

Name: Sierra Nevada Multi-Source Meadow Polygons Compilation (v 2.0)

Format: ESRI ArcGIS 10 File Geodatabase

Feature Class name: SNMMPC_v2

Summary:

Compiled meadows polygons for the Sierra Nevada of California containing 18,780 meadow polygons (total area = 112,567 hectares, 278,160 acres).

Citations:

UC Davis, Center for Watershed Sciences & USDA Forest Service, Pacific Southwest Region, 2017. Sierra Nevada Multi-Source Meadow Polygons Compilation (v 2.0), Vallejo, CA, Regional Office: USDA Forest Service.

2017. <http://meadows.ucdavis.edu/>

Weixelman, D. A., B. Hill, D.J. Cooper, E.L. Berlow, J. H. Viers, S.E. Purdy, A.G. Merrill, and S.E. Gross. 2011. Meadow Hydrogeomorphic Types for the Sierra Nevada and Southern Cascade Ranges in California: A Field Key. Gen. Tech. Rep. R5-TP-034. Vallejo, CA. U.S. Department of Agriculture, Forest Service, Pacific Southwest Region, 34 pp.

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Access and use limitations

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Description

Brief Methods:

In version 2 of the Sierra Nevada Multi-source Meadow Polygons Compilation, polygon boundaries from the original layer (SNMMPC_v1 - <https://meadows.ucdavis.edu/data/4>) were updated using 'heads-up' digitization from high-resolution (1m) NAIP imagery. In version 1, only polygons larger than one acre were retained in the published layer. In version 2, existing polygon boundaries were split, reduced in size, or merged, and additional polygons not captured in the original layer were digitized. If split, original IDs from version 1 were retained for one half and a new ID was created for the other half. In instances where adjacent meadows were merged together, only one ID was retained and the unused ID was "decommissioned". If digitized, a new sequential ID was assigned.

Data dictionary:

Field	Description
AREA_ACRE	Meadow area in acres
STATE	State in which the meadow is located (CA or NV)
ID*	Unique meadow identifier UCDSNMxxxxxx *Note: IDs are non-sequential*
HUC12	Unique identifier for the Hydrologic Unit Code (HUC), level 12, in which the meadow is located
OWNERSHIP	Land ownership status (multiple sources)
EDGE_COMPLEXITY	Gives an indication of the meadow's exposure to external conditions EDGE COMPLEXITY = (MEADOWperimeter/EAC perimeter) [EAC = Equal Area Circle]
DOM_ROCKTYPE	Dominant rock type on which the meadow is located based on the USGS layer
VEG_MAJORITY	Vegetation majority based on the LANDFIRE layer (GROUPVEG attribute)
SOIL_SURVEY	Soil survey from which SOIL_COKEY, MAPUNIT_Kf, MAPUNIT_ClayTot_r, SOIL_MUKEY, and SOIL_COMP_NAME were assigned to each meadow (SSURGO or STATSGO depending on layer coverage)
SOIL_MUKEY	Mapunit Key: Unique identifier for the Mapunit in which the meadow is located
SOIL_COKEY	Component Key: Unique identifier for the major component of the mapunit in which the meadow is located
SOIL_COMP_NAME	Component Name: Name of the soil component with the highest representative value in the mapunit in which the meadow is located
MAPUNIT_Kf	K factor: A soil erodibility factor that quantifies the susceptibility of soil particles to detachment by water. Low: 0.05-0.2 Moderate: 0.25-0.4, High: >0.4
MAPUNIT_ClayTot_r	Representative value (%)of total clay
CATCHMENT_AREA	The approximate area of the upstream catchment exiting through the meadow(sq. m)
ELEV_MEAN	Mean elevation (m)
ELEV_RANGE	Elevation range (m) across each meadow
ED_MIN_FStopo_ROADS	Minimum Euclidean Distance (m) to Forest Service Topographic Map Data Transportation Roads

