Welcome to GIS DAY 2023

Using GIS technology to explore, innovate, and transform Santa Clara County

November 1, 2023

Exploring the new Santa Clara Countywide Fine Scale Vegetation Map

3 Example Applications

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GOLDEN GATE NATIONAL PARKS CONSERVANCY

Presentation Outline

- Quick Recap: Santa Clara Countywide Fine Scale Vegetation Map and Landscape Database Project
- 3 Example Applications – Fine Scale Veg Map:
  1. Summarizing Forest Distribution on Protected Open Space Lands.
  2. Exploring Canopy Mortality by Fine Scale Vegetation Map Class.
  3. Using Mean Lidar Derived Stand Height to Identify Potential Areas of Type Conversion.
- Q&A / Acknowledgements

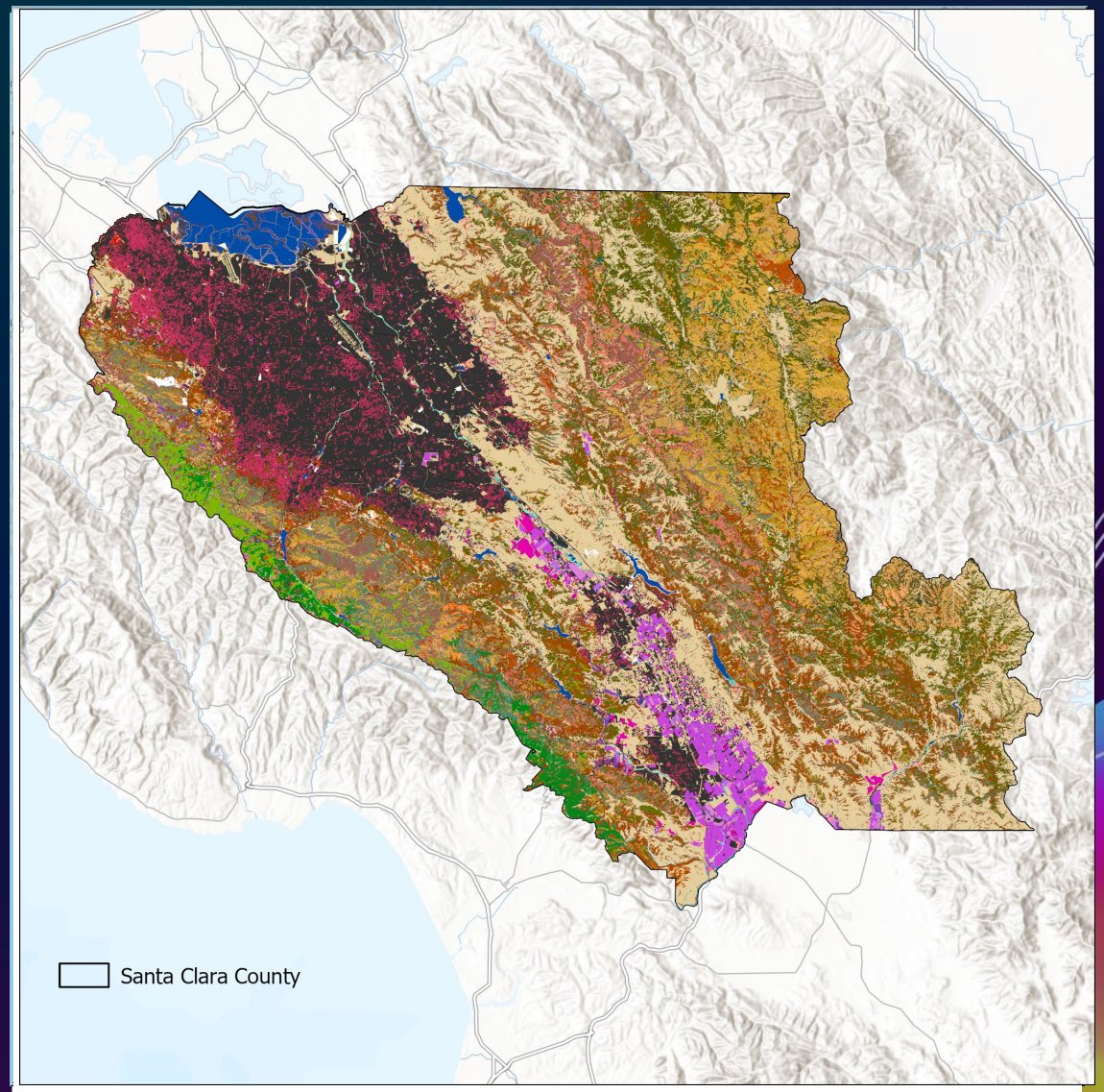
Quick Recap: Santa Clara Countywide Fine Scale Vegetation Map and Landscape Database Project

- Funded by a consortium of local, state, federal and NGO partners in Santa Cruz and Santa Clara counties, and led by the Santa Cruz Mountains Stewardship Network.

