

*FINAL REPORT*

# **VEGETATION CLASSIFICATION AND MAPPING**

**NAVAL BASE VENTURA COUNTY  
SAN NICOLAS ISLAND, CALIFORNIA**

**N62473-07-D-3204, TASK ORDER 0015**

*PREPARED FOR*



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**MARCH 2014**

## **ACRONYMS AND ABBREVIATIONS**

°F	degrees Fahrenheit
CDFW	California Department of Fish and Wildlife
COR	Contract Officer's Representative
CNPS	California Native Plant Society
DoD	Department of Defense
FGDC	Federal Geographic Data Committee
GIS	Geographic Information System
MCV	Manual of California Vegetation
MMU	minimum mapping unit
NAIP	National Agricultural Imagery Program
NAVFAC SW	Naval Facilities Engineering Command, Southwest Division
NBVC	Naval Base Ventura County
NPS	National Park Service
NVCS	National Vegetation Classification Standard
SC	Station Contact
SDSFIE	Spatial Data Standards for Facilities, Infrastructure and Environment
SNI	San Nicolas Island



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## Executive Summary

Vegetation classification and mapping was conducted at Naval Base Ventura County (NBVC) San Nicolas Island (SNI), California using the National Vegetation Classification Standard (NVCS). Objectives were to: (1) survey, map and classify vegetation communities in order to produce a product that is consistent, repeatable, and translatable to regional/national levels; and (2) provide a vegetation community classification and resultant map based on a floristic vegetation classification to SNI.

The vegetation map classes represented the association level of the NVCS except in the case of Mediterranean California Naturalized Annual and Perennial Grassland, which was mapped to the group level due to the heterogeneity of the species composition in these stands. A total of 17 vegetation classes were identified on SNI. Of these, 16 vegetation classes were mapped aboard the installation using a 0.10 hectare (0.25 acre) minimum mapping unit (MMU) for a total of 5,600.51 hectares (14,225.26 acres) mapped. Surveys were conducted within select vegetation communities during four sampling periods between February and April 2013. A total of 157 classification plots representing 17 vegetative communities were sampled.

One community, *Lycium californicum* Association, was identified through classification sampling but was not able to be mapped because the sizes and photographic signatures of this community's stands prevented identification through aerial photographs. Another community, *Opuntia littoralis* Alliance, did not meet the MMU but was able to be delineated due to its unique photographic signature in stands of significant sizes. These two communities were included in this report because of their importance as habitat for the federally threatened Island night lizard (*Xantusia riversiana*).

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# 1. Introduction

The project consisted of installation-wide vegetation classification and mapping for Naval Base Ventura County (NBVC), San Nicolas Island, California. HDR conducted vegetation mapping and sampling to obtain information necessary for land use and management decisions in support of military training activities, and facilities development and maintenance. Vegetation classification and mapping was carried out using the National Vegetation Classification Standard (NVCS). An accuracy assessment was performed subsequent to the vegetation classification sampling and concurrently with the Rare Plant Mapping survey project. Vegetation plot sampling was conducted during three survey periods between February and March 2013 while accuracy assessments were conducted over three periods between March and May 2013.

## 1.1 Project Location

SNI is one of eight Channel Islands located within the Santa Barbara Channel off the southern California coast (see **Figure 1-1**). SNI is the most distant of the islands from the mainland, located 110 kilometers (69 miles) from the nearest point on the mainland, and is the most northwesterly of the four southern Channel Islands. The closest Channel Island to SNI is Santa Barbara Island, 49 kilometers (30 miles) to the northeast. SNI is oblong in shape, with the long axis running roughly from the northwest to southeast.

## 1.2 Objective

The purpose of this project is to classify and map vegetation communities in order to support natural resource management decisions, support the Department of Defense (DoD) mission, and ensure compliance with applicable Federal, state, and local statutes and regulations on NBVC San Nicolas Island. Objectives for this survey were to: (1) survey, map and classify vegetation communities in order to create a product that is consistent, repeatable, and translatable to regional/national levels; and (2) provide a vegetation community classification and resultant map based on the U.S. NVCS. The goal was to collect biological information on vegetation associations to a minimum accuracy of 80 percent. This level of detail ensured a product that complies with national standards for vegetation classification and habitat assessment as defined by CDFW, California Native Plant Society (CNPS), Federal Geographic Data Committee (FGDC), and NVCS.

## 1.3 Environmental Setting

The climate of SNI is described as “Mediterranean” due to the coastal setting, moist winters, dry summers and mild temperatures. Temperatures average between 12 and 20° C (54 and 66° F) year-round. Annual rainfall averages 200 millimeters (8 inches), with most of it falling between November and March. Wind-driven fog and low clouds deposit significant amounts of moisture on the western and northern portion of the island. SNI is noted for a nearly constant northwest wind averaging around 15 to 25 kilometers per hour (9 to 15 miles per hour) (WRCC 2013).

The highest point on SNI is 276 meters (907 feet) above sea level (US Navy 2000). The island is 14.5 kilometers (9 miles) long and 5.8 kilometers (3.6 miles) wide and is approximately 5,600.51 hectares (14,225.26 acres). The island consists of a large central mesa surrounded on the north, east, and south sides by highly eroded cliffs leading to narrow coastal flats. The western point of the island is dominated by rolling coastal and inland sand dunes. The coastline is an alternating patch of sandy beaches and rocky outcroppings.



**Figure 1-1. Location of Naval Base Ventura County, San Nicolas Island off the coast of southern California**



1 SNI is composed of alternating layers of marine sandstone and siltstone beds, both of which contain small  
2 amounts of conglomerate and pebbly mudstone. This rock sequence has been determined to be of Eocene  
3 age. Several small andesitic dikes of possibly Miocene age intrude the Eocene sedimentary rocks on the  
4 southwest end of the island. The central and western portions of the island are covered primarily in dune  
5 sand and marine terrace deposits of Quaternary age (US Navy 1963).

6 The U.S. Soil Conservation Service mapped 27 soil units on SNI in 1985 (USSCS 1985). It found that the  
7 most common soil type on the island was rock outcrops (497 hectares [1228 acres]) followed by  
8 Vizcapoint severely eroded land complexes (514 hectares [1,270 acres]), dune sand (469 hectares [1,159  
9 acres]), and Vizcapoint sandy loam (437 hectares [1,080 acres]) (US Navy 1996).

10 The predominant natural communities occurring on SNI include coastal scrub dominated by Menses'  
11 goldenbush (*Isocoma menziesii* var. *menziesii*), giant tickseed (*Leptosyne gigantea*), silver bush lupine  
12 (*Lupinus albifrons*), and Trask's astragalus (*Astragalus traskiae*) as well as several semi-natural  
13 herbaceous stands of grasslands composed of annual bromes (*Bromus diandrus*, *Bromus madritensis*  
14 subsp. *rubens*) and slender oat (*Avena barbata*). Within the dune communities, sand verbenas (*Abronia*  
15 *maritima*, *Abronia umbellata*) and silver burr ragweed (*Ambrosia chamissonis*) are dominant in some  
16 areas, while others are now dominated by iceplant species (*Carpobrotus* and *Mesembryanthemum* spp.)  
17 and European beach grass (*Ammophila arenaria*).

### 18 1.3.1 Species of Special Concern

19 Federal and state-listed species at SNI include a federally threatened bird, the western snowy plover  
20 (*Charadrius alexandrinus nivosus*). The island's sole native reptile species, the island night lizard  
21 (*Xantusia riversiana*), is a federally listed threatened species. Several marine mammals species covered  
22 under the Marine Mammal Protection Act are found on SNI. Northern elephant seals (*Mirounga*  
23 *angustirostris*), California sea lions (*Zalophus californianus*), and harbor seals (*Phoca vitulina*) use the  
24 island's shores to molt and give birth. Southern sea otters (*Enhydra lutris nereis*) are rare visitors to the  
25 kelp beds surrounding the islands. While no plant species found on the island are federally listed, three  
26 plants are listed by the California Department of Fish and Wildlife: the endangered San Nicholas Island  
27 buckwheat (*Eriogonum grande* var. *timorum*), the threatened beach spectacle-pod (*Dithyrea maritima*),  
28 and the rare Trask's milkvetch (*A. traskiae*) are known to occur on the island.

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## 2. Methodology

HDR biologists conducted installation-wide vegetation classification and mapping at NBVC San Nicolas Island. This methodology specifies (1) mapping rules, including how the minimum mapping unit was determined, what was considered a distinctive vegetation stand, and how sampling points were determined; (2) the sampling rationale and methodology; (3) terminology and recent vegetation classifications used for the survey; and (4) data processing methodology. The sampling methodology includes a prioritized sampling strategy for the study area, proposed number of samples and general timing.

The project area includes approximately 5,600.51 hectares (14,225.26 acres) on SNI. The vegetation community classification and concomitant Geographic Information System (GIS) vegetation map is based on a floristic vegetation classification according to the NVCS and on statewide vegetation classification and mapping standards agreed upon by a state and Federal government consortium of vegetation information users.

### 2.1 Mapping and Classification Strategy

Aerial photographs and existing maps were used to characterize the vegetation as precisely as possible. Mapping was based on 6-inch pixel resolution ( $\pm 1:16,800$ ) true color ortho-rectified aerial photographs taken in 2011 and on the ground fieldwork conducted in 2013. In addition to color aerial imagery, National Agriculture Imagery Program (NAIP) imagery from 2012 was also used to delineate vegetation classes. NAIP acquires aerial imagery taken during the growing season in the continental United States.

Training in NPS field sampling protocols was conducted from October 29 to November 5, 2012, where Channel Island National Park staff on Santa Rosa Island trained HDR biologists on the methodology of Vegetation Rapid Assessment and Relevé sampling methods (CNPS 2007a, 2007b). Within this protocol, the basic unit to be mapped is a vegetation stand, defined as an area of vegetation that has both compositional and structural integrity and represents a homogenous vegetation type that is repeatable across the landscape. The data collected in the field was entered directly into the National Park Service (NPS) PLOTS version 3.2 database (available at <http://science.nature.nps.gov/im/inventory/veg/plots.cfm>) using a tablet computer. This method allows collection of the same data as paper datasheets but eliminates the time and effort spent managing and processing paper datasheets and can reduce the risk of errors being introduced while transcribing paper data sheets into a computer. Plant identification was determined using *Flora of San Nicolas Island* (Junak 2008) and the Jepson Manual (2012).

Vegetation classification was based on the NVCS (FGDC 2008) and the CDFW Vegetation Classification and Mapping Program, which develops and maintains California's expression of the NVCS. Vegetation mapping was done in accordance with standards established by the FGDC for vegetation mapping on Federal lands. The FGDC website (<http://www.fgdc.gov/standards/publications/index.html>) explains the development of the classification standards currently used for mapping and classifying vegetation.

Developing a classification of vegetation from an area with limited or no existing vegetation plot data could make accurate association and alliance level definitions difficult. Prior quantitative plot data from the California Channel Islands was inadequate at the time of the publication of the first edition of the *Manual of California Vegetation* (Keeler-Wolf pers. comm.). Jennings et al. (2009) state that a set of plots covering the full geographic and environmental range is needed for describing the type in relation to

similar types elsewhere. Associations are based on overall species composition and composition of diagnostic species. Despite a characteristic range of species composition and diagnostic species, results vary continuously over the landscape. As such, vegetation classification relies on representative plots to define the central concept of the type. Multivariate analysis is used to arrange plots spanning the compositional and geographic range into discrete types and to illustrate these types' relation to other types (Jennings et al. 2009). Because data from the Channel Islands and particularly SNI was lacking at the time of the first edition of the *Manual of California Vegetation*, the associations and alliances treated within the manual may not contain the entire geographic and environmental range of types or even their proper identity. The vegetation types on the California Channel Islands likely represent geographic and environmental range "extensions" of the mainland types, and due to environmental isolation, may exhibit significant variation in composition and structure from their mainland counterparts. Environmental as well as historical stochasticity contributes to differences in species composition and diagnostic species (Jennings et al. 2009). On SNI, climate and isolating factors originating in island endemics differ from mainland California, as does the history of intensive sheep grazing that resulted in environmental degradation on SNI. Because this potential stochasticity may not have been captured in the first edition of the *Manual of California Vegetation*, SNI plots may appear as "data outliers" when compared to the plot data of a particular type defined from other parts of California.

Despite the absence of quantitative plot data from SNI prior to the 2013 mapping exercise, a majority of the plots could still be assigned to an association or alliance with a relative degree of certainty. The standard for assigning plots to an already defined association is determined by a composition consistent with a characteristic range of species occurrences in combination with the presence of diagnostic species and the biogeographic context (Jennings et al. 2009). The California Channel Islands are part of the California Floristic Province's Southwest Region which it shares with coastal mainland of southern California (albeit in its own subregion) and some of these mainland areas have relatively extensive plot data (Santa Monica Mountains and western San Diego County). There is also a relatively high number of species (including some diagnostic community species) that are present on the mainland as well as the Channel Islands. Coyote bush (*Baccharis pilularis*), alkali heath (*Frankenia salina*), silver burr ragweed, red sand verbena (*Abronia maritima*) and salt grass (*Distichlis spicata*) are all diagnostic community species present on SNI which also have large latitudinal ranges on the mainland (Baldwin et al. 2012). Lastly, in addition to the diagnostic community species many of the native species on SNI also occur on the mainland. Junak (2008) identifies 137 native taxa from SNI with only 15 of these species being Channel Island endemics.

Still, unique stands of vegetation, based on species composition, on SNI argue for further sampling and analysis of these novel stands. Additional sampling and analysis of these stands on SNI, in combination with vegetation sampling efforts on the other northern Channel Islands, would further determine the relationships and thresholds for inclusion within the vegetation types on SNI and the other northern Channel Islands. Some of the more unique stands of vegetation on SNI that would warrant additional sampling would include: *Ambrosia chamissonia*–*Abronia maritima*–*Cakile maritima* Association; *Isocoma menziesii*/Lupinus albifrons–*Astragalus traskiae* Association and *Deinandra clementina* Provisional Association.

*Ambrosia chamissonia*–*Abronia maritima*–*Cakile maritima* Association is a synonym for the MCV *Ambrosia chamissonia*–*Abronia latifolia*–*Cakile maritima* Association. *Abronia latifolia* is only known from San Miguel Island and is considered extirpated from there (Junak et al. 1997). *A. maritima* is known from several of the Channel Islands. Further sampling and analysis of stands of this association on SNI and the other Channel Islands would provide information regarding similarity/dissimilarity between these two associations.

The *Isocoma menziesii*/*Lupinus albifrons*—*Astragalus traskiae* Association on SNI appears to be very similar to the *Isocoma menziesii* – *Lupinus albifrons* – *Astragalus miguelensis* Association on Santa Rosa Island and other northern Channel Islands. Trask’s milkvetch and San Miguel Island milkvetch (*A. miguelensis*) appear to share similar niches of coastal bluffs, dunes and beaches (Baldwin et al. 2012). Additionally, these two species do not co-occur on any of the Channel Islands (Wallace 1985), which could also argue for similarity of niche overlap.

*Deinandra clementina* Provisional Association occurs on several of the Channel Islands and Sawyer et al (2008) identify the *Deinandra clementine*-*Eriogonum giganteum* Provisional Shrubland Alliance as one that needs more sampling and analysis especially on the southern Channel Islands. Only two plots were sampled within this association on SNI. The total area of this association mapped on SNI is slightly over 150 acres so these stands on SNI are likely undersampled and should be targeted for additional sampling and analysis.

### 2.1.1 GIS Standard

The FGDC requires that all Federal agencies follow the NVCS. All GIS data was delivered in Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE) v2.6 compliant format. Aerial photos were formatted for pre-ArcGIS version 9.3. Spatial data used to generate maps is consistent with Naval Facilities Engineering Command, Southwest Division (NAVFAC SW) metadata standards.

### 2.1.2 Mapping Rules

Not all vegetation types are equally mappable at a particular scale. Coordination during vegetation classification and the aerial photo-interpretation resolved whether it was best to map vegetation directly at the finest association level, at the higher-classification levels (such as at the alliance), or as a mosaic or complex. Mapping rules were developed as necessary to ensure consistency and accuracy throughout the project. Appropriate minimum mapping units and minimum vegetation stand (polygon) widths and thresholds were established. **Table 2-1** lists the mapping rules used in this project, several of which are further explained below.

