Dataset Name: Alameda and Contra Costa Fine Scale Vegetation Map

Version: 5/15/2025

Credits: East Bay Regional Park District, CAL FIRE, Tukman Geospatial LLC

Access: Publicly Available

Appropriate Scale Range for Use: 1:5,000 and smaller

Dataset Summary:

For the final project report that includes detailed methods and an accuracy assessment, go to this link: https://vegmap.press/alcc_finescale_final_report

The Alameda and Contra Costa County fine scale vegetation map is a 115-class vegetation map of Alameda and Contra Costa Counties with 140,442 polygons. The fine scale vegetation map represents the state of the landscape in 2020 and adheres to U.S. National Vegetation Classification (USNVC, or NVC) standards. The map was designed to be used at scales of 1:5,000 and smaller. Table 1 shows the options for downloading the fine scale vegetation map.

Table 1. Options for downloading the Alameda and Contra Costa fine scale vegetation map

Description	Location
File GDB Feature Class	https://vegmap.press/alcc_vegmap
Layer Symbology	https://vegmap.press/alcc_vegmap_layer_file
Layer Package	https://vegmap.press/alcc_vegmap_layer_package
Feature Service	https://vegmap.press/alcc_vegmap_feature_service
Vector Tile Package	https://vegmap.press/alcc_vegmap_vtp
Web Map	https://vegmap.press/alcc_webmap

Map class definitions, as well as a dichotomous key for the map classes, can be found in the Alameda and Contra Costa Fine Scale Vegetation Map Key (https://vegmap.press/alcc_mapping_key). A key to map class abbreviations is also available (https://vegmap.press/alcc_vegmap_abbrevs).

The next section provides an overview of methods. The methods overview is followed by tables that show the minimum mapping unit for the project and the list of attributes contained in the fine scale map's attribute table.

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Fine Scale Vegetation Methods Overview:

The fine scale vegetation map was created using semi-automated methods that include field work, computer-based machine learning, and manual aerial photo interpretation. The vegetation map was developed by first creating an enhanced lifeform map, a 27-class map that served as a foundation for the fine-scale map. The lifeform map was created using "expert systems" rulesets in Trimble Ecognition. These rulesets combine automated image segmentation (stand delineation) with object-based image classification techniques. In contrast with machine learning approaches, expert systems rulesets are developed heuristically based on the knowledge of experienced image analysts. Key data sets used in the expert systems rulesets for enhanced lifeform included: 2020 orthophotography, the 2020 LiDAR derived Canopy Height Model (CHM), and other LiDAR derived landscape metrics.

After it was produced using Ecognition, the preliminary enhanced lifeform map product was manually edited by photo interpreters. Manual editing corrected errors where the automated methods produced incorrect results. Edits were made to correct two types of errors: 1) unsatisfactory polygon (stand) delineations and 2) incorrect polygon labels.

The mapping team used the enhanced lifeform map as the foundation for the finer scale and more floristically detailed fine scale vegetation map. For example, a single polygon mapped in the enhanced lifeform map as 'evergreen hardwood' might be divided into four polygons in the fine scale map including California live oak, California bay forest, and madrone.

The enhanced lifeform map was refined into the fine scale vegetation map using a semi-automated approach. The approach combines Ecognition segmentation, extensive field data collection, machine learning, manual editing, and expert review. Ecognition segmentation results in refinement and subdivision of the larger lifeform polygons. Field data collection results in a large number of training polygons labeled with their field-validated map class. Machine learning relies on the field collected data as training data and a stack of GIS datasets as predictor variables. The resulting model is used to create automated fine-scale labels for common forest classes countywide. Machine learning algorithms for this project included both Random Forests and Support Vector Machines (SVMs). Machine learning is followed by extensive manual editing, which is used to 1) edit segment (polygon) labels when they are incorrect and 2) edit segment (polygon) shape when necessary. All shrub, pine/cypress, riparian, and wetland fine scale map classes are delineated manually using photo interpretation and field data. The Santa Clara Fine Scale Vegetation Map extends 250 meters into Alameda County. This overlapping area was removed from the Alameda County map, giving precedence to the Santa Clara Fine Scale Map. The border areas between Alameda and Santa Clara counties were then edge-matched through manual photo interpretation.

The map classes in the fine scale vegetation map generally correspond to the alliance level of the U.S. National Vegetation Classification, but some map classes - especially herbaceous types - correspond to higher levels of the hierarchy (such as group or macrogroup).

Minimum Mapping Units:

Table 2 shows the minimum mapping units (MMUs) for the fine scale vegetation map.

Table 2. Minimum Mapping Units by Feature Type

Feature Type	Minimum Mapping Unit
Agricultural Classes	1/4 Acre
Woody Upland Classes	1/2 acre for contrasting lifeforms (e.g., 'forest fragments' surrounded by non-forest); 1 acre for different alliances in the same lifeform
Woody Riparian Classes	1/4 Acre
Upland Herbaceous Classes	1/2 Acre for contrasting lifeforms, 1 acre for different alliances in the same lifeform
Wetland Herbaceous Classes	1/4 acre
Bare Land	1/2 Acre
Developed	1/5 Acre
Water	400 square feet

Fine Scale Vegetation Map Attributes:

Table 3 shows the attributes (fields) in the fine scale vegetation map.

