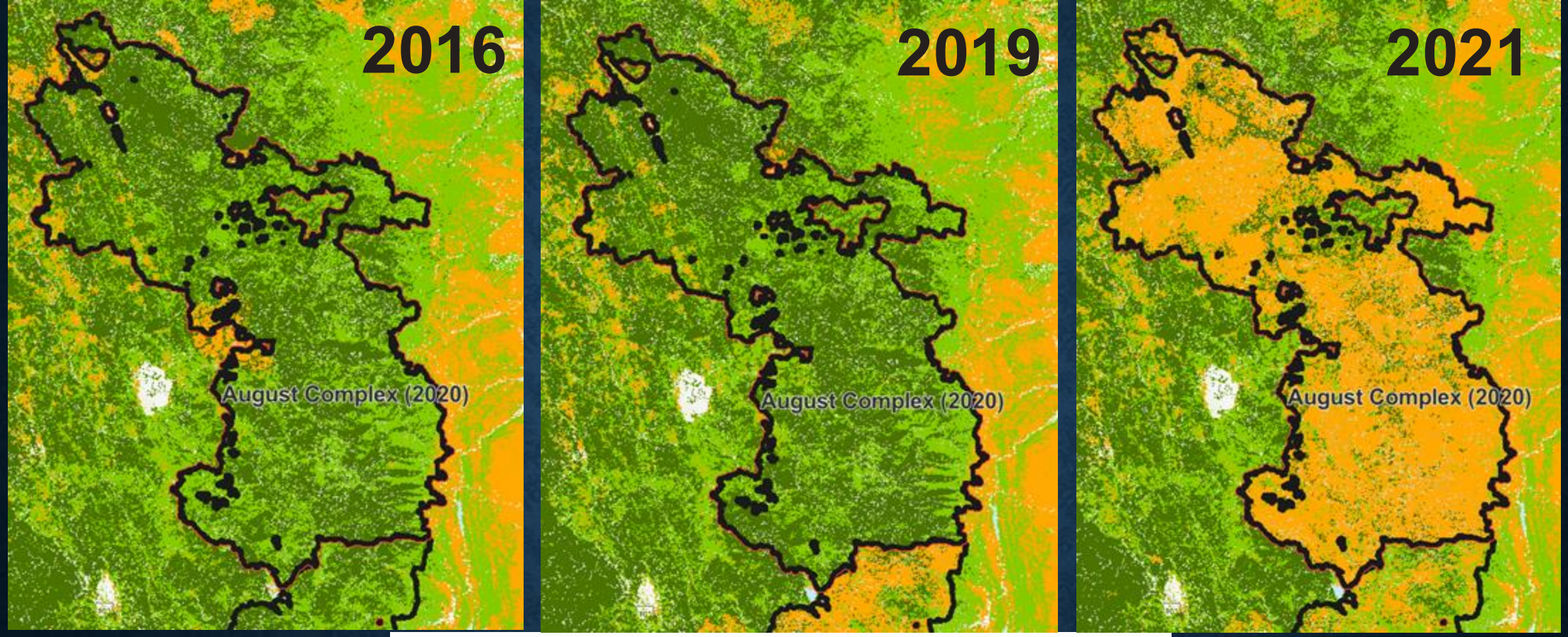
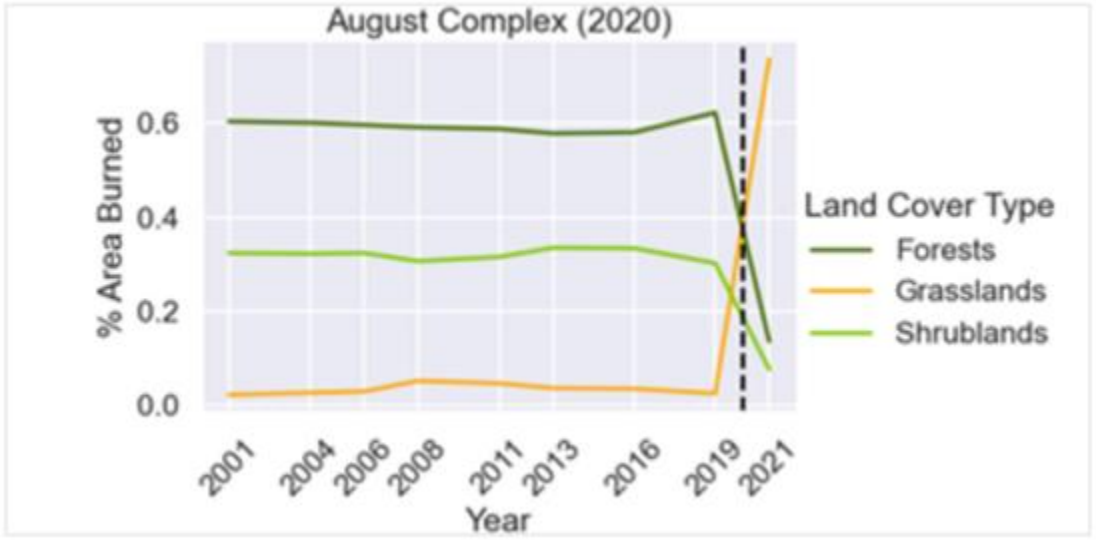