**Table 2-1. Mapping rules used during vegetation community delineation on San Nicolas Island**

Type	Specification
<b>MMU</b>	0.10 hectare (0.25 acre)
<b>Minimum width</b>	2.5 meters (8.20 feet)
<b>Delineation</b>	Varied, but typically a scale of 1:2000
<b>Non-vegetated areas</b>	Stands of <1% vegetation were classified as beach, dune, barren
<b>Roads and buildings</b>	Mapped as Developed areas. This includes all buildings and other structures, paved roads, maintained (graded) dirt roads, borrow pits, and adjacent ornamental vegetation regularly maintained through mowing or other activities.

Key: MMU = Minimum Mapping Unit

### 2.1.3 Minimum Mapping Unit

Map scale determines the smallest area that can be drawn and recognized on a map. The smallest area that can be represented on a map, or minimum mapping unit (MMU), was determined based on the variability

of the vegetation over small areas. The California Biodiversity Council's Memorandum of Understanding regarding vegetation recommends a MMU of less than 0.20 hectare ( $\leq 0.5$  acre) for fine scale surveys (areas  $< 20,000$  hectares [ $< 50,000$  acres]). The National Park Service separates MMU recommendations by vegetation types: for arid to semi-arid woodlands, shrublands, and wooded shrublands, the NPS recommends 0.5 to 2.0 hectares (1.2 to 4.9 acres); for herbaceous and non-vascular vegetation, it recommends 0.1 to 0.5 hectares (0.25 to 4.9 acres) (NPS 2010).

The MMU captures distinct vegetation stands, defined as "a spatially continuous unit of vegetation with uniform composition, structure, and environmental conditions." This term is often used to indicate a particular example of a plant community (Jennings et al. 2009). A stand is defined as an area of vegetation that has both compositional and structural integrity and represents a homogenous vegetation type that is repeated across the landscape. Stands can be selected prior to a site visit using aerial photos or other reconnaissance methods, or may be selected on site. Once a stand was selected, a field sampling form was completed that records both vegetation and environmental data.

A MMU of approximately 0.10 hectare (0.25 acre) was used for the Vegetation Classification Map (**Appendix A**). It was determined that 0.10 hectare (0.25 acre) MMU captured unique vegetation stands on SNI that would have not been mapped if a larger MMU was selected; while a smaller MMU would overly dissect the landscape. These captured vegetation stands, which would have otherwise been undetectable, will provide useful information when making natural resources management decisions on the installation. The 0.10 hectare (0.25 acre) MMU was not applied to the *Opuntia littoralis* Alliance due to its importance as habitat for the federally threatened Island night lizard; instead, stands of any size that had a distinguishable aerial signature were delineated.

## 2.1.4 Classification

Classification of landforms, associations, and alliances was based on standardized field plot observations, standardized type descriptions, review of proposed changes to the accepted types and their descriptions, and publication and permanent archiving of accepted types, revisions to the classification, and underlying data and analyses. Vegetation associations and alliances identified were based on the principles outlined in **Section 2.1.5**. The CDFW has established many location-specific associations and alliances which can be found at: <http://www.dfg.ca.gov/biogeodata/vegcamp/>. Floristic units that have potential to occur in the study area were identified based on a review of the CDFW categories and recent classification projects centered in southern coastal California (Evens and San 2005, Klein and Evens 2006, NPS 2006).

## 2.1.5 Vegetation Classification Process

Vegetation mapping classes were based on the existing NVCS (FGDC 2008). Naming conventions used the floristic units of "associations," as defined by the NVCS, International Vegetation Classification system (HRWG 2012), A Manual of California Vegetation (Sawyer et al. 2009), or the Vegetation Classification Manual for Western San Diego County (Sproul et al. 2011) as appropriate. Classification of associations and alliances were based on the following principles:

1. Standardized field observations: Vegetation associations and alliances were documented through analysis of standardized field plot data collected across the potential range of a vegetation type and closely related types.
2. Vegetation was classified based on existing vegetation criteria, organized around ecological factors and biogeography: diagnostic and dominant species, diagnostic and dominant growth forms, and full floristic composition.

3. Type descriptions: Floristic units included sufficient information to determine the distinctive features of the types and their relationship to accepted NVCS types. Vegetation types identified that did not conform to existing vegetation classification types according to the NVCS standards were translated to higher-order group and macro-group categories in the NVCS, and a new association type was proposed and labeled as a provisional community. These proposed classifications included comparison of the focal type with related types, showing the differentiating characteristics.
4. Review: Vegetation types identified and mapped were evaluated through an accuracy assessment and analysis completed by HDR biologists.
5. Plot data used to define vegetation types were provided to the Contract Officer's Representative (COR). The information: (a) included the rationale for classification decisions, (b) allowed for quantitative revision of the descriptions based on original data and new data, and (c) provided the basis for new or revised type descriptions. Accordingly, plot data conformed to a standard format so as to readily allow for reevaluation. All plant taxa referenced in plot data or community type descriptions were defined by reference to public databases or publications.

## 2.1.6 Vegetation Key

The classification of vegetation associations is described in **Appendix B** in a dichotomous key format. This structure allows the utilization of classification in the field and in various management applications. The keys represent a set of decision rules that specify the limits of each category. The key is organized to allow for the greatest ease of use. Dichotomous steps are based upon easily observable visual differences in vegetative and site physiognomy and, on a smaller scale, easily identified vegetative characteristics. Careful application and use of the dichotomous key facilitates more accurate identification of plant associations. There could be times when a plant community cannot be keyed out and if so, it is possible that none of the described plant community descriptions fit. If this is the case, further assessment and modification may be necessary. During this classification and mapping project, for example, the original key included an *Isocoma menziesii* Association and an *Isocoma menziesii* – *Lupinus albifrons* Association. As classification surveys progressed, the widespread presence of Trask's milkvetch (*Astragalus traskiae*) in association with Menzies' goldenbush and California silver bush lupine (*Lupinus albifrons*) resulted in the creation of a new provisional association of *Isocoma menziesii* – *Lupinus albifrons* / *Astragalus traskiae*.

## 2.1.7 Vegetation Descriptions

The CDFW has established many location-specific alliances and associations which can be found at: <http://www.dfg.ca.gov/biogeodata/vegcamp/>. Data and vegetation samples from plot surveys were used to assign each mapping unit with the appropriate established vegetative association. Once the appropriate association was identified the data was reviewed to determine locations where further distinctions would allow for identification of potentially new associations in accordance with the NVCS. New associations were organized based upon the dominant or codominant plant species. These associations were listed as "provisional" communities, indicating that these types have not been recognized by the NVCS and have not been formally described or analyzed.

Determinations were based upon a variety of characteristics. Stands with similar dominant life forms but differing lower-canopy species were divided into separate associations. At the alliance and association levels, major distinctions were made based upon the species present within that area. Distinguishing features of associations were based on factors such as vegetation height, canopy cover, soil type or geologic formations.

## 2.1.8 Mapping and Sampling Surveys

Prior to the commencement of field activities at SNI, preliminary community delineations were conducted through aerial photographs and ArcGIS. Over the course of three survey periods, vegetation sampling was conducted via NPS Rapid Assessment protocol. Sampling points were chosen both prior to and during field surveys and targeted areas of potentially unique vegetation signatures. During the following surveys, the preliminary delineations were adjusted according to the data collected to ensure a high degree of floristic and spatial accuracy in the map. Surveys were conducted during five periods in 2013 (see **Table 2-2**).

**Table 2-2. Survey Periods and Dates**

Survey Period	Survey Date(s)	Veg Plot Sampling	Accuracy Assessment
1	February 11-15, 2013	•	
2	March 4-11, 2013	•	
3	March 18-22, 2013	•	•
4	April 5-10, 2013		•
5	May 3-6, 2013		•

Short-term climatic fluctuation can affect plant population demographics which in turn can also affect vegetation characteristics. Vegetation boundaries can shift with variation in the areal extent of plant populations. Shifts in dominant and diagnostic species as well as the species composition of vegetation communities can also be affected by climatic conditions.

Plant population sizes can fluctuate annually due to differences in germination and mortality rates, as well as immigration and emigration due to seed dispersal. Annual climatic variance can affect plant demographics such as seed production, seed germination success and rates; seedling mortality rates, etc., all of which contribute to a population size in any given year. Precipitation (both amount and seasonality) and temperature are two major climatic factors which can influence the blooming time and observable population sizes of many ephemeral plant species both annuals and herbaceous perennials. Drought conditions can have several effects on plant populations including seed production and seed germination rates. Bauder et al. (1994) found a strong relationship between current year's population size and previous year's precipitation at certain sites for the endangered annual San Diego thorn mint (*Acanthomintha ilicifolia*) suggesting a drought impact on seed production.

The seasonality of precipitation, especially timing of the onset of winter storms can have a marked effect on the relative abundances of native ephemeral plant populations. Early heavy winter storms could favor the growth of non-natives as these species would get a head start over the native species and have a markedly size advantage over these natives by the time they germinate/start growth in late winter/early spring. Conversely, the absence of early winter storms whereby most of the seasonal precipitation is in late winter, could be more beneficial to the natives as both natives and non-natives would germinate/initiate growth at relatively the same time and non-natives would not have the advantage of several months of growth.

The average annual rainfall on SNI from 1948-2005 was 8.21 inches (Junak 2008). Precipitation for the 2012-2013 season on SNI was 5.09 inches, so the mapping of vegetation on SNI (February-May 2013)



was conducted during a drought year. Additionally, in 2012-13 the three months of heaviest precipitation on San Nicolas were October (0.86 inches), November, (1.32 inches) and December (1.41 inches) with only 1.27 inches falling from January 2013 through May 2013 (Smith, pers. comm.; wunderground.com 2014). A disproportionate amount of the precipitation falling in early winter may have been advantageous for exotic annual species at the expense of native annual and herbaceous perennials as exotic annual species may have been given a “head start” by germinating earlier and subsequently attaining significant size by the time natives started germinating. Drought conditions on SNI would affect plant populations by reducing seed germination and seed production in a particular year with limited seed production affecting population sizes in subsequent years.

In addition to precipitation, temperature is an important abiotic variable that can strongly influence population demographics especially annuals and herbaceous perennials. Many species need a threshold soil temperature to initiate seed germination. Additionally, some ephemeral native species require a relatively cold period to break dormancy and facilitate germination or in the case of herbaceous perennials, initiate new growth. This adaptation would ensure that these species would be well adapted to growth at a time of the year when reproductive success is likely; however, these types of species would be at a substantial disadvantage when competing with annual exotics which germinate at warmer temperatures (Bauder and Sakrison 1997) a trait that allows these exotics to germinate at the onset of winter rains in some instances several months before the natives. Historically in southern California and on SNI, February is the coldest month of the year. On SNI, December-March are the historically the months of heaviest precipitation. Germination and growth of many native ephemerals starts in late February - early March. Many non-native species that have become established in southern California do not require this stratification and many of these non-native annuals will germinate immediately after the onset of winter rains.

Not only population size but the areal extent of a population can be affected by climatic conditions. Individuals at the periphery of a population (i.e. outliers) could be at the physiological tolerance limits for the species; with sub-optimal climatic years rendering these peripheral areas even less hospitable, resulting in a contracting of a population’s extent in these sub-optimal years.

## **2.1.9 Accuracy Assessments**

During rare plant surveys conducted subsequent to vegetation sampling, 315 accuracy assessment plots were sampled to determine the precision of vegetation community classifications (NPS 2010). These accuracy assessment plot locations utilized the same locations as the rare plant surveys. While staffing and budget constraints prohibited a truly “blind” sample data value (mapped class in which the accuracy assessments occurred), accuracy assessments results were not considered until after final map delineations and plot classifications were performed. Accuracy assessment plots consisted of a circular plot of roughly the MMU value (0.10 hectare [0.25 acre]). Adjustments were made to accommodate plots of less than 0.10 hectare (0.25 acre) or where a circular plot was not appropriate for the vegetation community stand. In areas of sparse vegetation the 0.25 acre MMU was considered too small for an accuracy assessment for a particular stand. In these particular instances plots larger than 0.25 acres was assessed.

## **2.1.10 Natural Resources Constraints**

Adjustments were made to the field schedule and vegetation plot locations to avoid disturbance of federally protected species. Areas near sensitive marine mammal haul-outs were avoided unless accompanied by NBVC personnel. Review of known western snowy plover nesting areas was conducted prior to the breeding season to avoid disturbance of these birds.

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### 3. Results

This section provides descriptions of the 17 vegetative communities found on SNI. The minimum sample size was set at 3 plots for classification and descriptions; however, descriptions of associations with fewer than 3 were provided if the association was previously sampled and described or the vegetation was confirmed as distinctive and repeated based on field observations or photographic signature (NPS 2006). A species table is provided for each description listing the constancy value (Con) for each species in each classification. The constancy value is the percentage of classification plots in a given community in which each listed species was documented. Species with a constancy value of at least 20 percent are listed in the table. Average (Avg), minimum (Min), and maximum (Max) percent cover values as calculated across all samples for each vegetation type. The final value (n) lists the numbers of plots sampled in each community type. Cover data was collected using range values; for use in analysis, these ranges were converted to midpoints. The cover codes with corresponding cover ranges and averages are listed in **Table 3-1**. Values of “tr” indicate a trace (<0.1 percent) amount of the species was observed within that stand.

**Table 3-1. Cover codes, ranges, and averages**

Code	Percent Cover Range	Percent Cover Average
01	Trace	0
02	0.1-1	.5
03	1-2	1.5
04	2-5	3
05	5-10	7.5
06	10-25	17.5
07	25-50	37.5
08	50-75	62.5
09	75-95	85
10	>=95	95.5

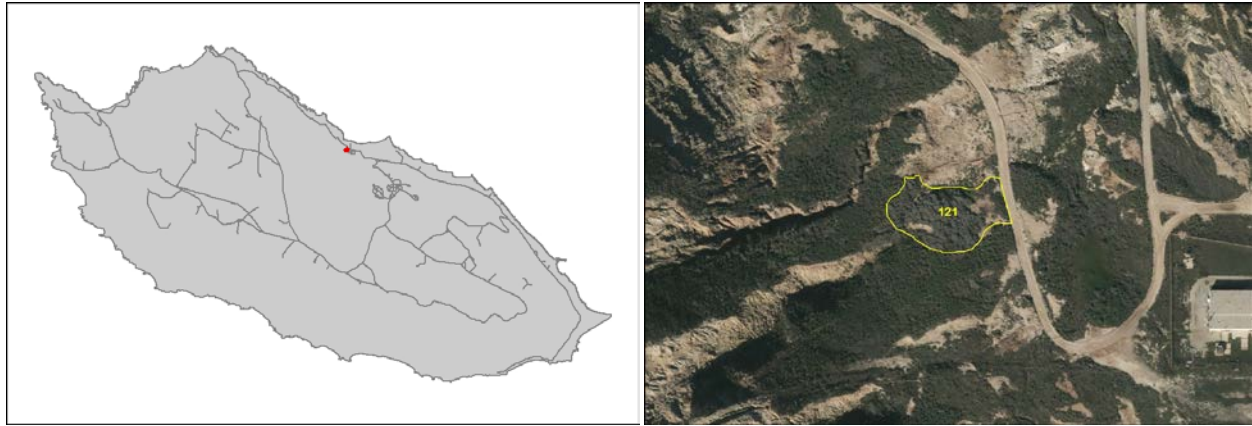
#### 3.1 Shrubland Communities

##### 3.1.1 *Artemisia californica* Alliance

California sagebrush (*Artemisia californica*) is the most common and widespread species of southern California coastal sage scrub. California sagebrush is found on all of the Channel Islands, while the closely related island sagebrush (*A. nesiotica*) is found on three of the islands: San Nicolas, Santa Barbara and San Clemente. Both species grow up to 2 meters (6.5 feet) and this alliance occurs on gentle to steep slopes of variable aspects at low elevations. One association of this community was mapped on SNI. Island sagebrush is included within this classification because of the close relations between the two *Artemisia* species.

### 3.1.1.1 *Artemisia californica* Association (Code: 121)

This association occurs on SNI with island sagebrush as the sole dominant species. Other species found in this community include common yarrow (*Achillea millefolium*), Australian saltbush (*Atriplex semibaccata*), ripgut brome, and blue dicks (*Dichelostemma capitatum*). A total of 0.17 hectare (0.43 acre) of this association was mapped on SNI and one plot was sampled. Several other occurrences of individuals of island sagebrush were found associated with stands of *Opuntia littoralis* Alliance. An example of this community is shown in **Figure 3-1**.