- Aligns with methods used in other regional mapping efforts including Sonoma, Marin, San Mateo, Alameda, and Contra Costa counties.

- Key deliverables included:
  - 5m fuels model
  - Wildfire Hazard and Risk to Structures Mapping
  - 5-class Impervious Surface Mapping
  - Lidar Derived Topography and Vegetation Structure Layers
  - Enhanced Vegetation Lifeform Map (26-classes)
  - Floristic Classification and Vegetation Descriptions
  - Fine Scale Vegetation Map (121-classes, 309,785 features, based on 2020 aerial imagery)

- All deliverables available via PacificVegMap.org

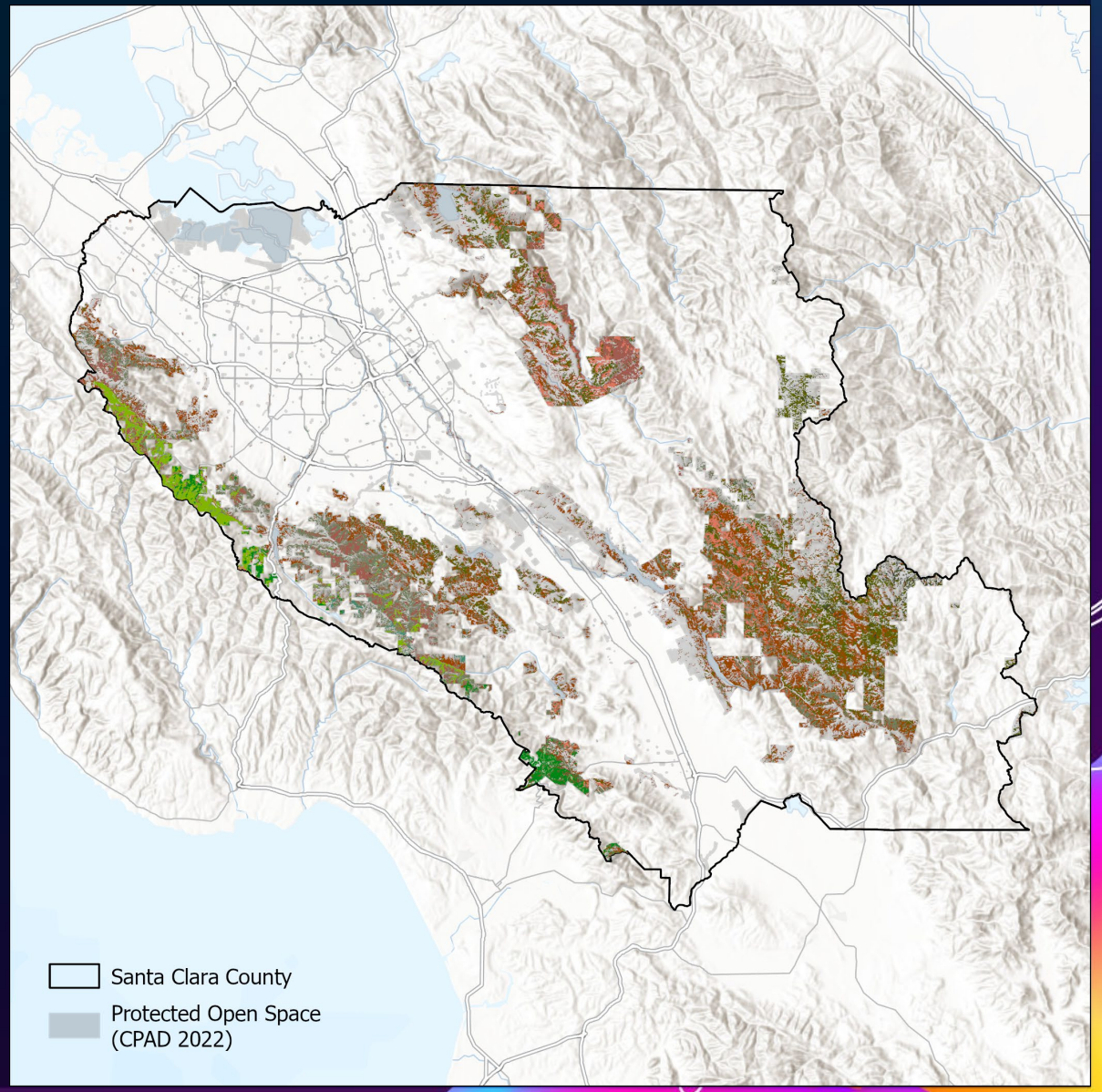


Fine Scale Vegetation Map

3 Example Applications – Fine Scale Veg Map

Summarizing Forest Distribution on Protected Open Space Lands

- The countywide fine scale veg map is a detailed depiction of the vegetation communities in Santa Clara county, based on local floristic classification and consistent with the Manual of California Vegetation.
- This gives land managers and other users greater insight into the distribution and composition of key vegetation assemblages, for example forests and woodlands.
- We can use open space boundaries (CPAD 2022) to summarize the distribution of protected forests and woodlands in Santa Clara County.
- This can provide valuable insight into opportunities to improve forest resilience, increase conservation, protect watershed health, etc.



Summarizing Forest Distribution on Protected Open Space Lands

Forest Lifeform	Fine Scale Vegetation Map Class	Common Name	Lifeform Class	Total Acres in Santa Clara County	Total Protected Acres	Percent Protected
Conifer Types	Juniperus californica Alliance	California juniper	Conifer	2,050	7	0.3%