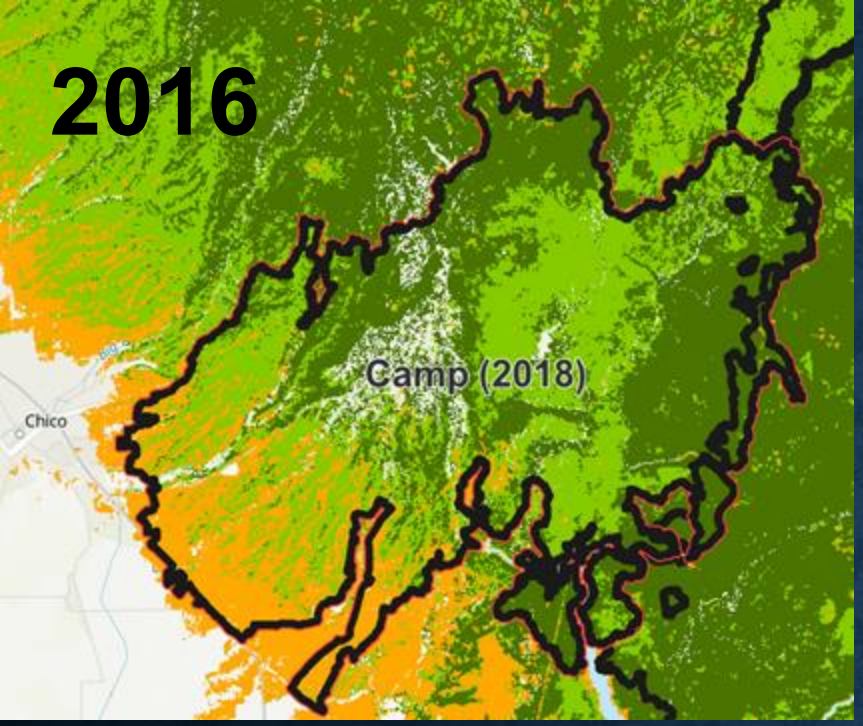
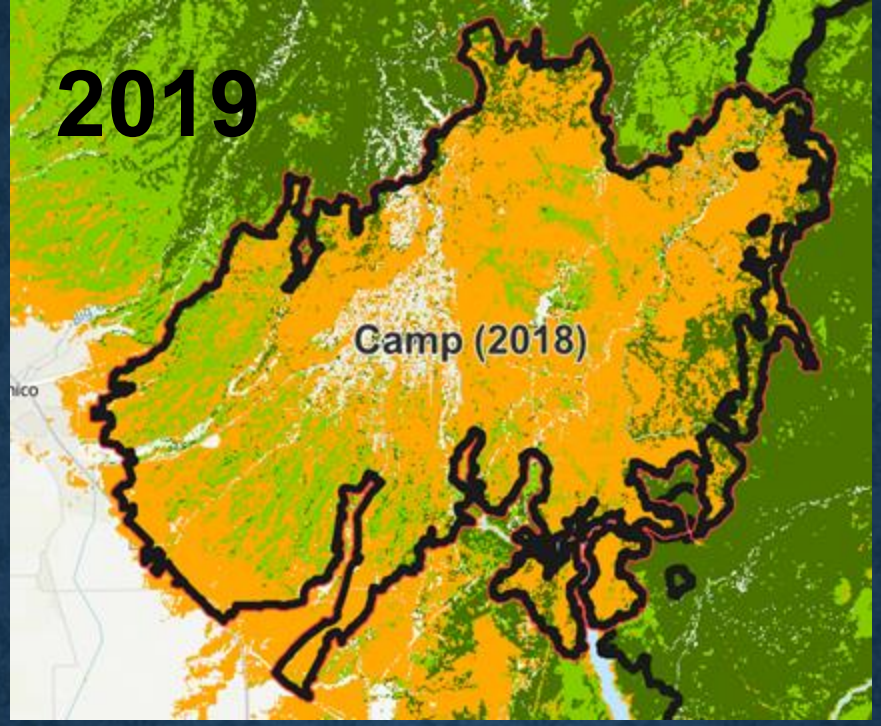