Map Location of the *Artemisia californica* Association on the installation Typical Aerial Signature for this *Artemisia californica* Association

#### *Artemisia californica* Association (Code: 121)

Layer	Species Name	Con	Avg	Min	Max
Shrub	<i>Artemisia nesiotica</i>	100	37.5	37.5	37.5
	<i>Lycium californicum</i>	100	7.5	7.5	7.5
	<i>Opuntia littoralis</i>	100	tr	tr	tr
Herb	<i>Atriplex semibaccata</i>	100	2.5	2.5	2.5
	<i>Dichelostemma capitatum</i>	100	2.5	2.5	2.5
	<i>Bromus</i> sp.	100	1.5	1.5	1.5
	<i>Achillea millefolium</i>	100	0.5	0.5	0.5
	<i>Melilotus officinalis</i>	100	tr	tr	tr
	<i>Spergularia macrotheca</i> . var. <i>macrotheca</i>	100	tr	tr	tr
	<i>Bromus diandrus</i>	100	tr	tr	tr
n=1					



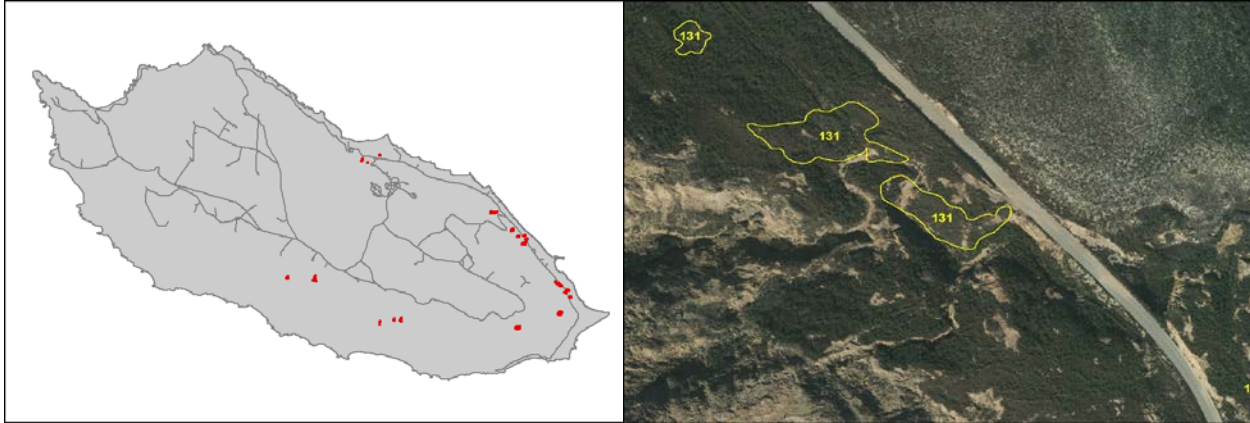
**Figure 3-1. *Artemisia californica* Association on San Nicolas Island**

### 3.1.2 *Opuntia littoralis* Alliance (Code 131)

*Opuntia littoralis* Alliance occurs along the coast of southern California. Coast prickly pear (*Opuntia littoralis*) and/or other cacti occurs with other shrubs to form a canopy that is generally <2 meters (6.5 feet). Some taller shrubs may be present in sparse cover. The canopy is intermittent or continuous in two tiers; the herbaceous layer is open to continuous (Sawyer et al. 2009). On SNI, *Opuntia littoralis*, *Opuntia oricola* or *Cylindropuntia prolifera* was found in scattered patches primarily on the northern coastal plain with scattered populations on the north and south escarpments. Most patches consisted of a small number of individual plants while others consisted of populations of more than 50 individuals. The absence of other diagnostic species did not allow for classification of these plots to the association level. Other species detected within surveyed plots include island sagebrush, common yarrow, Australian saltbush, ripgut brome, blue dicks, yellow sweetclover (*Melilotus officinalis*), red brome (*Bromus madritensis* subsp. *rubens*), island false bindweed (*Calystegia macrostegia* subsp. *amplissima*), Catalina tarweed (*Deinandra clementina*), Menzies' goldenbush, silver bird's-foot trefoil (*Acmispon argophyllus* var. *argenteus*), burclover (*Medicago polymorpha*), common iceplant (*Mesembryanthemum crystallinum*), and slenderleaf iceplant (*Mesembryanthemum nodiflorum*). On SNI, 3.14 hectares (7.76 acres) of this community were mapped, and one plot was sampled. An example of this community is shown in

**Figure 3-2.**





Map Location of the *Opuntia littoralis* Alliance on the installation

Typical Aerial Signature for this *Opuntia littoralis* Alliance

### *Opuntia littoralis* Alliance

Layer	Species Name	Con	Avg	Min	Max
Shrub	<i>Opuntia littoralis</i>	100	17.5	17.5	17.5
	<i>Isocoma menziesii</i> var. <i>menziesii</i>	100	7.5	7.5	7.5
Herb	<i>Bromus madritensis</i> subsp. <i>rubens</i>	100	37.5	37.5	37.5
	<i>Mesembryanthemum crystallinum</i>	100	17.5	17.5	17.5
	<i>Atriplex semibaccata</i>	100	2.5	2.5	2.5
	<i>Deinandra clementina</i>	100	2.5	2.5	2.5
	<i>Medicago polymorpha</i>	100	1.5	1.5	1.5
	<i>Mesembryanthemum nodiflorum</i>	100	0.5	0.5	0.5
	<i>Achillea millefolium</i>	100	tr	tr	tr
	<i>Acmispon argophyllus</i> var. <i>argenteus</i>	100	tr	tr	tr
Vine	<i>Calystegia macrostegia</i> subsp. <i>amplissima</i>	100	1.5	1.5	1.5
n=1					



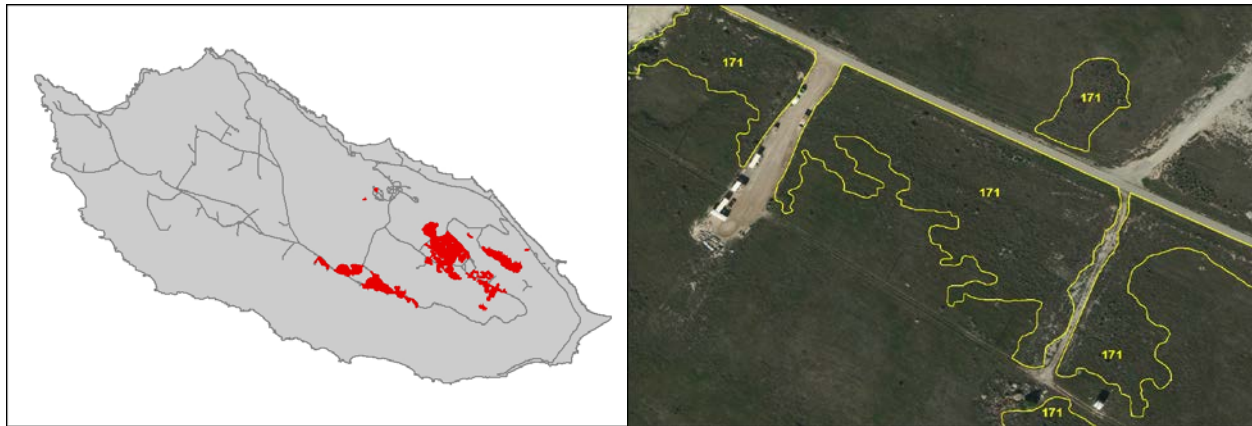
Figure 3-1. *Opuntia littoralis* Alliance

### 3.1.3 *Isocoma menziesii* Alliance

*Isocoma menziesii* Alliance has a discontinuous distribution along the southern California coast. Menzies' goldenbush mixes with other perennial shrubs to form an open to intermittent canopy. The canopy is low, <1.0 meter (3.2 feet), with an open to continuous herbaceous layer (Sawyer et al. 2009). This species is common throughout all areas of SNI. Three associations within this alliance were mapped on SNI.

#### 3.1.3.1 *Isocoma menziesii* Association (Code: 171)

Other species detected within surveyed plots include common yarrow, Australian saltbush, red brome, freeway iceplant (*Carpobrotus edulis*), giant tickseed, silver bird's-foot trefoil, and common iceplant. On SNI, a total of 113.90 hectares (281.46 acres) were mapped and 17 plots were sampled in this community. An example of this community is shown in **Figure 3-3**.



Map Location of the *Isocoma menziesii* Association on the installation Typical Aerial Signature for this *Isocoma menziesii* Association

#### *Isocoma menziesii* Association (Code: 171)

Layer	Species Name	Con	Avg	Min	Max
Shrub	<i>Isocoma menziesii</i> var. <i>menziesii</i>	100	11.1	1.5	37.5
	<i>Atriplex semibaccata</i>	65	1.2	tr	7.5
	<i>Baccharis pilularis</i>	35	4.1	tr	17.5
	<i>Leptosyne gigantea</i>	35	2.8	tr	7.5
Herb	<i>Achillea millefolium</i>	71	0.6	tr	2.5
	<i>Bromus madritensis</i> subsp. <i>rubens</i>	59	18.8	2.5	62.5
	<i>Acmispon argophyllus</i> var. <i>argenteus</i>	59	2.6	tr	17.5
	<i>Avena barbata</i>	29	21.1	tr	85.0
	<i>Bromus diandrus</i>	29	10.2	1.5	17.5
	<i>Crassula connata</i>	29	0.1	tr	0.5
	<i>Carpobrotus edulis</i>	24	1.6	tr	2.5
	<i>Dichelostemma capitatum</i>	24	5.5	0.5	17.5
	<i>Lomatium insulare</i>	24	0.1	tr	0.5
Vine	<i>Calystegia macrostegia</i> subsp. <i>amplissima</i>	35	1.8	tr	2.5
n=17					



**Figure 3-2. *Isocoma menziesii* Association**

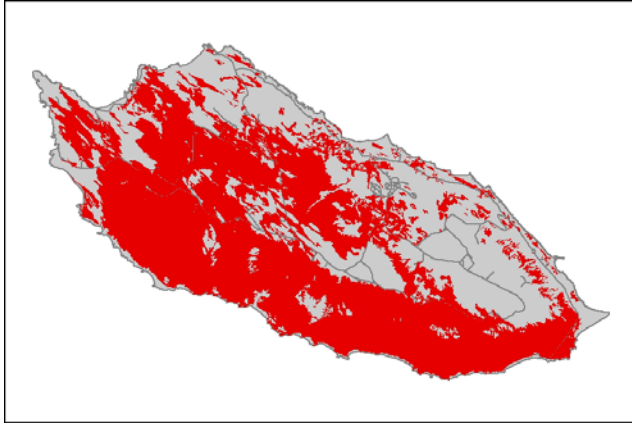
**3.1.3.2 *Isocoma menziesii* – *Lupinus albifrons* / *Astragalus traskiae* Provisional Association**  
(Codes: 172 and 173)

This provisional association was created based on the strong association of the three species. A similar community, *Isocoma menziesii* – *Lupinus albifrons* Association, has been described on the mainland and could have been applied here had Trask's milkvetch not been so abundant and widespread in this community. *Isocoma menziesii* is the dominant species in this community, with one or both of California silver bush lupine or Trask's milkvetch subdominant. On SNI, this provisional association is found primarily on the southern escarpment and southwestern ridge. In this area, all species were of very low density with patches of higher density located primarily on ridges and valley floors. Other species detected within surveyed plots include giant tickseed, common yarrow, silver bird's-foot trefoil, and red brome.

During the digital delineation stage of this project, areas of dense vegetation were mapped separately from sparse areas (areas of <5 percent vegetative cover). During sampling, however, these areas were classified as one community, the *Isocoma menziesii* – *Lupinus albifrons*/*Astragalus traskiae* Association. This distinction between sparse (Code 173) and non-sparse (Code 172) was maintained for map clarity, but treated as one community for classification and accuracy assessment purposes.

On SNI, this association was the single most extensive association mapped. A total of 3375.81 hectares (8341.79 acres) of this community were mapped with 956.99 hectares (2364.78 acres) denoted as sparse, and 59 plots were sampled in this community. An example of this community is shown in **Figure 3-4**.





Map Location of the *Isocoma menziesii* – *Lupinus albifrons* / *Astragalus traskiae* Association (combined sparse and non-sparse) on the installation



Typical Aerial Signatures for this *Isocoma menziesii* – *Lupinus albifrons* / *Astragalus traskiae* Association, sparse (Code 173) and non-sparse (Code 172).

***Isocoma menziesii* – *Lupinus albifrons* / *Astragalus traskiae* Provisional Association (Codes: 172 and 173)**

Layer	Species Name	Con	Avg	Min	Max
<b>Shrub</b>	<i>Isocoma menziesii</i> var. <i>menziesii</i>	100	11.9	1.5	37.5
	<i>Lupinus albifrons</i> var. <i>douglasii</i>	75	8.1	tr	37.5
	<i>Leptosyne gigantea</i>	41	2.0	tr	7.5
	<i>Atriplex semibaccata</i>	25	1.1	tr	7.5
<b>Herb</b>	<i>Astragalus traskiae</i>	64	8.7	tr	45.0
	<i>Bromus madritensis</i> subsp. <i>rubens</i>	64	13.1	tr	62.5
	<i>Acmispon argophyllus</i> var. <i>argenteus</i>	64	1.4	tr	7.5
	<i>Carpobrotus edulis</i>	56	5.6	tr	37.5
	<i>Mesembryanthemum crystallinum</i>	53	12.9	tr	62.5
	<i>Achillea millefolium</i>	49	0.5	tr	2.5
	<i>Abronia umbellata</i>	39	0.6	tr	2.5
	<i>Ambrosia chamissonis</i>	32	1.4	tr	17.5
	<i>Crassula connata</i>	29	0.1	tr	0.5
	<i>Malacothrix incana</i>	22	0.2	tr	1.5
	<i>Avena barbata</i>	20	5.1	tr	37.5
	<i>Mesembryanthemum nodiflorum</i>	17	0.4	tr	1.5
<b>Vine</b>	<i>Calystegia macrostegia</i> subsp. <i>amplissima</i>	44	1.3	tr	7.5
<b>n=59</b>					



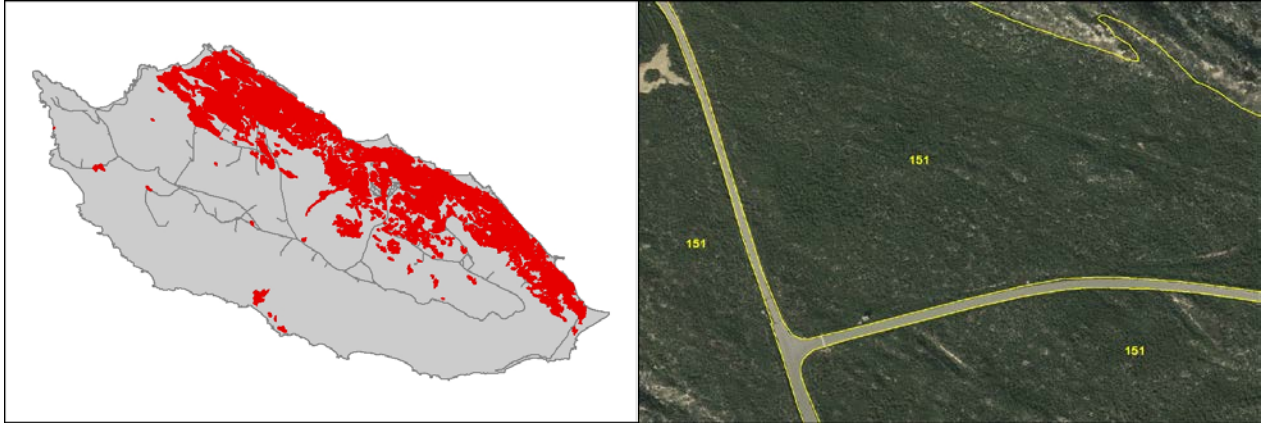
**Figure 3-3. *Isocoma menziesii* - *Lupinus albifrons* / *Astragalus traskiae* Provisional Association**

### 3.1.4 *Leptosyne gigantea* Alliance

*Leptosyne gigantea* Alliance occurs along the coast of southern California and bluffs and stabilized dunes on the Channel Islands. Giant tickseed commonly occurs with coastal sage scrub species. Different height classes of shrubs may be present, and the canopy can be open to intermittent and two-tiered with an herbaceous layer that is open to intermittent (Sawyer et al. 2009).