	Pinus attenuata Alliance	knobcone pine	Conifer	1,876	520	28%
	Pinus coulteri Alliance	Coulter pine	Conifer	713	3	0.4%
	Pinus ponderosa – (Quercus agrifolia – Arbutus menziesii) Provisional Association	ponderosa pine	Conifer	237	111	47%
	Pinus sabiniana Woodland Alliance	California foothill pine	Conifer	6,729	1,630	24%
	Pseudotsuga menziesii – Notholithocarpus densiflorus / Vaccinium ovatum Association	Douglas-fir	Conifer	9,686	5,912	61%
	Sequoia sempervirens Alliance	coast redwood	Conifer	11,272	3,449	31%
Decidious Hardwood Types	Acer macrophyllum Mapping Unit	big leaf maple	Decidious Hardwood	431	275	64%
	Aesculus californica Alliance	California buckeye	Decidious Hardwood	4,009	1,031	26%
	Quercus douglasii Alliance	blue oak	Decidious Hardwood	83,854	23,947	29%
	Quercus kelloggii Alliance	California black oak	Decidious Hardwood	16,879	6,739	40%
	Quercus lobata Mapping Unit	valley oak	Decidious Hardwood	12,099	3,764	31%
Evergreen Hardwood Types	Arbutus menziesii Alliance	pacific madrone	Evergreen Hardwood	420	187	45%
	Notholithocarpus densiflorus Alliance	tanoak	Evergreen Hardwood	1,633	891	55%
	Quercus agrifolia Alliance	coast live oak	Evergreen Hardwood	82,147	32,567	40%
	Quercus chrysolepis (tree) Alliance	canyon live oak	Evergreen Hardwood	17,175	9,040	53%
	Quercus wislizeni – Quercus parvula (tree) Alliance	Interior live oak	Evergreen Hardwood	2,262	538	24%
	Umbellularia californica Mapping Unit	California bay	Evergreen Hardwood	44,332	21,361	48%
Mixed Hardwoods	Quercus (agrifolia, douglasii, garryana, kelloggii, lobata, wislizeni) Alliance	mixed oaks	Mixed Hardwood	4,148	1,708	41%

Total Protected Acres of Native Upland Forests and Woodlands, Santa Clara Countywide Fine Scale Vegetation Map, California Protected Areas Database (2022)

