SONOMA VEG MAP

SONOMA COUNTY VEGETATION MAPPING & LIDAR PROGRAM

High-Quality Data for Planning, Conservation and Resource Management

Dataset Name: Sonoma County Fine Scale Vegetation and Habitat Map

Version: 5/1/2017

Download Location: http://sonomavegmap.org/data-downloads/ OR ArcGIS.com

Credits: Sonoma Veg Map, Sonoma County Agricultural Preservation and Open Space District

Access: Publicly Available

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

Dataset Summary:

Note*: This fine scale map is a final draft product and will be updated in late 2017 with final results from map accuracy assessment work. Any changes to the map at that time will be minor.*

The Sonoma County fine scale vegetation and habitat map is an 83-class vegetation map of Sonoma County with 212,391 polygons. The fine scale vegetation and habitat map represents the state of the landscape in 2013 and adheres to the National Vegetation Classification System (NVC). The map was designed to be used at scales of 1:5,000 and smaller.

Map class definitions, as well as a dichotomous key for the map classes, can be found in the Sonoma Vegetation and Habitat Map Key (https://sonomaopenspace.egnyte.com/dl/xObbaG6lF8). A list of links to other relevant documents can be found at the end of this datasheet.

A much more detailed methods document than what is offered in this datasheet will be published once the accuracy assessment is complete.

Fine Scale Vegetation and Habitat Methods Overview:

The fine scale vegetation and habitat map was created using semi-automated methods that include field work, computer-based machine learning, and manual aerial photo interpretation. The vegetation and habitat map was developed by first creating a lifeform map, an 18-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 lifeform included: orthophotography ('11 and '13), the LiDAR derived Canopy Height Model (CHM), and other LiDAR derived landscape metrics.

After it was produced using Ecognition, the preliminary 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 lifeform map as the foundation for the finer scale and more floristically detailed Fine Scale Vegetation and Habitat map. For example, a single polygon mapped in the lifeform map as forest might be divided into four polygons in the in the fine scale map including redwood forest, Douglas-fir forest, Oregon white oak forest, and bay forest.

The fine scale vegetation and habitat map was developed 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 a refinement of the 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 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.

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

Minimum Mapping Units:

Table 1 shows the minimum mapping units (MMUs) for the fine scale vegetation and habitat map.

Table 1. 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 surrounded by non-forest), 1 acre for different fine scale map classes in the same lifeform
Woody Riparian Classes	1/4 Acre for contrasting lifeforms, 1 acre for different alliances
Upland Herbaceous Classes	1/2 Acre for contrasting lifeforms, 1 acre for different alliances
Wetland Herbaceous Classes	1/4 Acre for contrasting lifeforms, 1 acre for different alliances
Bare Land	1/2 Acre
Developed	2/10 Acre
Water	400 square feet

Fine Scale Vegetation and Habitat Map Attributes:

Table 2 shows the attributes (fields) in the fine scale vegetation and habitat map.

Table 2. Fine Scale Vegetation and Habitat Map Attributes

Fine Scale Map Attributes (Name/Alias)	**Description**
MAP_CLASS/Map Class	National Vegetation Classification (NVCS) Map class. The full NVCS hierarchy is provided through a relationship class on this field.
SOURCE/Source	Source for label – ‘remotely sensed’ or ‘field’
REL_COV/Relative Cover	Relative softwood and hardwood cover in 5-classes for forested stands
ALLIANCE/Alliance	Field validated alliance if a stand with a group/macrogroup level map class was validated to the alliance
OID_COPY/OID_COPY	Unique Polygon Identifier
Abbrv/Abbrv	Map class abbreviations for use in cartography and visualization
LIFEFORM/Lifeform	19-class land-use-land-cover lookup, with more detail in ag and developed and less detail in forest
LF_FOREST/Forest Lifeform	17-class land-use-land-cover lookup, with more detail in forest and less detail in ag. and developed
SERP_FLAG/Serpentine Flag	Flag for map classes highly correlated to serpentine; 1 for serpentine classes, 0 for non-serpentine classes
TREE_HT_MN/Mean LiDAR Tree Height	Mean stand height from LiDAR-derived canopy height model (CHM)
TREE_HT_MX/Max LiDAR Tree Height	Max stand height from LiDAR-derived canopy height model (CHM)