#### 3.1.4.1 *Leptosyne gigantea* Association (Code: 151)

This association is dominant on the north and northwestern coastal planes as well as in vegetated areas of the northern escarpment. It is becoming common on the northern portion of the mesa and in pockets throughout the remainder of the island. Other species detected within surveyed plots include common yarrow, ripgut brome, red brome, blue dicks (*Dichelostemma capitatum*), Menzies' goldenbush, silver bird's-foot trefoil, and California silver bush lupine. In several areas on the north escarpment, surveyors noted dense populations of bright green dudleya (*Dudleya virens* subsp. *insularis*); further sampling of these areas should be conducted to investigate the possibility of a provisional association of *L. gigantea* and *D. virens* subsp. *insularis*. On SNI, 972.63 hectares (2403.43 acres) of this community were mapped and 23 plots were sampled. An example of this community is shown in **Figure 3-5**.



Map Location of the *Leptosyne gigantea* Association on the installation Typical Aerial Signature for this *Leptosyne gigantea* Association

***Leptosyne gigantea* Association (Code: 151)**

Layer	Species Name	Con	Avg	Min	Max
<b>Shrub</b>	<i>Leptosyne gigantea</i>	100	23.0	7.5	45.0
	<i>Isocoma menziesii</i> var. <i>menziesii</i>	87	4.4	0.5	17.5
	<i>Lupinus albifrons</i>	43	4.7	0.5	17.5
	<i>Atriplex semibaccata</i>	30	0.3	tr	1.5
	<i>Opuntia littoralis</i>	22	2.3	tr	7.5
<b>Herb</b>	<i>Achillea millefolium</i>	61	1.5	tr	7.5
	<i>Bromus madritensis</i> subsp. <i>rubens</i>	61	16.3	0.5	37.5
	<i>Acmispon argophyllus</i> var. <i>argenteus</i>	52	0.8	tr	2.5
	<i>Dichelostemma capitatum</i>	39	1.6	tr	7.5
	<i>Bromus diandrus</i>	35	3.4	tr	17.5
	<i>Atriplex semibaccata</i>	30	0.5	tr	1.5
	<i>Avena barbata</i>	30	0.9	tr	2.5
	<i>Crassula connata</i>	26	0.5	tr	2.5
<b>Vine</b>	<i>Calystegia macrostegia</i> subsp. <i>amplissima</i>	30	2.1	tr	2.5
<b>n=23</b>					



**Figure 3-4. *Leptosyne gigantea* Association**



### 3.1.5 *Lycium californicum* Alliance

*Lycium californicum* Shrubland Alliance occurs on coastal bluffs of southern California. California desert-thorn (*Lycium californicum*) occurs with other perennial shrubs in a canopy of <4.0 meters (13.1 feet). The canopy is open to intermittent generally with a continuous herbaceous layer (Sawyer et al. 2009). One association within this alliance was mapped on SNI.

#### 3.1.5.1 *Lycium californicum* Association (Code: 141)

Other species detected within surveyed plots include common yarrow, ripgut brome, San Nicolas Island buckwheat, Menzies' goldenbush, San Nicolas biscuitroot (*Lomatium insulare*), silver bird's-foot trefoil, and common iceplant. Two plots within this community were sampled. This community though sampled eventually was not mapped as stand sizes were too small to be mapped. An example of this community on SNI is shown in **Figure 3-6**. *Lycium californicum* Association.

#### *Lycium californicum* Association (Code: 141 )

Layer	Species	Con	Avg	Min	Max
Shrub	<i>Eriogonum grande</i> var. <i>timorum</i>	100	4.5	1.5	7.5
	<i>Lycium californicum</i>	100	5.0	2.5	7.5
	<i>Isocoma menziesii</i> var. <i>menziesii</i>	100	2.0	1.5	2.5
Herb	<i>Bromus diandrus</i>	100	1.5	1.5	1.5
	<i>Mesembryanthemum crystallinum</i>	100	1.3	tr	2.5
	<i>Acemispom argophyllus</i> var. <i>argenteus</i>	100	1.0	0.5	1.5
	<i>Lomatium insulare</i>	100	0.3	tr	0.5
	<i>Avena barbata</i>	50	0.5	0.5	0.5
n=2					



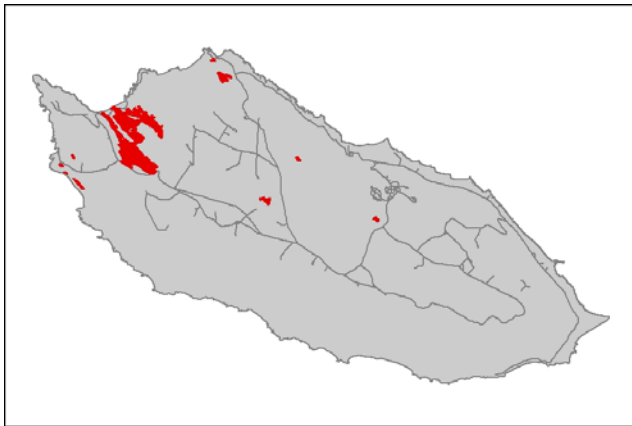
**Figure 3-5. *Lycium californicum* Association**

### 3.1.6 *Lupinus albifrons* Alliance

*Lupinus albifrons* Shrubland Alliance occurs all along the coast and in alluvial fans throughout California. California silver bush lupine occurs with other small shrubs and sub-shrubs. The canopy is <2.0 meters (6.5 feet) with an open canopy. The herbaceous layer is open to intermittent and includes seasonal annuals (Sawyer et al. 2009). One association within this alliance was mapped on SNI.

#### 3.1.6.1 *Lupinus albifrons* Coastal Association (Code: 161)

This association is found in scattered, medium-sized patches along the western portion of the island, primarily in sandy soils. Other species detected within surveyed plots include red sand verbenas, silver bur ragweed, freeway iceplant, giant tickseed, Menzies' goldenbush, and dunedelion (*Malacothrix incana*). On SNI, 84.43 hectares (208.62 acres) of this community were mapped and 8 plots were sampled. An example of this vegetation type on SNI is shown in **Figure 3-7**.



Map Location of the *Lupinus albifrons* Coastal Association on the installation



Typical Aerial Signature for this *Lupinus albifrons* Coastal Association

#### *Lupinus albifrons* Coastal Association (Code: 161)

Layer	Species Name	Con	Avg	Min	Max
Shrub	<i>Lupinus albifrons</i> var. <i>douglasii</i>	100	26.8	7.5	62.5
	<i>Leptosyne gigantea</i>	86	3.3	tr	7.5
	<i>Isocoma menziesii</i> var. <i>menziesii</i>	29	0.3	tr	0.5
Herb	<i>Carpobrotus edulis</i>	71	17.3	1.5	62.5
	<i>Abronia maritima</i>	43	6.5	0.5	17.5
	<i>Malacothrix incana</i>	43	0.3	tr	0.5
	<i>Ambrosia chamissonis</i>	29	1.0	0.5	1.5
		n=8			



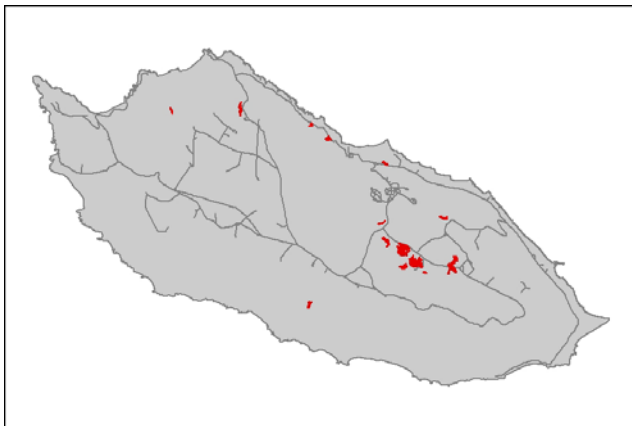
**Figure 3-6. *Lupinus albifrons* Coastal Association**

### 3.1.7 *Baccharis pilularis* Alliance

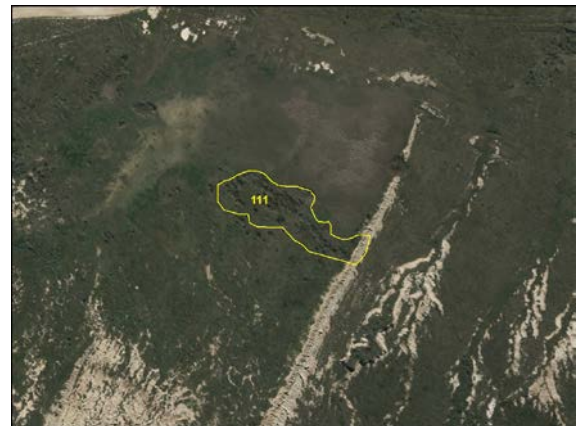
*Baccharis pilularis* Shrubland Alliance occurs all along the coast of California along rivers, streams, stabilized dunes, bluffs and open slopes and ridges. Coyote brush occurs with other perennial shrubs. It forms a variably structured canopy that is <3.0 meters (9.8 feet). The herbaceous layer is also variable (Sawyer et al. 2009). One association within this alliance was mapped on SNI.

#### 3.1.7.1 *Baccharis pilularis* / Annual Grass-Herb (Code: 111)

On SNI, this association is common in shallow drainages throughout the central mesa as well as in drainages on the northern coastal plain. Other species detected within surveyed plots include common yarrow, Australian saltbush, slender oat, riggut brome, red brome, giant tickseed, blue dicks, and Menzies' goldenbush. On SNI, 18.08 hectares (44.68 acres) were mapped and 8 plots were sampled. An example of this community is shown in **Figure 3-8**.



Map Location of the *Baccharis pilularis* / Annual Grass-Herb Association on the installation



Typical Aerial Signature for this *Baccharis pilularis* / Annual Grass-Herb Association



***Baccharis pilularis* / Annual Grass-Herb Association (Code: 111)**

Layer	Species Name	Con	Avg	Min	Max
<b>Shrub</b>	<i>Baccharis pilularis</i>	100	13.7	2.5	37.5
	<i>Leptosyne gigantea</i>	88	1.7	tr	7.5
	<i>Isocoma menziesii</i> var. <i>menziesii</i>	75	2.8	0.5	7.5
	<i>Atriplex semibaccata</i>	63	0.6	tr	1.5
	<i>Lupinus albifrons</i> var. <i>douglasii</i>	38	1.3	tr	2.5
<b>Herb</b>	<i>Achillea millefolium</i>	100	0.8	tr	2.5
	<i>Avena barbata</i>	63	20.5	7.5	62.5
	<i>Bromus diandrus</i>	50	30.6	2.5	45.0
	<i>Dichelostemma capitatum</i>	50	5.6	tr	17.5
	<i>Bromus madritensis</i> subsp. <i>rubens</i>	38	18.3	2.5	45.0
	<i>Acmispon argophyllus</i> var. <i>argenteus</i>	38	0.7	tr	1.5
	<i>Cynodon dactylon</i>	25	50.0	0.5	62.5
	<i>Deinandra clementina</i>	25	0.5	0.5	0.5
	<i>Distichlis spicata</i>	25	19.0	0.5	37.5
	<i>Schoenoplectus americanus</i>	25	4.0	0.5	7.5
<b>Vine</b>	<i>Calystegia macrostegia</i> subsp. <i>amplissima</i>	50	1.1	tr	1.5
<b>n=8</b>					



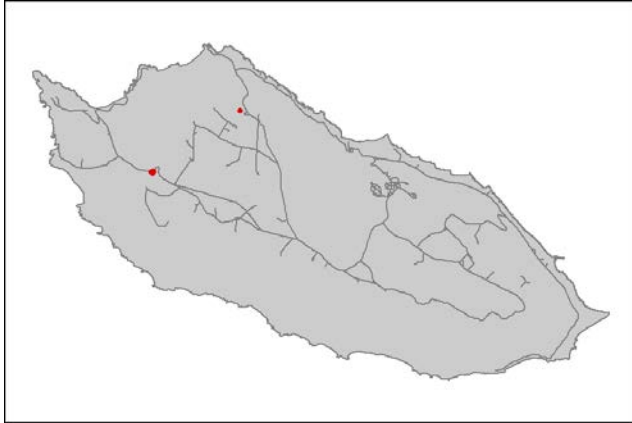
**Figure 3-7. *Baccharis pilularis* / Annual Grass-Herb Association**

### 3.1.8 *Salix lasiolepis* Alliance

*Salix lasiolepis* Alliance occurs along stream banks, seeps and drainages throughout California. Arroyo willow (*Salix lasiolepis*) occurs with other shrubs and trees. It ranges greatly in height, but can be up to 10.0 meters (32.8 feet). As a shrubland, taller trees may emerge from the canopy which is open to continuous. The herbaceous layer is variable (Sawyer et al. 2009). One association within this alliance was mapped on SNI.

### 3.1.8.1 *Salix lasiolepis* Association (Code: 101)

This association is only found in two locations on SNI: Army Springs and Humphrey's Sump. Other species detected within the surveyed plots include giant reed (*Arundo donax*), island false bindweed, salt grass, three-square (*Schoenoplectus americanus*), and common sowthistle (*Sonchus oleraceus*). On SNI, 0.41 hectare (1.02 acres) of this community was mapped and one plot was sampled.



Map Location of the *Salix lasiolepis* Association on the installation



Typical Aerial Signature for this *Salix lasiolepis* Association

#### *Salix lasiolepis* Association (Code: 101)

Layer	Species Name	Con	Avg	Min	Max
Tree	<i>Salix lasiolepis</i>	100	37.5	37.5	37.5
Herb	<i>Distichlis spicata</i>	100	2.5	2.5	2.5
	<i>Schoenoplectus americanus</i>	100	2.5	2.5	2.5
	<i>Arundo donax</i>	100	1.5	1.5	1.5
	<i>Sonchus oleraceus</i>	100	tr	tr	tr
Vine	<i>Calystegia macrostegia</i> subsp. <i>amplissima</i>	100	0.5	0.5	0.5
n=1					

## 3.2 Herbaceous Communities

### 3.2.1 *Abronia maritima* — *Abronia chamissonis* Alliance [MCV Synonym: *Abronia latifolia* — *Ambrosia chamissonis*]

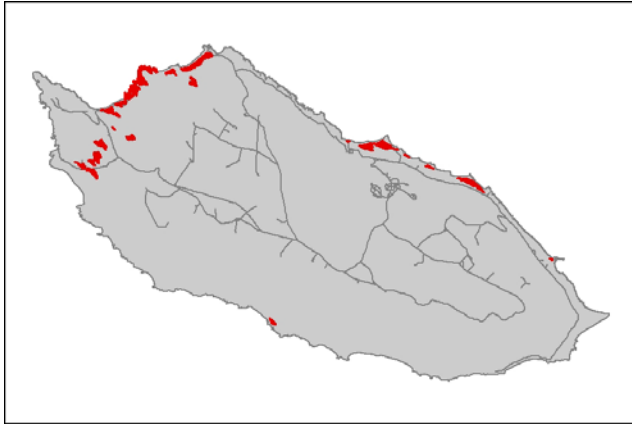
*Abronia maritima* – *Abronia chamissonis* Alliance occurs along sand dunes of coastal bars, river mouths and spits along the immediate coastline. This dune mat consists of the dominant plants along with other perennial herbs, grasses and low shrubs to form a low, sparse to continuous canopy. Emergent shrubs may be present at low cover. The herbaceous layer is <50 centimeters (<19/69 inches) (Sawyer et al. 2009). Two associations within this alliance have been mapped on SNI.