Summarizing Forest Distribution on Protected Open Space Lands

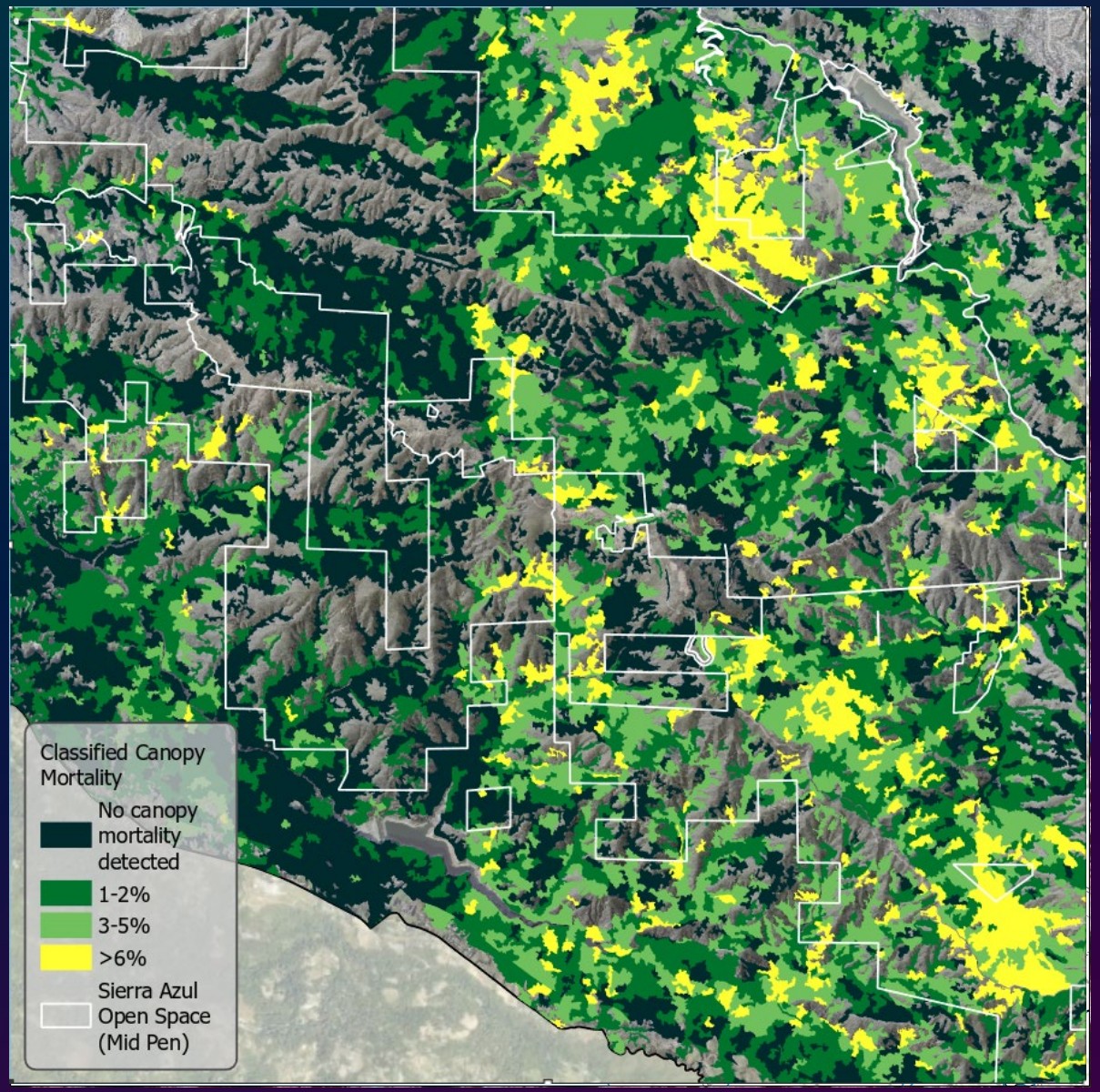
Forest Lifeform	Fine Scale Vegetation Map Class	Common Name	California State Parks		Santa Clara County Parks		Mid Pen		Santa Clara Valley OSA		SFPUC	
			Acres	Percent of Countywide Protected	Acres	Percent of Countywide Protected	Acres	Percent of Countywide Protected	Acres	Percent of Countywide Protected	Acres	Percent of Countywide Protected
Conifer Types	Juniperus californica Alliance	California juniper	7	100%	0	0%	0	0%	0	0%	0	0%
	Pinus attenuata Alliance	knobcone pine	0	0%	34	7%	389	75%	86	17%	0	0%
	Pinus coulteri Alliance	Coulter pine	0	0%	2	67%	0	0%	0	0%	0	0%
	Pinus ponderosa – (Quercus agrifolia – Arbutus menziesii) Provisional Association	ponderosa pine	110	99%	0	0%	1	1%	0	0%	0	0%
	Pinus sabiniana Woodland Alliance	California foothill pine	1,055	65%	131	8%	69	4%	26	2%	73	4%
	Pseudotsuga menziesii – Notholithocarpus densiflorus / Vaccinium ovatum Association	Douglas-fir	105	2%	3134	53%	2,613	44%	273	5%	0	0%
	Sequoia sempervirens Alliance	coast redwood	0	0%	2,693	78%	550	16%	33	1%	0	0%
Decidious Hardwood Types	Acer macrophyllum Mapping Unit	big leaf maple	8	3%	40	15%	141	51%	39	14%	25	9%
	Aesculus californica Alliance	California buckeye	687	67%	85	8%	102	10%	23	2%	8	1%
	Quercus douglasii Alliance	blue oak	13,481	56%	3,678	15%	106	0%	909	4%	2,074	9%
	Quercus kelloggii Alliance	California black oak	3,267	48%	1,544	23%	75	1%	185	3%	647	10%
	Quercus lobata Mapping Unit	valley oak	536	14%	1,443	38%	95	3%	170	5%	535	14%
Evergreen Hardwood Types	Arbutus menziesii Alliance	pacific madrone	24	13%	83	44%	81	43%	0	0%	0	0%
	Notholithocarpus densiflorus Alliance	tanoak	0	0%	454	51%	412	46%	75	8%	0	0%
	Quercus agrifolia Alliance	coast live oak	12,743	39%	7299	22%	4,031	12%	4,120	13%	942	3%
	Quercus chrysolepis (tree) Alliance	canyon live oak	30	0.3%	1,785	20%	4,158	46%	588	7%	476	5.3%
	Quercus wislizeni – Quercus parvula (tree) Alliance	Interior live oak	14	3%	443	82%	24	4%	41	8%	0	0%
	Umbellularia californica Mapping Unit	California bay	4,589	21%	3,647	17%	8,132	38%	1,917	9%	963	5%
Mixed Hardwoods	Quercus (agrifolia, douglasii, garryana, kelloggii, lobata, wislizeni) Alliance	mixed oaks	470	28%	363	21%	11	1%	143	8%	306	18%