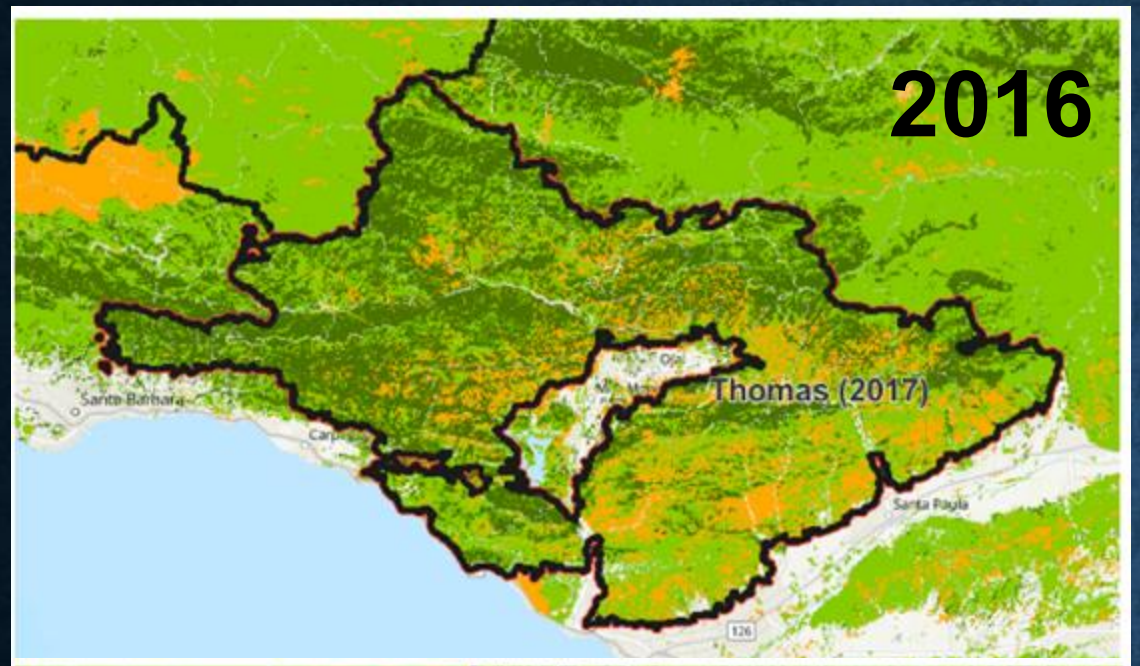


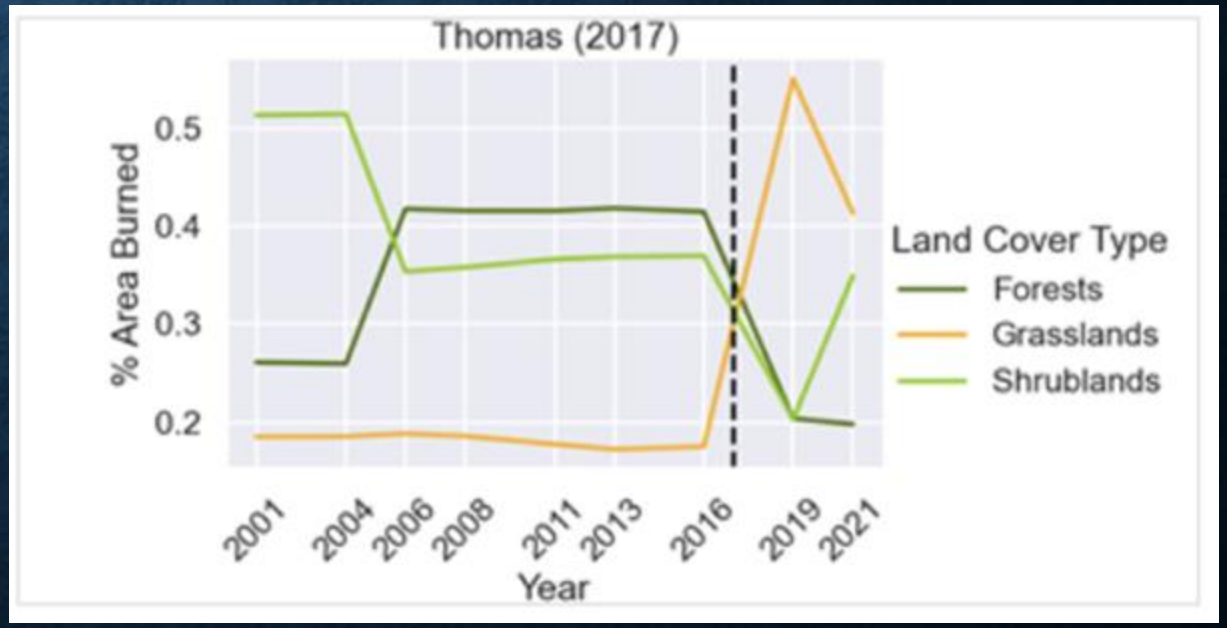
Largest Fire:
Burned 417, 898 Hectares





Most Structures Lost: 18,804



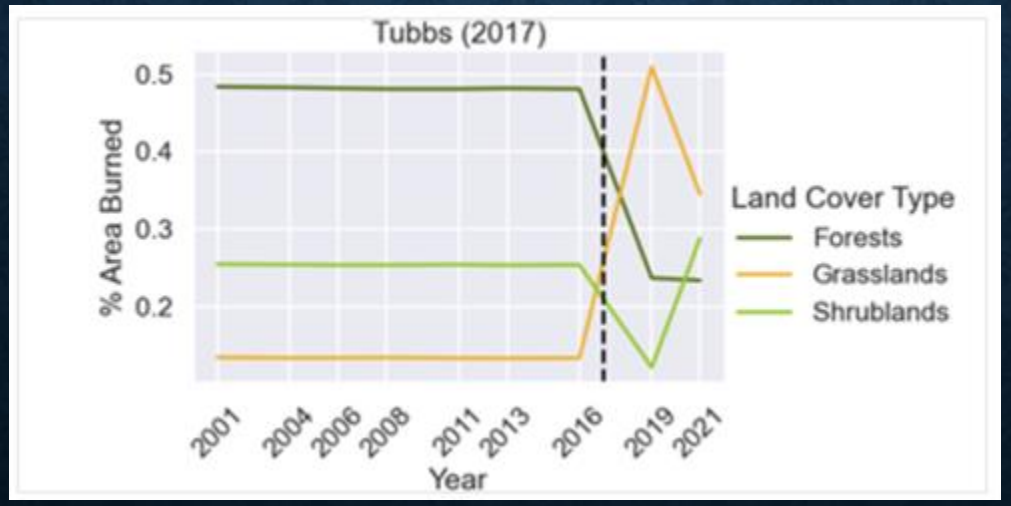


Only Winter Fire


2016
Tubbs (2017)


2019
Tubbs (2017)


2021
Tubbs (2017)


Tubbs (2017)
% Area Burned
0.5
0.4
0.3
0.2
2001
2004
2006
2008
2011
2013
2016
2019
2021
Year
Land Cover Type
Forests
Grasslands
Shrublands

DISCUSSION

With fire hazards increasing as fuels go untreated, management after catastrophic fires will become more critical to maintain rangelands health.

- Fuel treatments can alter fuel conditions so that wildfires are easier to control and less destructive.
- Costs of fuel treatments vary widely, yet the relative costs and success must be considered as opposed to doing nothing and having fuel loads return.
- Potential benefits of fuel treatments, such as reduced wildfire risk, reduce fire suppression costs, and reduced structural losses will be site specific.
- Site-specific analysis must account for the cumulative cost of fuel treatments, the likelihood of wildfire return with or without treatments, and overall rangeland health.

DISCUSSION

Grazing should be utilized (cattle, sheep, and/or goats) post-wildfire to extend the return interval of the brush, and therefore lengthen the fire return interval, mimicking what was naturally occurring before European settlers.

- The limited number of publications from the 1950's-1970's, showed the benefit of grazing. The scientific literature needs to build on those, demonstrating the benefit of grazing post-fire today.
- If the area was forested, active restoration must occur at the fire footprint, otherwise the trees are out competed by brush.
- Continue to advocate for managing our lands post-wildfire.
- Support legislation that promotes prescribed grazing of any livestock species.

QUESTIONS?

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