#### 3.2.1.1 *Ambrosia chamissonis* — *Abronia maritima* — *Cakile maritima* Association (Code: 181)

This association is found solely on dunes near the coast of SNI. The dominant species in this association is silver burr ragweed (*Abronia chamissonis*) with the co-dominant species of red sand verbena and European sea rocket (*Cakile maritima*). Other species detected within the surveyed plots include pink



- 1 sand verbena (*Abronia umbellata*), freeway iceplant, and dunedelion. On SNI, 56.35 hectares (139.25)
- 2 acres were mapped and 3 plots were sampled in this community. An example of this community is shown
- 3 in **Figure 3-9**.



Map Location of the *Ambrosia chamissonis* — *Abronia maritima* — *Cakile maritima* Association on the installation



Typical Aerial Signature for this *Ambrosia chamissonis* — *Abronia maritima* — *Cakile maritima* Association

***Ambrosia chamissonis* — *Abronia maritima* — *Cakile maritima* Association (Code: 181)**

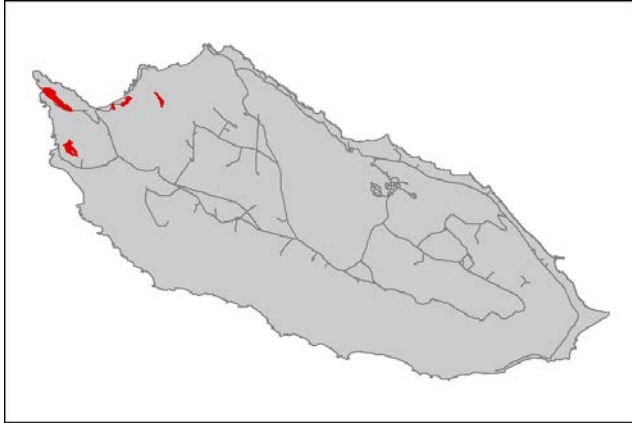
Layer	Species Name	Con	Avg	Min	Max
Herb	<i>Ambrosia chamissonis</i>	100	3.5	1.5	7.5
	<i>Carpobrotus edulis</i>	100	1.5	0.5	2.5
	<i>Cakile maritima</i>	100	1.5	0.5	2.5
	<i>Abronia maritima</i>	67	9.0	0.5	17.5
	<i>Malacothrix incana</i>	67	0.3	tr	0.5
<b>n=3</b>					



**Figure 3-8. *Ambrosia chamissonis* - *Abronia maritima* - *Cakile maritima* Association**

### 3.2.1.2 *Cakile maritima* – *Ambrosia chamissonis* – *Carpobrotus edulis* Association (Code: 182)

This association is found solely in dunes near coastal areas of SNI. The dominant species in this association is European sea rocket with co-dominants of silver burr ragweed and freeway iceplant. Other species found in this community include pink sand verbena, common iceplant, and Menzies' goldenbush. This community was mapped to 14.91 hectares (36.83 acres) on SNI, and 3 plots were sampled.



Map Location of the *Cakile maritima* – *Ambrosia chamissonis* – *Carpobrotus edulis* Association on the installation



Typical Aerial Signature for this *Cakile maritima* – *Ambrosia chamissonis* – *Carpobrotus edulis* Association

#### *Cakile maritima* – *Ambrosia chamissonis* – *Carpobrotus edulis* Association (Code: 182)

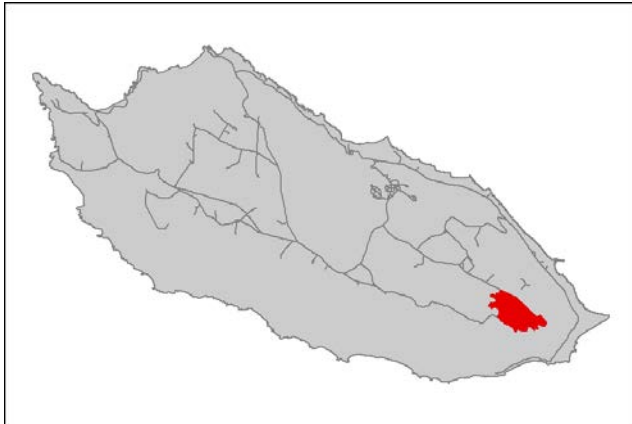
Layer	Species Name	Con	Avg	Min	Max
Shrub	<i>Isocoma menziesii</i> var. <i>menziesii</i>	67	1.5	0.5	2.5
	<i>Lupinus albifrons</i> var. <i>douglasii</i>	67	9.5	1.5	17.5
Herb	<i>Abronia umbellata</i>	100	0.7	tr	1.5
	<i>Ambrosia chamissonis</i>	100	1.8	0.5	2.5
	<i>Carpobrotus edulis</i>	100	40.0	17.5	85.0
	<i>Cakile maritima</i>	100	0.7	tr	1.5
	<i>Mesembryanthemum crystallinum</i>	100	1.0	tr	2.5
	<i>Bromus madritensis</i> subsp. <i>rubens</i>	67	1.5	0.5	2.5
	<i>Crassula connata</i>	67	tr	tr	tr
	<i>Astragalus traskiae</i>	33	2.5	2.5	2.5
	<i>Carpobrotus chilensis</i>	33	17.5	17.5	17.5
	<i>Acmispon argophyllus</i> var. <i>argenteus</i>	33	7.5	7.5	7.5
	<i>Malacothrix foliosa</i> subsp. <i>polyccephala</i>	33	1.5	1.5	1.5
	<i>Malacothrix incana</i>	33	0.5	0.5	0.5
	<i>Mesembryanthemum nodiflorum</i>	33	0.5	0.5	0.5
n=3					

### 3.2.2 *Deinandra clementina* – *Eriogonum giganteum* Provisional Alliance

Island tar plant is found on Anacapa Island as well as the southern Channel Islands. On San Clemente Island, this species forms a provisional association with Island buckwheat (*Eriogonum giganteum*) (Sawyer et al. 2008). On SNI, this species is found scattered throughout several communities but is concentrated on the east portion of the mesa south of the airfield, where it is strongly dominant over all other species.

### 3.2.2.1 *Deinandra clementina* – *Eriogonum giganteum* Provisional Association (Code: 201)

This provisional association is dominant at a portion of the eastern mesa, southeast of the air field. Other species detected within surveyed plots include Menzies' fiddleneck (*Amsinckia menziesii*), Australian saltbush, ripgut brome, red brome, sand pygmyweed (*Crassula connata*), blue dicks, goldentop grass (*Lamarckia aurea*), California goldfields (*Lasthenia californica*), and Russian thistle (*Salsola australis*). On SNI, this community includes 61.88 hectares (152.90 acres) where two plots were sampled. An example of this community is shown in **Figure 3-10**.



Map Location of the *Deinandra clementina* Association on the installation



Typical Aerial Signature for this *Deinandra clementina* Association

#### *Deinandra clementina* – *Eriogonum giganteum* Provisional Association (Code: 201)

Layer	Species Name	Con	Avg	Min	Max
Shrub	<i>Atriplex semibaccata</i>	50	0.5	0.5	0.5
Herb	<i>Deinandra clementina</i>	100	62.5	62.5	62.5
	<i>Bromus madritensis</i> subsp. <i>rubens</i>	100	17.5	17.5	17.5
	<i>Lasthenia californica</i>	100	tr	tr	tr
	<i>Bromus diandrus</i>	50	1.5	1.5	1.5
	<i>Dichelostemma capitatum</i>	50	0.5	tr	0.5
n=2					



**Figure 3-9.** *Deinandra clementina* – *Eriogonum giganteum* Provisional Association

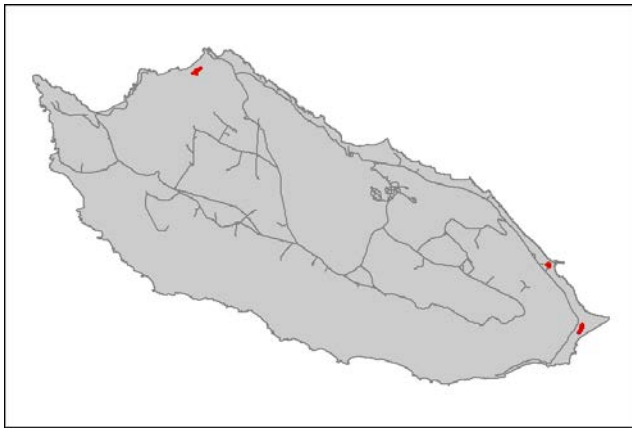


### 3.2.3 *Frankenia salina* Alliance

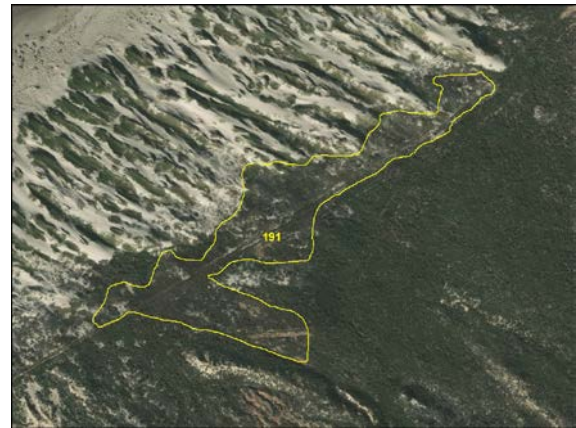
The *Frankenia salina* Alliance occurs in coastal salt marshes, brackish marshes, alkali meadows and alkali playas. Alkali heath is dominant or co-dominant in the herbaceous and subshrub layer. The cover is open to continuous with a low canopy cover of <60.0 centimeters (23.6 inches) (Sawyer et al. 2009). Two associations in this alliance were mapped on SNI.

#### 3.2.3.1 *Frankenia salina* Association (Code: 191)

Other species detected within the plots surveyed include Australian saltbush, ripgut brome, San Nicolas Island buckwheat, Menzies' goldenbush, and wooly seablite (*Suaeda taxifolia*). One plot was sampled in this community and 2.00 hectares (4.91 acres) were mapped. An example of this community is shown in **Figure 3-11**.



Map Location of the *Frankenia salina* Association on the installation



Typical Aerial Signature for this *Frankenia salina* Association

#### *Frankenia salina* Association (Code: 191)

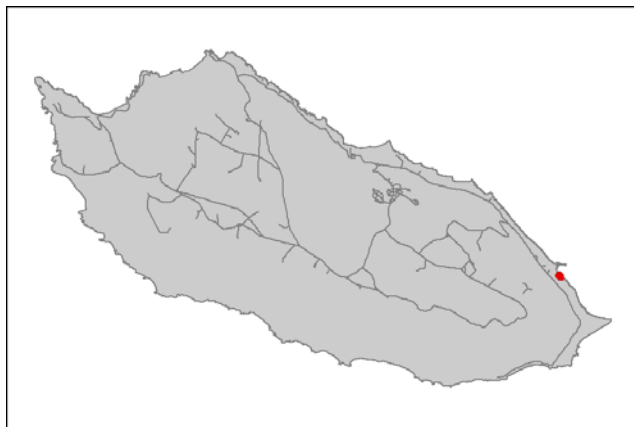
Layer	Species Name	Con	Avg	Min	Max
Shrub	<i>Atriplex semibaccata</i>	100	2.5	2.5	2.5
	<i>Isocoma menziesii</i> var. <i>menziesii</i>	100	0.5	0.5	0.5
Herb	<i>Bromus diandrus</i>	100	12	12	12.0
	<i>Frankenia salina</i>	100	2.5	2.5	2.5
	<i>Eriogonum grande</i> var. <i>timorum</i>	100	2.5	2.5	2.5
	<i>Suaeda taxifolia</i>	100	1.5	1.5	1.5
n=1					



**Figure 3-10. *Frankenia salina* Association**

### 3.2.3.2 *Frankenia salina* / *Distichlis spicata* Association (Code: 192)

In addition to the alkali heath and salt grass, other species detected within the plots surveyed include California saltbush (*Atriplex californica*), Australian saltbush ripgut brome, and woolly seablite. Two plots, near the desalination plant were sampled in this community and 0.28 hectare (0.70 acre) was mapped. An example of this community is shown in **Figure 3-12**.



Map Location of the *Frankenia salina* / *Distichlis spicata* Association on the installation



Typical Aerial Signature for this *Frankenia salina* / *Distichlis spicata* Association

### *Frankenia salina* / *Distichlis spicata* Association (Code 192)

Layer	Species Name	Con	Avg	Min	Max
Shrub	<i>Atriplex semibaccata</i>	50	1.5	1.5	1.5
	<i>Atriplex californica</i>	50	0.5	0.5	0.5
Herb	<i>Distichlis spicata</i>	100	51.3	17.5	85.0
	<i>Frankenia salina</i>	100	51.3	17.5	37.5
	<i>Suaeda taxifolia</i>	100	7.3	2.5	12.0
	<i>Bromus diandrus</i>	50	1.5	1.5	1.5
n=2					



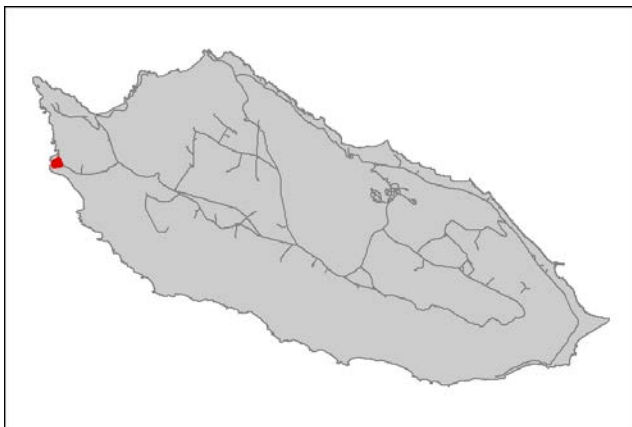
**Figure 3-11. *Frankenia salina* / *Distichlis spicata* Association**

### 3.2.4 *Distichlis spicata* Alliance

The *Distichlis spicata* Alliance occurs in coastal salt marshes and inland habitats including playas swales and terraces along washes that are typically intermittently flooded. Salt grass is dominant or co-dominant in the herbaceous layer with a relative cover of >30-50% (Sawyer et al. 2009). One association in this alliance was mapped on SNI.

#### 3.2.4.1 *Distichlis spicata* Association (Code: 193)

Besides the salt grass, other species detected within the plots surveyed include Watson's saltbush (*A. watsonii*), Menzies' goldenbush, slenderleaf iceplant, and alkali heath. One plot was sampled in this community at Rockcrusher Beach, and 1.02 hectares (2.53 acres) were mapped. An example of this community is shown in **Figure 3-12**.



Map Location of the *Frankenia salina* / *Distichlis spicata* Association on the installation



Typical Aerial Signature for this *Frankenia salina* / *Distichlis spicata* Association



***Distichlis spicata* Association (Code 193)**

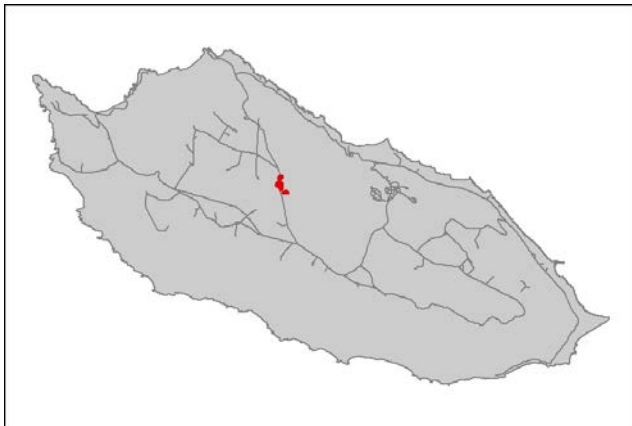
Layer	Species Name	Con	Avg	Min	Max
Shrub	<i>Isocoma menziesii</i> var. <i>menziesii</i>	100	2.5	2.5	2.5
	<i>Atriplex watsonii</i>	100	1.5	1.5	1.5
Herb	<i>Distichlis spicata</i>	100	7.5	7.5	7.5
	<i>Frankenia salina</i>	100	0.5	0.5	0.5
	<i>Mesembryanthemum nodiflorum</i>	100	0.5	0.5	0.5
n=1					

**3.2.5 *Ammophila arenaria* Semi-Natural Herbaceous Stands**

*Ammophila arenaria* Semi-Natural Herbaceous Stands are found on dunes, river mouths and spits along the immediate coastline throughout California. European beach grass is a highly invasive perennial grass, in this alliance it is dominant in the herbaceous layer and occasionally co-occurring with shrubs. The <1.0 meter (3.2 feet) canopy is intermittent to continuous (Sawyer et al. 2009). One association within this alliance was mapped on SNI.