Protected Acres by Agency (>13,000 acres managed) of Native Upland Forests and Woodlands Types (>200 ac), Santa Clara Countywide Fine Scale Vegetation Map, California Protected Areas Database (2022)

3 Example Applications – Fine Scale Veg Map

Exploring Canopy Mortality by Fine Scale Vegetation Map Class

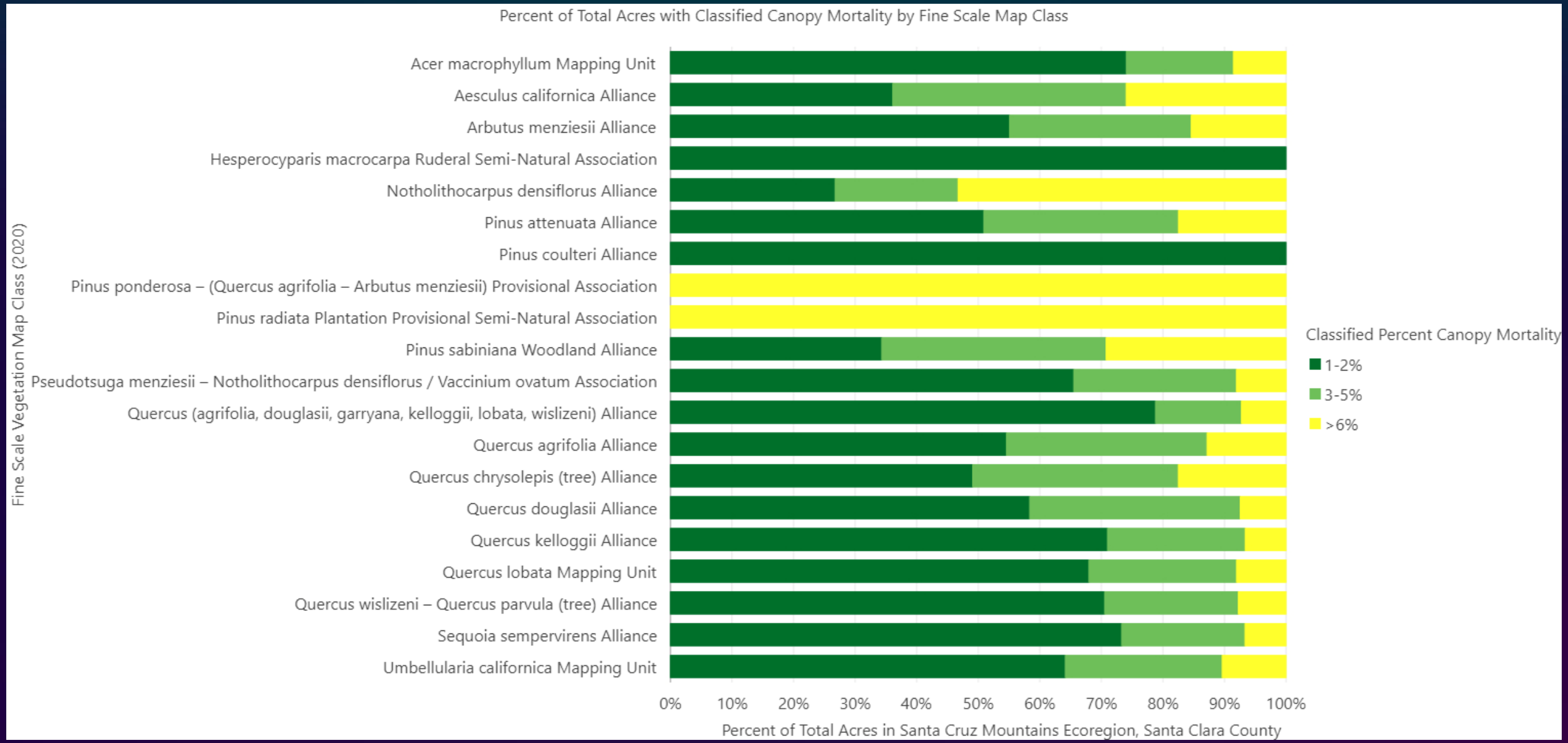
- With support from Santa Clara County FireSafe Council, percent canopy mortality attribution was developed for all forest and woodland classes within the Santa Cruz Mountains Ecoregion.
- This attribute in the fine scale veg map (% Standing Dead 2020) estimates the percentage of woody canopy mortality (>7 feet) that did not show live crown in the 2020 imagery.
- Canopy mortality attribution is useful for understanding the distribution of mortality in forested stands that could be related to drought, pests, and/or pathogen impacts like sudden oak death.
- Identifying areas with canopy mortality can support landscape scale forest health and fuels reduction project planning (e.g., One Tam Forest Health).