ED_MIN_FStopo_TRAILS	Minimum Euclidean Distance (m) to Forest Service Topographic Map Data Transportation Trails
ED_MIN_LAKE	Minimum Euclidean Distance (m) to lake edges
ED_MIN_FLOW	Minimum Euclidean Distance (m) to NHD Streams/Rivers
ED_MIN_SEEP	Minimum Euclidean Distance (m) to NHD Seeps/Springs
MDW_DEM_SLOPE	Median DEM based slope (in degrees)
STRM_SLOPE_GRADE	Length-weighted average slope of all NHD flowline segments in each meadow. Given for meadows with flowlines. Meadows without flowlines are null for this attribute.
POUR_POINT_LAT	Latitude of the lowest point along a flowline at which water flows out of the meadow in decimal degrees (meadow with no flowline has null value)
POUR_POINT_LON	Longitude of the lowest point along a flowline at which water flows out of the meadow in decimal degrees (meadow with no flowline has null value)
HGM_Type	Dominant meadow hydrogeomorphic (HGM) type
LAT_DD	Latitude of polygon centroid in decimal degrees
LONG_DD	Longitude of polygon centroid in decimal degrees
Shape_Length	Meadow perimeter in meters
Shape_Area	Meadow area in sq. meters

Detailed Attribute Descriptions:

Geology

Field: DOM_ROCKTYPE

Data Source: USGS - <https://pubs.usgs.gov/of/2005/1305/>

Dominant rock type was attributed to the meadow polygons based on available state geology layers. Using Zonal Statistics in ArcGIS, the most abundant lithology in the map unit (ROCKTYPE1) was identified for each meadow.

Vegetation

Field: VEG_MAJORITY

Data Source: LANDFIRE - https://www.landfire.gov/version_comparison.php?mosaic=Y

Using Zonal Statistics in ArcGIS, the 2014 LANDFIRE dataset was used to attribute generalized vegetation (GROUPVEG) to the meadow polygons.

Soils

Fields: SOIL_SURVEY, SOIL_MUKEY, SOIL_COKEY, SOIL_COMP_NAME, MAPUNIT_Kf, MAPUNIT_ClayTot_r

Data Source: USDA, Natural Resources Conservation Service

SSURGO: <https://gdg.sc.egov.usda.gov/>

STATSGO: <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

SSURGO (1:24,000 scale) datasets were compiled for the entirety of the study area. Gaps were filled with compiled STATSGO data (1:250,000 scale).

Components were assigned based on the soil component with the highest representative value in the map unit in which the meadow was located. For each component, the clay and Kf values from the top-most horizon were assigned to each meadow polygon using Zonal Statistics.

Note: MAPUNIT_Kf may be null if the mapunit dominant condition is a miscellaneous area component such as Rock outcrop. Also, forested components with organic litter surface horizons will also return a null K-factor when the surface horizon K-factor is used.

STATSGO does not have the detail for approximation of soil properties in the mountain meadows. The polygons are so big (Order 4) that they do not recognize the soils in the meadows as unique components, so there are no data for the meadows anywhere in those map units. As for the K and clay values for CA790 (Yosemite NP), because it is a new survey, O horizons were populated for those components. There may be a similar issue with the Tahoe Basin. NRCS does not populate the K factor for O horizons. And, at least at the time, NRCS is not populating any mineral material in the O horizons. Many NRCS national interpretations have been edited to look at the first mineral horizon and exclude the O. There is also a lot of Rock Outcrop and no horizon data are populated for those components.

Slope

Field: MDW_DEM_SLOPE

Data Source: USGS 10m DEM

The median Digital elevation model (DEM) based slope (in degrees) was assigned via Zonal Statistics to each meadow. [All meadows have a value for this attribute.](#)

Field: STREAM_SLOPE_GRADE

Data Source: USGS National Hydrography Dataset (NHD) - <https://nhd.usgs.gov/data.html>

A length-weighted average slope of all NHD flowline segments was calculated within each meadow polygon. Meadows with no NHD flowline will have a NULL value for this attribute.