Fine Scale Map Attributes (Name/Alias)	Description
TREE_HT_SD/Standard Deviation LiDAR Tree Height	Standard deviation of stand height from LiDAR-derived canopy height model (CHM)
ABS_COVER/Absolute % Tree Canopy Cover	Absolute canopy cover – represents percent of stand's LiDAR returns that are greater than 15 feet above the ground
HDW_COV_LO/Absolute Hardwood Cover Low End	Low end of estimated absolute hardwood cover
HDW_COV_HI/Absolute Hardwood Cover High End	High end of estimated absolute hardwood cover for forest stands
CON_COV_LO/Absolute Conifer Cover Low End	Low end of estimated absolute conifer cover for forest stands
CON_COV_HI/Absolute Conifer Cover High End	High end of estimated absolute conifer cover for forest stands
PPT_IMPERV/Proportion Impervious	Percent of stand with impervious cover
PPT_PERV/Proportion Pervious	Percent of stand with pervious cover
PPT_PVD_RD/ Proportion Paved Road	Percent of stand that is paved road
PPT_DRT_RD/ Proportion Dirt Road	Percent of stand that is dirt road
PPT_OT_IMP/ Proportion Other Impervious	Percent of stand that is 'other impervious' (not road or building)
PPT_BUILDG/ Proportion Buildings	Percent of stand that is buildings
BM_MG_HA/Aboveground Biomass (Metric Tons per Ha)	Aboveground biomass in metric tons per hectare
BM_MG_AC/Aboveground Biomass (Metric Tons per Acre)	Aboveground biomass in metric tons per acre
BM_MG/Aboveground Biomass (Metric Tons)	Aboveground biomass in metric tons
CB_MG_HA/Aboveground Carbon (Metric Tons per Hectare)	Aboveground carbon in metric tons per hectare
CB_MG_AC/Aboveground Carbon (Metric Tons per Acre)	Aboveground carbon in metric tons per acre
CB_MG/Aboveground Carbon (Metric Tons)	Aboveground carbon in metric tons
CB_EQVT_HA/Aboveground Carbon (Equivalents per Hectare)	Aboveground carbon in metric tons of CO_2 equivalents (CO2e) per hectare
CB_EQVT_AC/Aboveground Carbon (Equivalents per Acre)	Aboveground carbon in metric tons of CO_2 equivalents (CO2e) per acre
CB_EQVTS/Aboveground Carbon (Equivalents)	Aboveground carbon in metric tons of CO_2 equivalents (CO2e)
MN_P05/Mean of 5^{th} Percentile Height	Lascanopy mean 5^{th} percentile height for forest stands
SD_P05/Standard Deviation of 5^{th} Percentile Height	Lascanopy standard deviation 5^{th} percentile height for forest stands
MN_P10/Mean of 10^{th} Percentile Height	Lascanopy mean 10^{th} percentile height for forest stands
SD_P10/Standard Deviation of 10^{th} Percentile Height	Lascanopy standard deviation 10^{th} percentile height for forest stands
MN_P25/Mean of 25^{th} Percentile Height	Lascanopy mean 25^{th} percentile height for forest stands
SD_P25/Standard Deviation of 25^{th} Percentile Height	Lascanopy standard deviation 25^{th} percentile height for forest stands
MN_P50/Mean of 50^{th} Percentile Height	Lascanopy mean 50^{th} percentile height for forest stands
SD_P50/Standard Deviation of 50^{th} Percentile Height	Lascanopy standard deviation 50^{th} percentile height for forest stands
MN_P75/Mean of 75^{th} Percentile Height	Lascanopy mean 75^{th} percentile height for forest stands
SD_P75/Standard Deviation of 75^{th} Percentile Height	Lascanopy standard deviation 75^{th} percentile height for forest stands
MN_P90/Mean of 90^{th} Percentile Height	Lascanopy mean 90^{th} percentile height for forest stands
SD_P90/Standard Deviation of 90^{th} Percentile Height	Lascanopy standard deviation 90^{th} percentile height for forest stands
MN_QAV/Mean LiDAR Average Square Height	Lascanopy mean average square height (QAV) for forest stands
SD_QAV/Standard Deviation LiDAR Average Square Height	Lascanopy standard deviation average square height for forest stands

Fine Scale Map Attributes (Name/Alias)	Description
MN_SKE/Mean LiDAR Skewness	Lascanopy mean LiDAR skewness for forest stands
SD_SKE/Standard Deviation LiDAR Skewness	Lascanopy standard deviation LiDAR skewness for forest stands
MN_AVG/Mean of LiDAR Returns	Lascanopy mean of all LiDAR returns for forest stands
MN_KUR/Mean LiDAR Kurtosis	Lascanopy mean LiDAR kurtosis for forest stands
SD_KUR/Standard Deviation of LiDAR Kurtosis	Lascanopy standard deviation LiDAR kurtosis for forest stands
MN_STD/Mean of the Standard Deviations of LiDAR Returns	Lascanopy standard deviation of LiDAR returns from lascanopy for forest stands

Related Datasets (available at http://sonomavegmap.org/data-downloads)**:**

- **Croplands** - The detailed crop information in this data product is also included the Sonoma County Croplands dataset, which is a “standalone” croplands product (it doesn’t include non-agricultural classes).
- **Lifeform Products -** Two lifeform products are available, the lifeform map and the forest lifeform map; both are derived from this Fine-Scale Vegetation and Habitat map. These products are simplifications of the vegetation map, with a fraction of the total map classes. The lifeform product provides more detail for agriculture and built up classes; the forest lifeform product provides more detail for forest and natural lands.
- **Water and Wetland Vegetation –** The Water and Wetland Vegetation map product is a derivative of this Fine-Scale Vegetation and Habitat map that represents only the water and wetland map classes as a “standalone” map product.