Exploring Canopy Mortality by Fine Scale Vegetation Map Class

Total Acres by 2020 Fine Scale Vegetation Map Class with Percent Canopy Mortality Class (>0%), Forests and Woodlands Only, Santa Clara County portions of the Santa Cruz Mts. Ecoregion

Exploring Canopy Mortality by Fine Scale Vegetation Map Class



Percent of Total Acres by 2020 Fine Scale Vegetation Map Class with Percent Canopy Mortality Class (>0%), Forests and Woodlands Only, Santa Clara County portions of the Santa Cruz Mts. Ecoregion

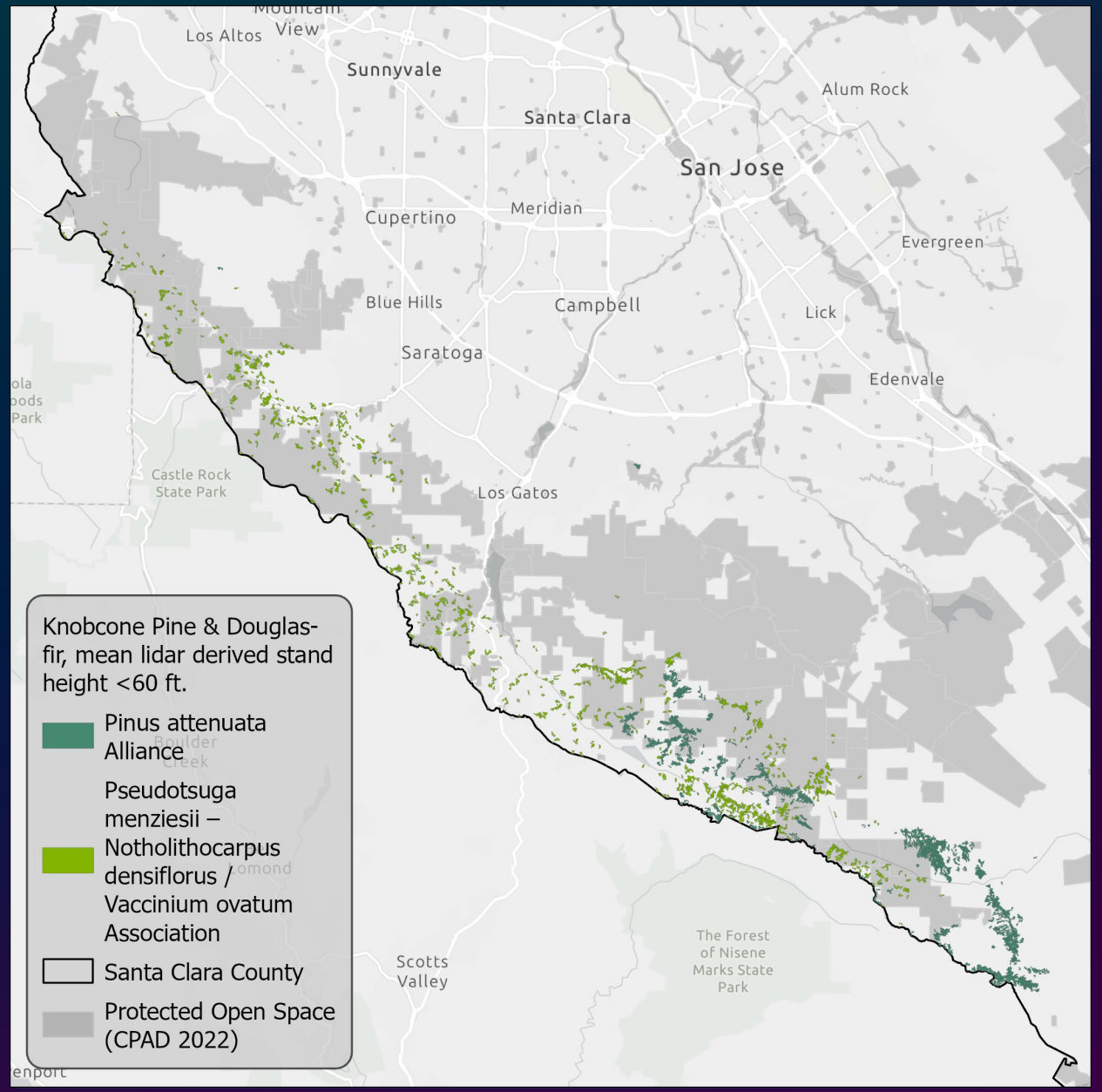
3 Example Applications – Fine Scale Veg Map