**3.2.5.1 *Ammophila arenaria* Stand Type (Code: 311)**

Examples of this stand type can be found along Shannon Road on the northwestern portion of the mesa, where it occurs in several monotypic or nearly-monotypic stands adjacent to the road. A total of 2.50 hectares (6.18 acres) were mapped on SNI and within that acreage, no plots were sampled. An example of this community is shown in **Figure 3-13**.



Map Location of the *Ammophila arenaria* Stand Type on the installation



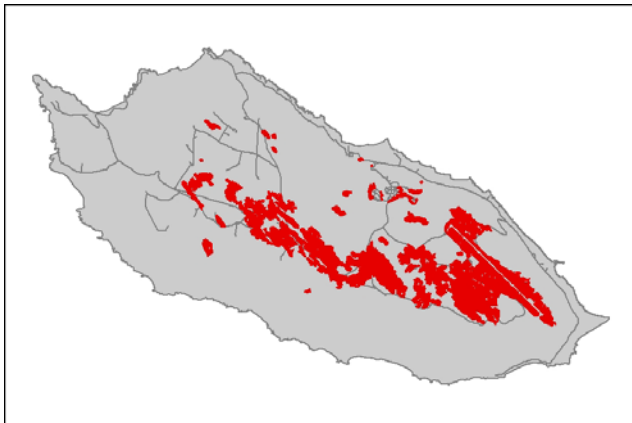
Typical Aerial Signature for this *Ammophila arenaria* Stand Type



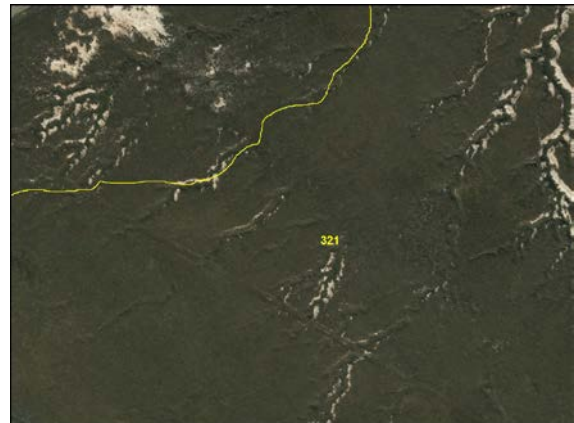
**Figure 3-12. *Ammophila arenaria* Stand type**

### 3.2.6 Mediterranean California Naturalized Annual and Perennial Grassland (Code: 321)

This description is based on the group level, which is the hierarchical level above the alliance. The group level is a useful classification where distinction cannot be made to the alliance or association level. With the exception of *Ammophila arenaria* Semi-Natural Herbaceous Stands, which were found to be strongly dominant over all other species in each stand, several Semi-Natural Stand types were lumped into this category due of the heterogeneity of species in the grasslands and difficulty distinguishing between types during photographic delineation. The dominant non-native grasses found in this community include ripgut brome, slender oat, and red brome. Other species found in this community include Menzies' goldenbush, common yarrow, Australian saltbush, coyote brush, island false bindweed, and giant tickseed. On SNI, 19 plots were sampled within this community and 548.38 hectares (1355.08 acres) were mapped. An example of this community is shown in **Figure 3-14**.



Map Location of the Mediterranean California Naturalized Annual and Perennial Grassland on the installation

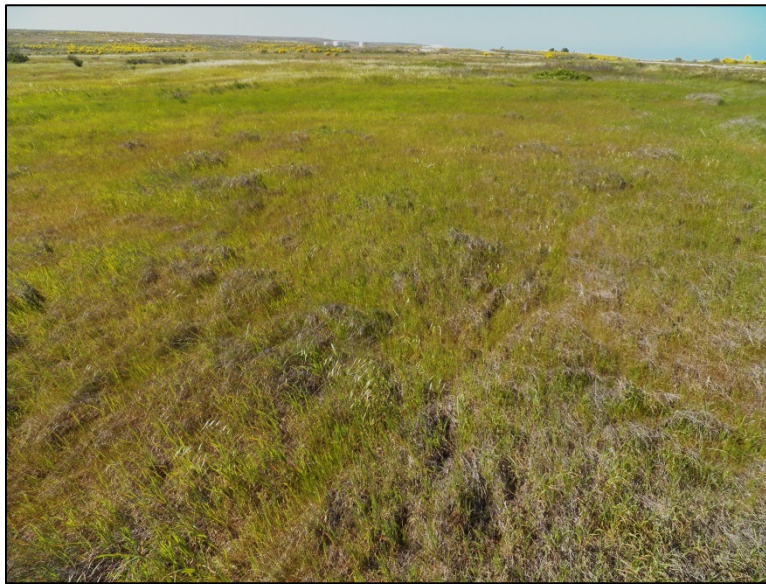


Typical Aerial Signature for this Mediterranean California Naturalized Annual and Perennial Grassland



**Mediterranean California Naturalized Annual and Perennial Grassland (Code: 321)**

Layer	Species Name	Con	Avg	Min	Max
<b>Shrub</b>	<i>Isocoma menziesii</i> var. <i>menziesii</i>	79	1.6	0.5	2.5
	<i>Atriplex semibaccata</i>	74	2.3	0	7.5
	<i>Leptosyne gigantea</i>	37	1.0	0	2.5
	<i>Baccharis pilularis</i>	26	1.0	0	1.5
	<i>Opuntia littoralis</i>	21	0.6	0	1.5
<b>Herb</b>	<i>Achillea millefolium</i>	68	0.3	tr	1.5
	<i>Bromus diandrus</i>	63	43.3	7.5	62.5
	<i>Avena barbata</i>	63	27.6	1.5	62.5
	<i>Dichelostemma capitatum</i>	42	2.8	tr	17.5
	<i>Bromus madritensis</i> subsp. <i>rubens</i>	37	21.1	2.5	37.5
	<i>Acmispon argophyllus</i> var. <i>argenteus</i>	26	1.5	tr	7.5
	<i>Medicago polymorpha</i>	26	0.5	tr	2.5
	<i>Deinandra clementina</i>	21	1.3	0.5	2.5
<b>Vine</b>	<i>Calystegia macrostegia</i> subsp. <i>amplissima</i>	58	3.0	tr	17.5
<b>n=19</b>					

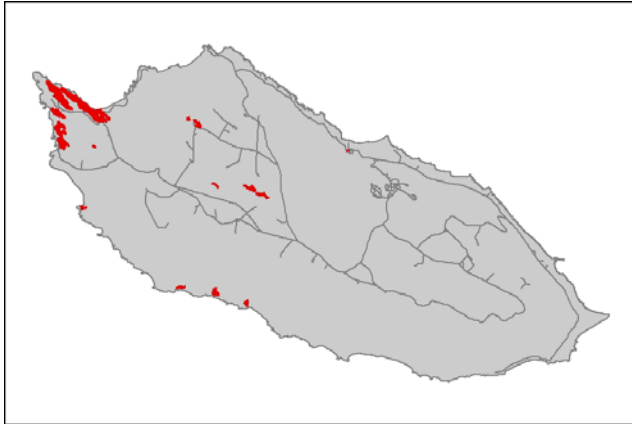


**Figure 3-13. Mediterranean California Naturalized Annual and Perennial Grassland**

**3.2.7 *Carpobrotus edulis* or other Ice Plants Semi-Natural Stands (Code: 301)**

In this Semi-Natural Stand, invasive freeway iceplant, *Carpobrotus chilensis* or other ice plant species are dominant in the herbaceous layer. Ice plant mats are found on bluffs, disturbed land, sand dunes and coastal and alkaline terraces. Ice plant is highly invasive and at least eight different species are found in California. The canopy is intermittent to continuous with a height of <50 centimeters (19.7 inches), with emergent shrubs present at low cover (Sawyer et al. 2009). Common iceplant and freeway icelplant were the dominant ice plants found in this community. Other species detected within the plots sampled on SNI include silver bur ragweed, Australian saltbush, European sea rocket, Menzies' goldenbush, and

- 1 California silver bush lupine. In 2013, 42.48 hectares (104.96 acres) were mapped and 8 plots were
- 2 sampled in this community. An example of this community is shown in **Figure 3-15**.



Map Location of the *Carpobrotus edulis* or other Ice Plants Semi-Natural Stands



Typical Aerial Signature for *Carpobrotus edulis* or other Ice Plants Semi-Natural Stands

***Carpobrotus edulis* or other Ice Plants Semi-Natural Stands (Code: 301)**

Layer	Species Name	Con	Avg	Min	Max
<b>Shrub</b>	<i>Isocoma menziesii</i> var. <i>menziesii</i>	75	0.6	tr	1.5
	<i>Atriplex semibaccata</i>	63	2.2	tr	7.5
	<i>Lupinus albifrons</i> var. <i>douglasii</i>	25	1.3	tr	2.5
<b>Herb</b>	<i>Mesembryanthemum crystallinum</i>	75	44.2	tr	85.0
	<i>Carpobrotus edulis</i>	38	12.7	tr	37.5
	<i>Cakile maritima</i>	38	0.5	tr	1.5
	<i>Ambrosia chamissonis</i>	38	0.2	tr	0.5
	<i>Bromus madritensis</i> subsp. <i>rubens</i>	25	1.5	0.5	2.5
	<i>Astragalus traskiae</i>	25	1.3	tr	2.5
	<i>Abronia umbellata</i>	25	1.0	0.5	1.5
	<i>Frankenia salina</i>	25	0.8	tr	1.5
	<i>Mesembryanthemum nodiflorum</i>	25	0.8	tr	1.5
	<i>Acmispon argophyllus</i> var. <i>argenteus</i>	25	0.3	tr	0.5
<b>Vine</b>	<i>Abronia maritima</i>	25	tr	tr	tr
	<i>Calystegia macrostegia</i> subsp. <i>amplissima</i>	25	19.5	1.5	37.5
<b>n=8</b>					

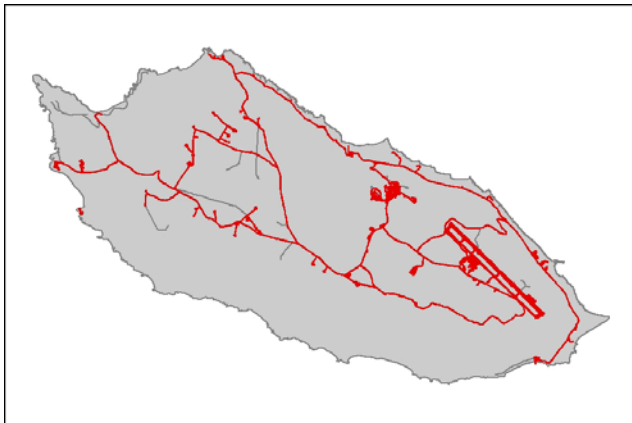


**Figure 3-14. *Carpobrotus edulis* or other Ice Plants Semi-Natural Stands**

### 3.2.8 Non-vegetated Communities

#### 3.2.8.1 Developed (Code: 000)

This category includes areas that have been physically altered to the extent of no longer supporting native vegetation. This can include buildings, paved and regularly maintained dirt roads, air fields, and parking lots. A total of 106.81 hectares (263.93 acres) were mapped on SNI and within that acreage, zero plots were sampled.



Map Location of the Developed/Landscaped/Unvegetated

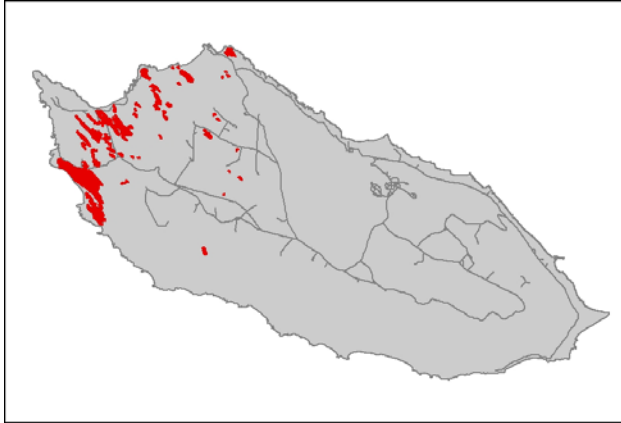


Typical Aerial Signature for Developed/Landscaped/Unvegetated

#### 3.2.8.2 Sand Dune (Code: 001)

These areas typically lack vegetation or have sparse vegetative cover. A total of 98.11 hectares (242.44 acres) were mapped on SNI and within that acreage, zero plots were sampled due to the lack of vegetation cover.





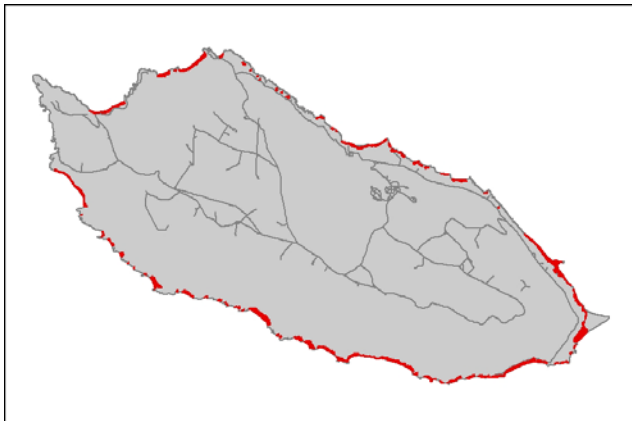
Map Location of Sand Dune



Typical Aerial Signature for Sand Dune

### 1 3.2.8.3 Beach (Code: 002)

2 Beach areas are composed of nearly flat sandy shores exposed and subjected to direct tidal flow  
 3 fluctuations. These areas typically lack vegetation. Beach stands are important pupping grounds for  
 4 marine mammals and critical nesting habitat for a state and federally listed threatened species, the western  
 5 snowy plovers. A total of 68.04 hectares (168.13 acres) were mapped on SNI and within that acreage,  
 6 zero plots were sampled due to the lack of vegetation cover.



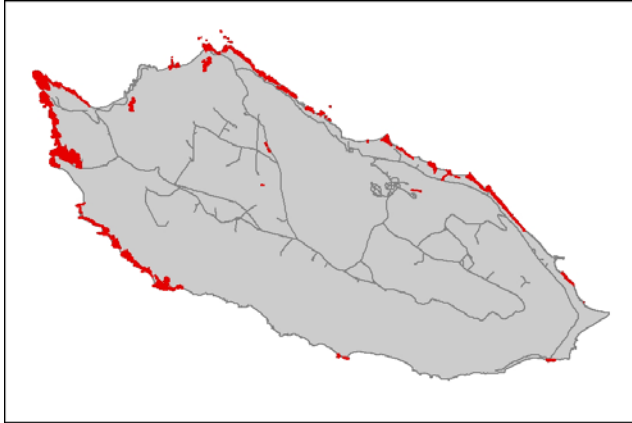
Map Location of Beach



Typical Aerial Signature for Beach

### 7 3.2.8.4 Barren (Code: 003)

8 These areas typically lack or consist of less than 1 percent vegetation cover. A total of 108.77 hectares  
 9 (268.78 acres) were mapped on SNI and within that acreage, zero plots were sampled due to the lack of  
 10 vegetation cover.



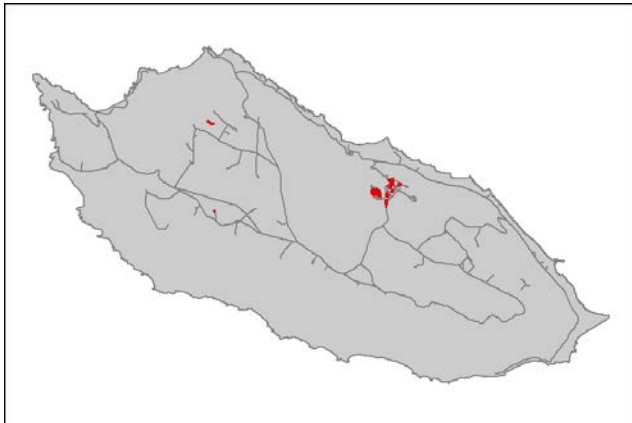
Map Location of Barren



Typical Aerial Signature for Barren

### 3.2.8.5 Ornamental Vegetation (Code: 004)

This category includes areas that have been physically disturbed and support primarily non-native, ornamental trees, shrubs, and grasses. On SNI, this may include maintained grass lawns around structures, plantings of *Eucalyptus*, myoporum (*Myoporum laetum*), and non-native palm and pine trees. A total of 5.75 hectares (14.20 acres) were mapped as ornamental vegetation on SNI.