Table 3. Fine Scale Vegetation Map Attributes

Fine Scale Map Attributes (Name/Alias)	Description
FINESCALE/Fine Scale Map Class in 2020	U.S. National Vegetation Classification (USNVC) map class label for all stands.
FSMC_ABBRV/Fine Scale Map Class Abbreviation in 2020	Map class abbreviations for use in cartography and visualization. A key to abbreviations is available here: https://vegmap.press/alcc_vegmap_abbrevs
FSMC_DESCRIPTION/Map Class Description in 2020	Map class descriptions as defined in the mapping key. The key is available here: https://vegmap.press/alcc_mapping_key
LIFEFORM/Lifeform in 2020	15-class lifeform label for all stands. Floristically more general than the fine scale map class.
ENHANCED_LIFEFORM/Enhanced Lifeform in 2020	27-class lifeform label for all stands. Forest and shrub class labels have more floristic definition than the lifeform map. Floristically more general than the fine scale map class.
ABS_COVER % lidar Returns > 15 Feet (2017-2022)[1]	Absolute cover of lidar returns greater than 15 feet in height. Derived from 2017-2022 lidar data.[1]
REL_CON_COV/Relative % Conifer Cover in 2020	Relative conifer cover, estimating the percent of tree canopy >= 15 ft. is conifer. Derived from machine learning on lidar-derived tree approximate objects combined with manual image interpretation of 2020 imagery.

[1] 2017-2022 date range for all lidar attributes refers to the different collection dates of lidar across different areas of the two counties. For more details, see the Alameda and Contra Costa County Fine Scale Veg Map Final Report.

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Fine Scale Map Attributes (Name/Alias)	Description
REL_HDW_COV/Relative % Hardwood Cover in 2020	Relative hardwood cover, estimating the percent of tree canopy >= 15 ft. is hardwood. Derived from relative conifer cover. (100-REL_CON_COV)
CON_COVER/Absolute % Conifer Cover in 2020	Absolute conifer cover, calculated as: ((relative % conifer cover/100) x (absolute % cover/100)) * 100
HDW_COVER/Absolute % Hardwood Cover in 2020	Absolute hardwood cover, calculated as: ((relative % hardwood cover/100) x (absolute % hardwood/100)) * 100
SHB_COVER/Absolute % Shrub Cover in 2020	Absolute shrub cover for herbaceous and shrub stands. Derived from machine learning combined with manual image interpretation of 2020 imagery.
STAND_HT_MN/ Mean lidar Stand Height (ft.) (2017-2022)	Mean stand height from lidar-derived canopy height model (CHM).
STAND_HT_MX/ Maximum lidar Stand Height (ft.) (2017-2022)	Maximum stand height from lidar-derived canopy height model (CHM). Calculated for areas of the stand greater than or equal to 15 feet tall.
STAND_HT_MD/Median lidar Stand Height (ft.) (2017-2022)	Median stand height from lidar-derived canopy height model (CHM). Calculated for areas of the stand greater than or equal to 15 feet tall.
STAND_HT_SD/Standard Deviation lidar Stand Height (ft.) (2017-2022)	Standard deviation of stand height from lidar-derived canopy height model (CHM). Calculated for areas of the stand greater than or equal to 15 feet tall.
IMPERVIOUS/% Impervious in 2020	Percent of stand that was impervious in 2020. Integrated from the Alameda and Contra Costa impervious surface maps.
PERVIOUS/% Pervious in 2020	Percent of stand that was pervious in 2020. Integrated from the Alameda and Contra Costa impervious surface maps.
PAVED_RD/% Paved Road in 2020	Percent of stand that was paved road in 2020. Integrated from the Alameda and Contra Costa County impervious surface map.
DIRT_RD/% Dirt and Gravel Road in 2020	Percent of stand that was dirt or gravel road in 2020. Integrated from the Alameda and Contra Costa County impervious surface map.
OTHER_IMPERVIOUS/% Other Impervious in 2020	Percent of stand that was a paved or unpaved, non-road surface (such as a paved or unpaved parking lot) in 2020. Integrated from the Alameda and Contra Costa County impervious surface map.
BUILDINGS/% Buildings in 2020	Percent of stand that was a building in 2020. Integrated from the Alameda and Contra Costa County impervious surface map.
SLOPE_MN/Mean Bare Earth Slope (2017-2022)	Mean bare-earth slope (degrees) derived from 2017–2022 lidar.
SLOPE_MX/Maximum Bare Earth Slope (2017-2022)	Maximum bare-earth slope (degrees) derived from 2017–2022 lidar.
SLOPE_SD/Standard Deviation Bare Earth Slope (2017-2022)	Standard deviation of the bare-earth slope (degrees) derived from 2017–2022 lidar.
STAND_DEAD/% Standing Dead Over 15ft. in 2022	Estimate of percent standing dead vegetation in forested stands. Estimates the percent of the woody canopy > 15 feet tall that did not have a living crown in 2022.
SOURCE/Fine Scale Map Label Source	Indicates whether stand's fine scale map class was validated during field work, or if the map label was assigned based on remote sensing methods.
ACRES/Acres	Acres of land encompassed by the stand.
FIRE_FLAG_20_25/Experienced Fire Between 2020-2025	Yes/No attribute, assigned yes when >50% of a stand overlapped with a fire that occurred between 2020-2025, based on published FRAP (CAL FIRE) perimeters.
OID_COPY/ OID_COPY	Index for internal use.

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Related Datasets and Resources:

- **Enhanced Lifeform –** The enhanced lifeform map is derived from this Fine-Scale Vegetation map. It is a simplification of the vegetation map, with a fraction of the total map classes.
- **Impervious Surfaces Map –** The impervious surfaces maps (Alameda and Contra Costa) are fine scale maps of built features including dirt gravel roads, paved roads, buildings, and other impervious surfaces.
- **CNPS Report –** *Vegetation Classification of Alliances and Associations in Alameda and Contra Costa, California*. This report provides very detailed information about Alameda and Contra Costa County's vegetation communities. This work includes a classification report and floristic key (more detailed than the mapping key), as well as detailed descriptions for each map class.