Using Mean Lidar Derived Stand Height to Identify Potential Areas of Type Conversion

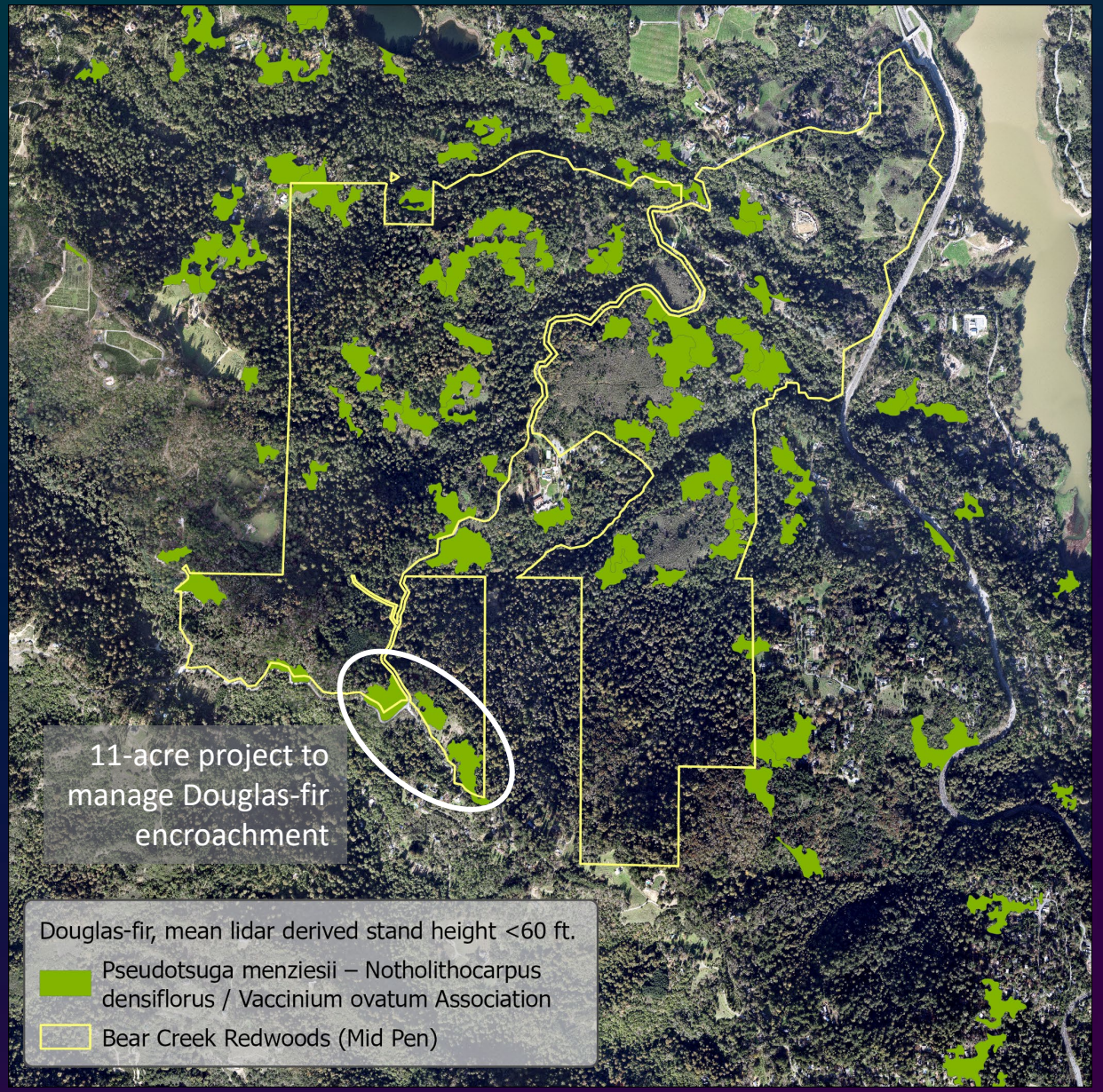
- In Marin County, the One Tam collaborative developed lidar derived structural classifications for various forests types to inform a regional forest health assessment and strategic plan.