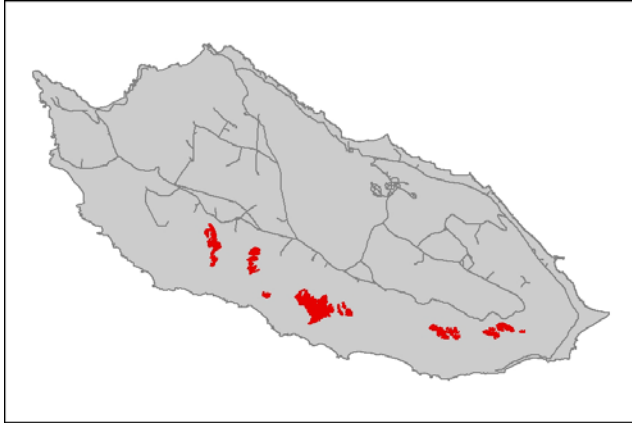
Map Location of Ornamental Vegetation



Typical Aerial Signature for Ornamental Vegetation

### 3.2.8.6 Eroded Cliffs and Hillside (Code: 005)

This classification includes various steep cliff and hillside areas with no vegetation. These were found primarily on the southern escarpment with a total area of 62.38 hectares (154.15 acres).



Map Location of Eroded Cliffs and Hillsides

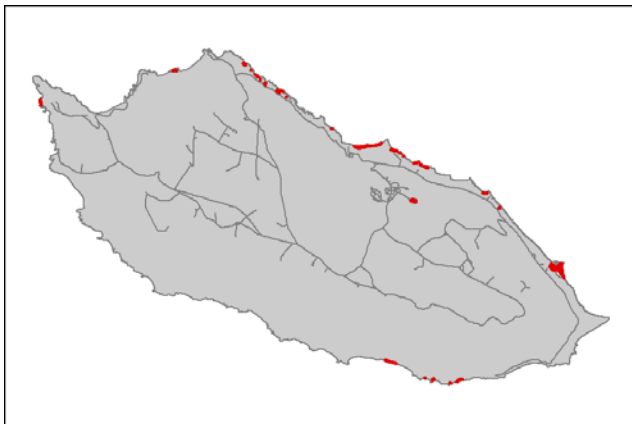


Typical Aerial Signature for Eroded Cliffs and Hillsides

1

### 2 3.2.8.7 Open Water (Code: OW)

3 These areas were delineated using the 2011 aerial imagery provided for field surveys in 2013. Open water  
 4 was mapped in cases where the shoreline did not match with the original footprint shapefile provided to  
 5 HDR by the U.S. Navy. Mapped Open Water polygons will likely change during tidal changes, changes  
 6 in sand distribution, and/or droughts. A total of 8.54 hectares (21.09 acres) were mapped on SNI and  
 7 within that acreage, zero plots were sampled.



Map Location of Open Water



Typical Aerial Signature for Open Water

## 8 3.3 Accuracy Assessment Results

9 After the completion of field classification sampling and digital map delineation, 315 points covering  
 10 most of the vegetation types on the island were used as accuracy assessment (AA) locations for the  
 11 delineated maps. Vegetation types were visually classified in the field, with the dominant vegetation  
 12 species recorded for each. Accuracy Assessment analysis assists map users in determining how much  
 13 confidence can be assigned to classification of mapped polygons.

14 The overall (project) accuracy value was calculated by creating a contingency table (**Table 3-2**) by  
 15 spatially joining the 315 AA points with the vegetation community polygon to produce a joined layer  
 16 with both the AA classification (as identified in the field) and the vegetation classification as  
 17 mapped. The table was then exported to a Microsoft Excel database and a pivot table representing the

misclassification matrix (contingency table) was created. Point estimates were calculated for user's and producer's accuracy rates for each classification by dividing the number of sites with matching map classes and field calls by the total number of sites assigned to that map class (for user's accuracy\_ or the total number of sites in which that class was identified in the field (for producer's accuracy). Ninety percent confidence intervals for these point estimates were created using:

$$90\% \text{ C.I.} = \hat{p} \pm \left\{ z_{\alpha} \sqrt{\frac{\hat{p}(1 - \hat{p})}{n}} + \frac{1}{(2n)} \right\}$$

Where  $\hat{p}$  = the point estimate of accuracy of a map class or field call class,  $z_{\alpha}$  = the value of the z distribution statistic at the alpha level selected (a two-sided 90% ( $\alpha=0.1$ ) confidence interval (1.645) was used for all classes), and n=the total number of sites (in the map class or AA class).

The overall accuracy rate was computed as the total number of plots with matches in map class and AA class and dividing that number by the total number of plots. The overall accuracy rate of the SNI vegetation map is 81.0 percent for mapped polygons, exceeding the minimum standard of 80 percent set for this project.

Table 3-2. Contingency Table

																					MAP USER'S ACCURACY			
		CODE	101	111	121	131	141	151	161	171	172	181	182	191	192	193	201	301	311	321	TOTAL	Point Estimate	90% Confidence Interval (Lower)	90% Confidence Interval (Upper)
Salix lasiolepis		101																			0	0.0%	0.0%	0.0%
Baccharis pilularis/Annual Grass-Herb		111																			0	0.0%	0.0%	0.0%
Artemisia californica		121			2																2	100.0%	100.0%	100.0%
Opuntia littoralis-Mixed Coastal Sage Scrub		131		1		9		2													12	75.0%	58.6%	99.7%
Lycium californicum		141																			0	0.0%	0.0%	0.0%
Leptosyne gigantea		151				1	1	117		6	2										127	92.1%	88.6%	96.4%
Lupinus albifrons		161																			0	0.0%	0.0%	0.0%
Isocoma menziesii		171						1		1	1										3	33.3%	5.2%	94.7%
Isocoma menziesii/Lupinus albifrons-Astragalus traskiae Provisional		172				2		9		23	117										151	77.5%	72.2%	83.4%
Ambrosia chamissonis-Abronia maritima-Cakile maritima		181								1											1	0.0%	50.0%	50.0%
Cakile maritima-Ambrosia chamissonis-Carpobrotus edulis		182									1										1	0.0%	50.0%	50.0%
Frankenia salina		191																			0	0.0%	0.0%	0.0%
Frankenia salina/Distichlis spicata		192																			0	0.0%	0.0%	0.0%
Distichlis spicata		193																			0	0.0%	0.0%	0.0%
Deinandra clementina-Eriogonum gigantea Provisional		201															1				1	100.0%	100.0%	100.0%
Carpobrotus edulis or other Ice Plants		301									6							3			9	33.3%	13.0%	64.7%
Ammophila arenaria		311																			0	0.0%	0.0%	0.0%
Mediterranean California Grassland		321															3			5	8	62.5%	40.6%	96.9%
		TOTAL	0	1	2	12	1	129	0	31	127	0	0	0	0	0	4	3	0	5	315			
MAP PRODUCER'S ACCURACY	POINT ESTIMATE		0.0%	0.0%	100.0%	75.0%	0.0%	90.7%	0.0%	3.2%	92.1%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	100.0%	0.0%	100.0%		OVERALL (POOLED) ACCURACY:  81.0%      77.5%      84.8%		
	90% CONFIDENCE INTERVAL (LOWER)		0.0%	50.0%	100.0%	58.6%	50.0%	86.9%	0.0%	0.0%	88.6%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	100.0%	0.0%	100.0%				
	90% CONFIDENCE INTERVAL (UPPER)		0.0%	50.0%	100.0%	99.7%	50.0%	95.3%	0.0%	10.0%	96.4%	0.0%	0.0%	0.0%	0.0%	0.0%	73.1%	100.0%	0.0%	100.0%				



## 4. Discussion

This project developed a floristic classification of vegetation within the boundaries of NBVC SNI which was used for mapping the vegetation communities of the island. **Appendix A** represents a map book of the installation depicting the mapped 17 vegetation classes on aerial imagery. A total of 5,600.51 hectares (14,225.26 acres) were mapped of which approximately 83.29 percent was classified as a predominantly native vegetation association, 10.29 percent was classified as a naturalized or semi-natural stand type, 2.04 percent was classified as cultural (developed/landscaped/disturbed), and 2.89 percent was classified as either beach or sand dune (**Table 4-1**). In addition, a dichotomous field key of the 17 associations/classes is provided in **Appendix B**.

Invasive plant species were found in over 95 percent of plots sampled in 2013. Invasive species and noxious weed control is currently being conducted on SNI. Limiting or reducing nonnative plant encroachment into native habitat (e.g., iceplant [*Carpobrotus* spp.] in beach dunes, mustard [*Brassica*] species throughout) benefits species of special concern (Section 1.3.1) by increasing suitable habitat for those species. Restoring large tracts of disturbed, vacant land to a more native condition could also benefit habitat availability.

1

**Table 4-1. Vegetation Classification, Acres, and Percentages**

Code	Description	Acres	Percent of total land area*
101	<i>Salix lasiolepis</i> Association	1.02	>0.01
111	<i>Baccharis pilularis</i> /Annual Grass-Herb Association	44.68	0.31
121	<i>Artemisia californica</i> Association	0.43	>0.010
131	<i>Opuntia littoralis</i> Alliance	7.76	0.05
151	<i>Leptosyne gigantea</i> Association	2403.43	16.90
161	<i>Lupinus albifrons</i> Coastal Association	208.62	1.47
171	<i>Isocoma menziesii</i> Association	281.46	1.98
172/173	<i>Isocoma menziesii</i> / <i>Lupinus albifrons</i> - <i>Astragalus traskiae</i> Association	8341.79	58.64
181	<i>Ambrosia chamissonis</i> - <i>Abronia maritima</i> - <i>Cakile maritima</i> Association	139.25	0.98
182	<i>Cakile maritima</i> - <i>Ambrosia chamissonis</i> - <i>Carpobrotus edulis</i> Association	36.83	0.26
191	<i>Frankenia salina</i> Association	4.91	0.03
192	<i>Frankenia salina</i> / <i>Distichlis spicata</i> Association	0.70	>0.01
193	<i>Distichlis spicata</i> Association	2.53	0.02
201	<i>Deinandra clementina</i> – <i>Eriogonum giganteum</i> Provisional Association	152.90	1.07
301	<i>Carpobrotus edulis</i> or other Ice Plants Semi-Natural Stands	104.96	0.74
311	<i>Ammophila arenaria</i> Stand Type	6.18	0.04
321	Mediterranean California Naturalized Annual and Perennial Grassland	1355.08	9.53
OW	Open Water	21.09	0.15
000	Developed	263.93	1.86
001	Sand dune	242.44	1.70
002	Beach	168.13	1.18
003	Barren	268.78	1.89
004	Ornamental vegetation	14.20	0.10
005	Eroded cliffs and hillsides	154.15	1.08
<b>Total</b>		<b>14,225.26</b>	<b>100.00</b>

Notes: \* Vegetation classification percentages were rounded to the one-hundredth decimal; for the small sample areas the results were not reflected in the total percent sampled.

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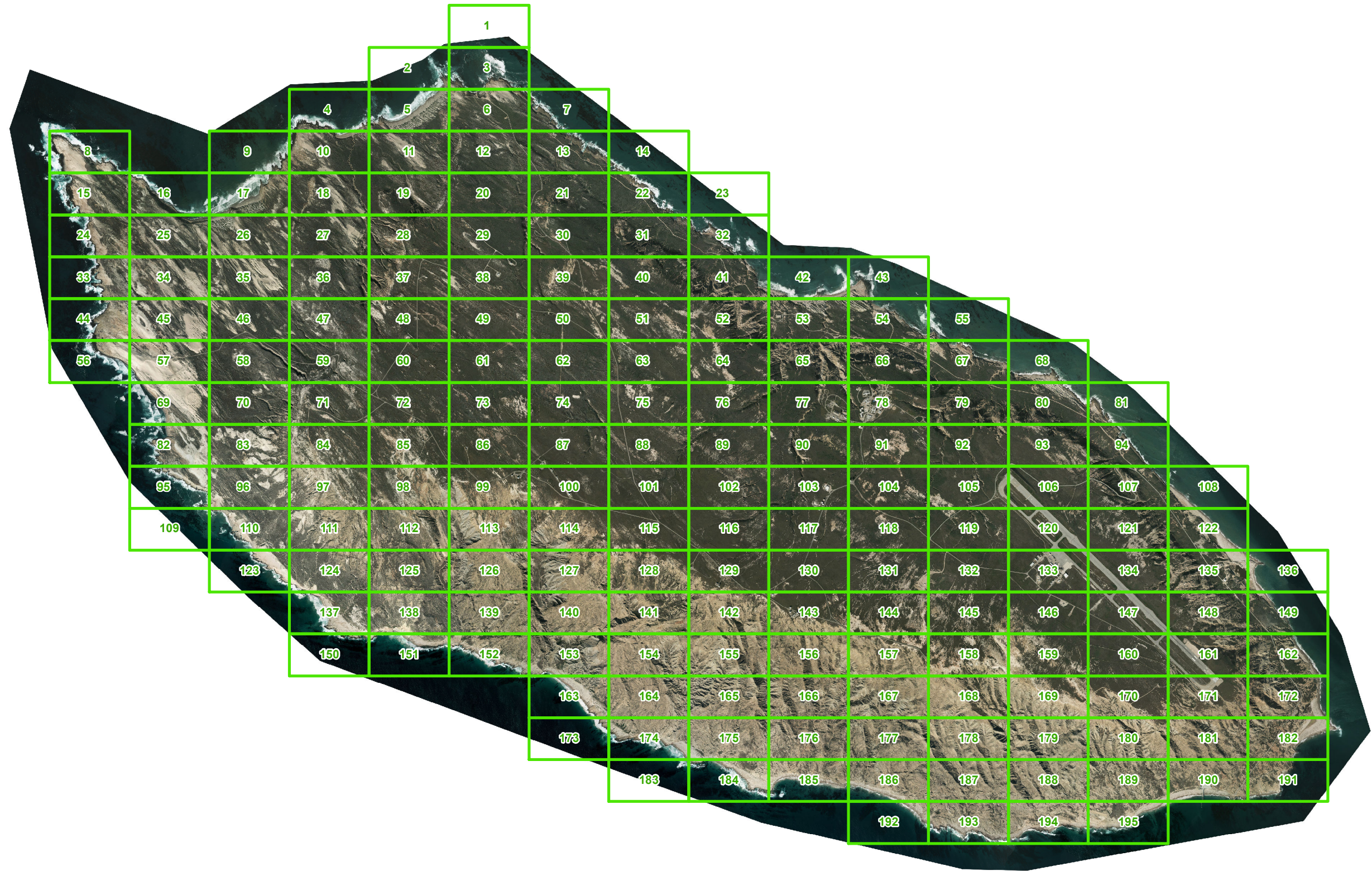
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## **APPENDIX A**

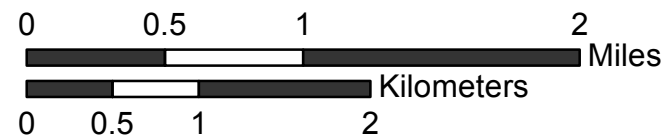
### **NBVC SAN NICOLAS ISLAND VEGETATION CLASSIFICATION MAP**