Catchment Area

Field: MDW_CATCHMENT_AREA (sq meters)

Data Source: USGS NHDPlus V2, NHDPlusHydrodem - http://www.horizon-systems.com/NHDPlus/NHDPlusV2_home.php

Script Source: USGS, Wes Kitlasten; USFS, Kirk Evans, Carol Clark

Using python scripting and the Watershed tool in ArcGIS, the area of the upstream catchment exiting through the meadow was obtained using a flow direction raster created from the NHDPlusHydrodem.

Euclidean Distance

Fields: ED_MIN_SEEP, ED_MIN_LAKE, ED_MIN_FLOW, ED_MIN_FSTopo_ROADS, ED_MIN_FSTopo_TRAILS

Data Source:

USGS National Hydrography Dataset (NHD) - <https://nhd.usgs.gov/data.html>

FSTopo - <https://data.fs.usda.gov/geodata/edw/datasets.php?xmlKeyword=FSTopo>

Using the Euclidean Distance (Spatial Analyst) tool in ArcGIS, the minimum distance to each meadow was calculated for NHD Springs/Seeps, NHD Streams/Rivers (flow), NHD Waterbodies (lakes), and FS Topographic Transportation Trails and Roads.

HGM Type

During the mapping process, the dominant Hydrogeomorphic (HGM) type (Weixelman et al 2011) was estimated for each meadow larger than one acre. Visual inspection of NAIP 1-m resolution imagery was used in this process. DEM layers were used to estimate the landform position. The USGS hydrographic layer was used to determine locations of flowlines. Google Earth imagery was used to estimate greenness during the summer months. Meadows are often composed of more than one HGM type. In this effort, the dominant type was estimated. HGM types have not yet been estimated for Yosemite and Sequoia Kings Canyon National Parks. Types were mapped according to the following visual interpretation.

- 1. Meadows adjacent to lakes or reservoirs and at nearly the same elevation as the Water body..... Lacustrine Fringe (LF)
 1'. Not as above..... 2
- 2. Meadow sites located in an obvious topographic depression. 3
 2'. Not as above..... 4
- 3. Sites with obvious standing water after mid-summer or vegetation remaining dark green after mid-summer. Depressional Perennial (DEPP)
 3'. Not as above. Sites with no standing water after mid-summer or apparently not remaining dark green after mid-summer. Depressional Seasonal (DEPS)
- 4. Meadows with a flow line (using the USGS hydrographic layer) entering from above the meadow and exiting below the meadow, or meadows located in a swale or drainway Riparian (RIP)
 4'. Not as above..... 5
- 5. Meadows fed by a spring or seep. No flowline entering from above the meadow. Typically occurring on hillslopes or toeslopes. In addition, the USGS DEM layer was used to look for the text label "Springs" and/or a symbol indicating a spring. Discharge Slope (DS)
- 5'. Dry meadows without a visible flowline entering from above the meadow, vegetation greenness disappears by mid-summer. No apparent groundwater inputs from springs or seeps. May occur in a swale, drainageway, gentle hillslope, or crest. Dry (Dry)

Ownership

Field: OWNERSHIP

Data Sources by priority:

- 1. USDA Forest Service Basic Ownership (OWNERCLASSIFICATION) - <https://data.fs.usda.gov/geodata/edw/datasets.php?dsCategory=boundaries>
- 2. National Parks Service (UNIT_NAME) - <https://irma.nps.gov/DataStore/>
- 3. California Protected Areas Database – CPAD (LAYER) - <http://www.calands.org/>
- 4. Protected Area Database-US (CBI Edition) Version 2.1 (OWN_NAME) - <http://consbio.org/products/projects/PAD-US-CBI-establishment-dates>

Ownership values were assigned to each meadow using the above priorities and Zonal Statistics in ArcGIS.

Datum/Projection

Projected Coordinate System: NAD_1983_California_Teale_Albers Projection: Albers

False Easting: 0.00000000

False Northing: -4000000.00000000

Central Meridian: -120.00000000

Standard Parallel 1: 34.00000000

Standard Parallel 2: 40.50000000

Latitude of Origin: 0.00000000

Linear Unit: Meter