- Research shows that the exclusion of fire, including modern fire suppression the interruption of indigenous burning following colonization, facilitates type conversion in fire adapted landscapes (Cocking et al., 2015; Hsu et al., 2012; Startin, 2022). Conversion of grasslands, shrublands, and open canopy oak woodlands to Douglas-fir forest is prevalant in the Bay Area including Santa Clara County.

- Analysis of the distribution of Douglas-fir stands in the veg map with a mean lidar-derived stand height attribute of ≤ 60 feet can be useful for identifying the potential type conversion areas.



Using Mean Lidar Derived Stand Height to Identify Potential Areas of Type Conversion



Management of Douglas-fir encroachment (top and bottom left), Bear Creek Redwoods, Courtesy of Midpeninsula Regional Open Space District. Douglas-fir stands ≤ 60 feet mean lidar derived stand height, 2020 Santa Clara Countywide Fine Scale Vegetation Map *(right).*

Q&A / Acknowledgements

Special thanks to Yoko Myers and the County of Santa Clara, Technology Services and Solutions Department!

Aerial Information Systems
Big Creek Lumber
California Department of Fish and Wildlife
California Department of Forestry and Fire Protection
California Department of Parks and Recreation
California Landscape Stewardship Network
California Native Plant Society
California State Coastal Conservancy
Carol Rice, Wildland Res Mgt
County of Marin
County of San Mateo
County of Santa Clara
County of Santa Cruz
Esther Mandeno, Digital Mapping Solutions
Golden Gate National Parks Conservancy
Gordon and Betty Moore Foundation
Greater Farallones Association
Kass Green & Associates
Marin Municipal Water District
MarinMap
Midpeninsula Regional Open Space District
National Aeronautics and Space Administration
National Oceanic and Atmospheric Administration
NatureServe
National Park Service
One Tam
Peninsula Open Space Trust
Point Blue Conservation Science
Quantum Spatial/NV5
Resources Legacy Fund
San Francisco Public Utilities Commission
San Francisco State University
San Mateo City/County Association of Governments
San Mateo Resource Conservation District
Santa Clara Valley Open Space Authority
Santa Clara Valley Water District
Santa Cruz Mountains Stewardship Network
Save the Redwoods League
Sonoma Agriculture and Open Space District
Tukman Geospatial
United States Geological Survey, 3D Elevation Program

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Questions	Answers
These are extremely detailed dataset. What was the biggest challenge to complete this project?	The data follows the methodology developed in Sonoma in 2013 and been applied in several counties in 2018, from then to now, this method has been refined. Relied upon state and federal standards and best practices, to ensure the data is consistent with other regional datasets. Biggest challenge was managing a large team and coordinating with many government agencies, as well as tracking the budget.
I volunteered for the National Park Service through a Meetup group called Wildland Restoration Warriors, and the rangers mentioned that they collected data of the plants we planted and the seeds we collected by area, is this data added to the database that the GIS team uses	short answer is no, the data is site specific, where as the GIS data is captured at a larger landscape scale, working with multiple counties. It's intended to depict the data that is applicable to larger region data, such as watershed or land management.
Understanding this is public domain data, do you have stats/info who uses these dataset?	Don't currently have the data or stats on web traffic, but we have the ability to capture the data and would like to in the future. This would be a great way to showcase ROI, and insights into who is using the data.
Will you have an application to map crops (corn, grapes, etc)?	Some of the land cover maps are related to Agriculture, but it is not crop specific. More so related to irrigation, and type of agriculture, for example orchards vs hay fields.
How do you cope with year to year (or longer term) change? Will you re-collect these data in the future?	The value of these datasets increase with time, change detection is the principal application of this data, especially in the event of landscape scale disturbance(climate change, wildfires, etc). As those events happen in the future, having a baseline dataset will help to show the impact of these landscape scale disturbances, as well as identifying and quantifying the changes in landscape. There are some agencies who are trying to use new automated change detection techniques, to increase the frequency of data captue and reduce costs.

Q & A