Map Book Grid



Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

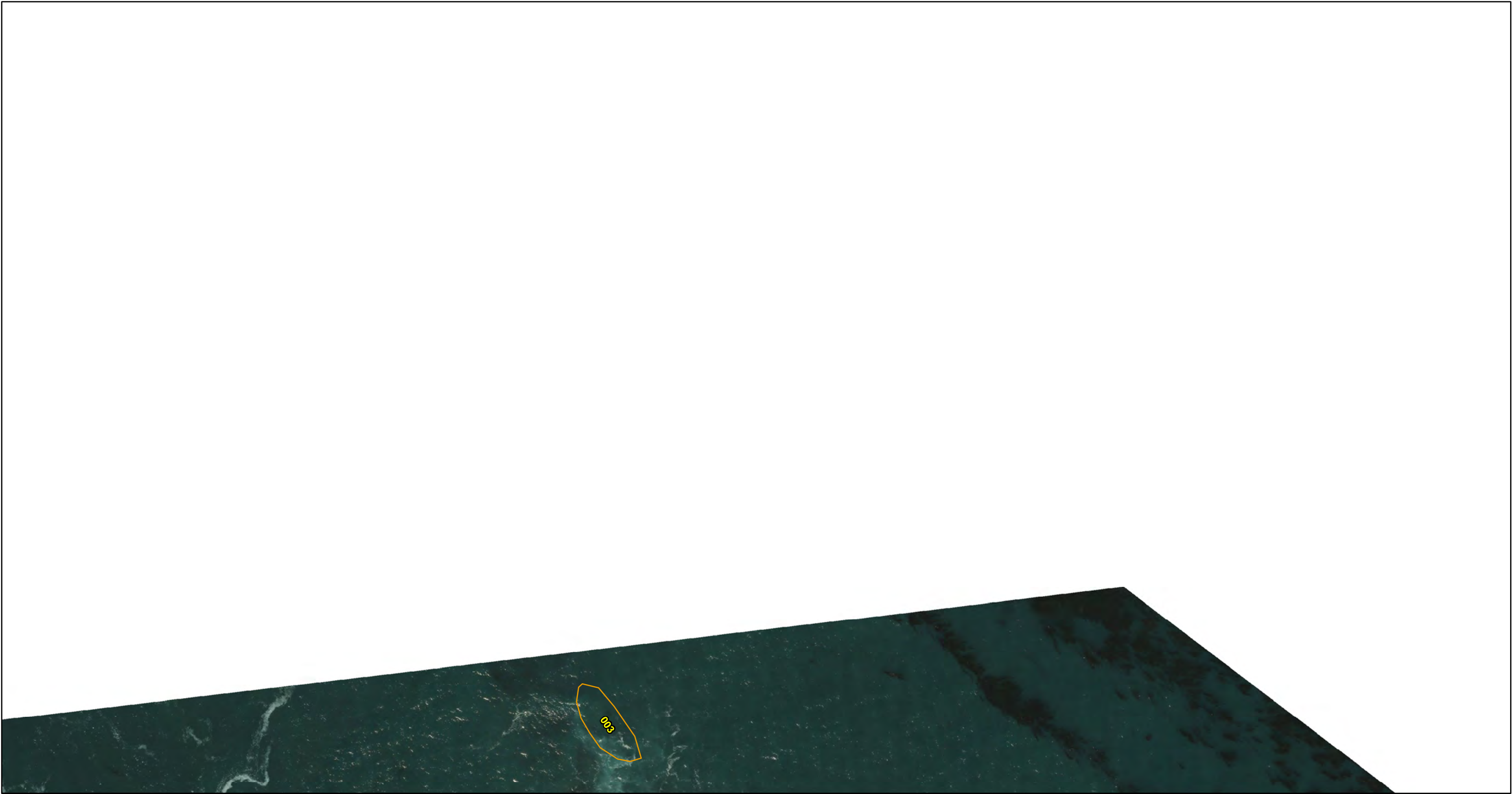




Vegetation Classifications

- 000, Developed
- 001, Sand dune
- 002, Beach
- 003, Barren
- 004, Ornamental vegetation
- 005, Eroded cliffs and hillsides
- 101, Salix lasiolepis Association
- 111, Baccharis pilularis/Annual Grass-Herb Association
- 121, Artemisia nesiotica Provisional Association
- 131, Opuntia littoralis-Mixed Coastal Sage Scrub Association
- 151, Coreopsis gigantea Association
- 161, Lupinus albifrons Association
- 171, Isocoma menziesii Association
- 172, Isocoma menziesii/Lupinus albifrons-Astragalus traskiae Provisional Association
- 173, Isocoma menziesii/Lupinus albifrons-Astragalus traskiae Provisional Association (sparse)
- 181, Ambrosia chamissonis-Abronia maritima-Cakile maritima Association
- 182, Cakile maritima-Ambrosia chamissonis-Carpobrotus edulis Association
- 191, Frankenia salina Association
- 192, Frankenia salina/Distichlis spicata Association
- 193, Distichlis spicata Association
- 201, Deinandra clementina Provisional Association
- 301, Carpobrotus edulis or other Ice Plants Semi-Natural Stands
- 311, Ammophila arenaria Stand Type
- 321, Mediterranean California Naturalized Annual and Perennial Grassland
- OW, Water





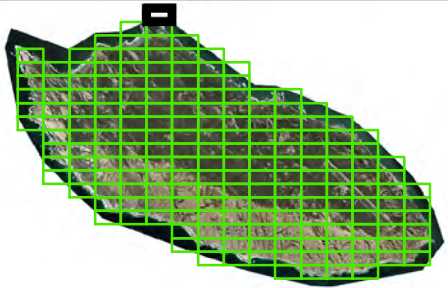
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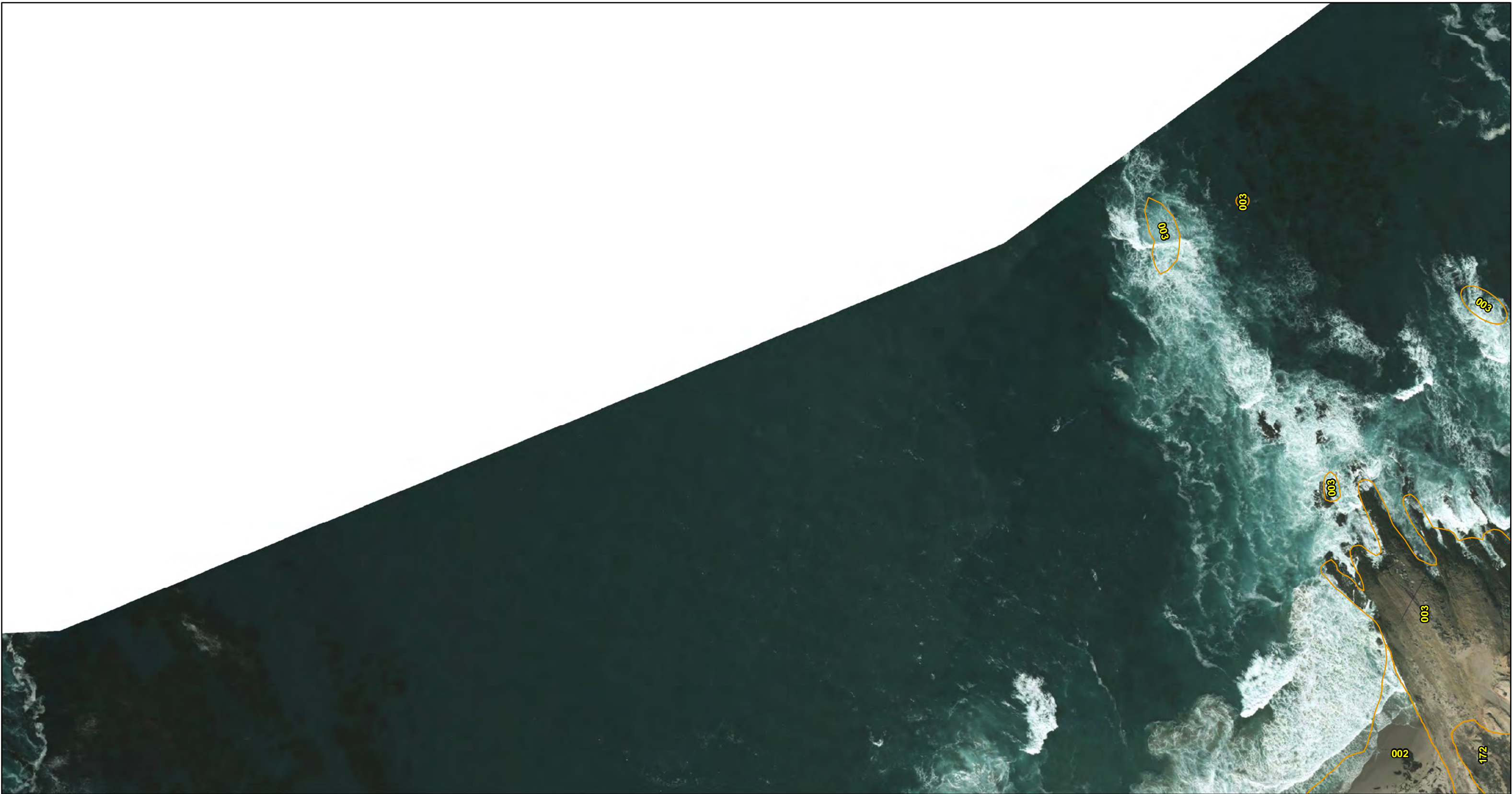


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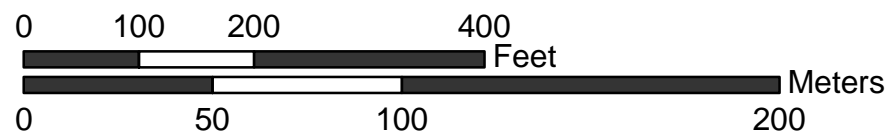
NBVC San Nicolas Island  
Vegetation Classification

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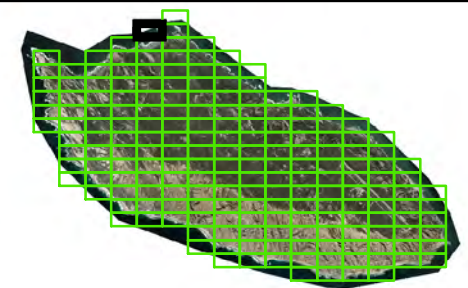
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Vegetation Classification

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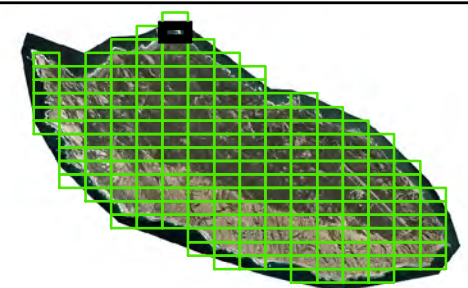
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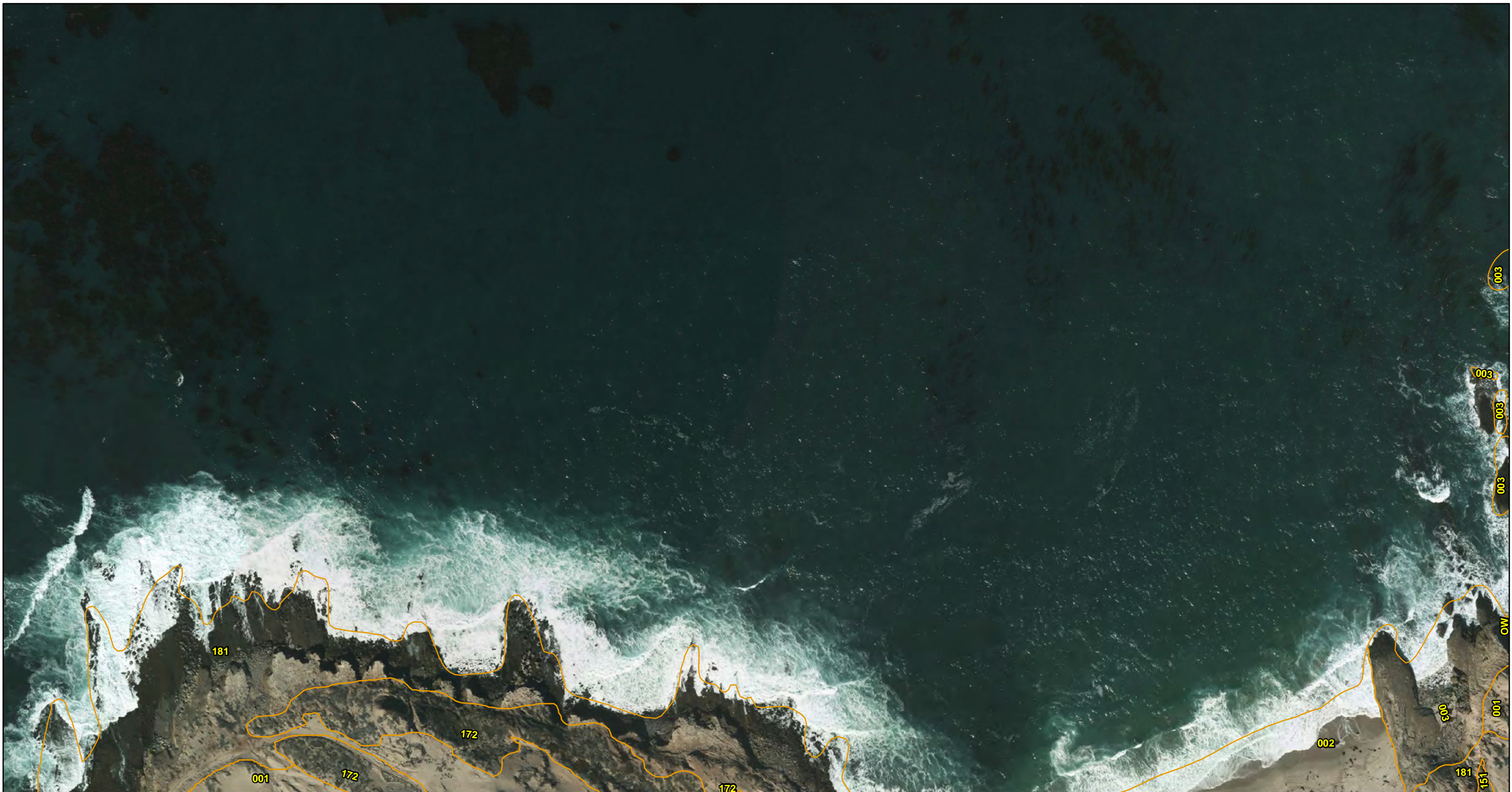
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Vegetation Classification

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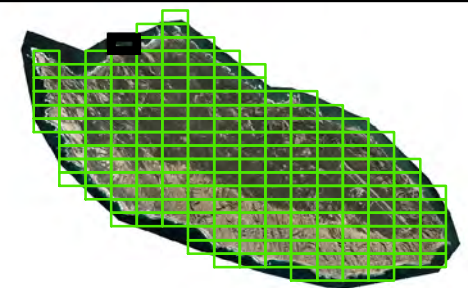
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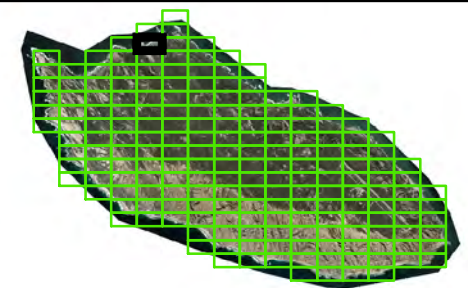
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Vegetation Classification

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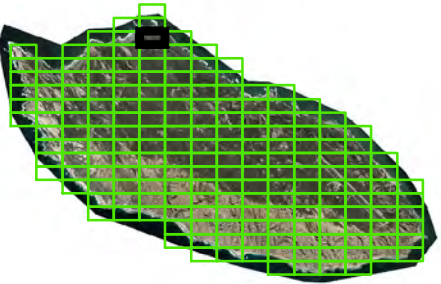
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Vegetation Classification

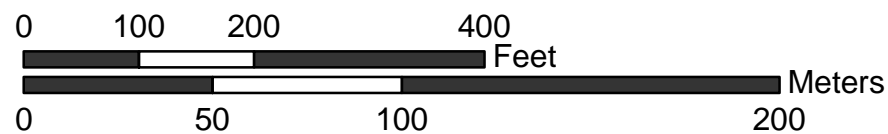
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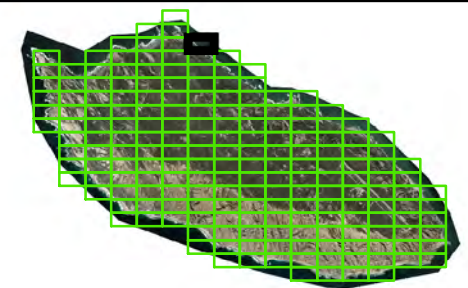
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Vegetation Classification

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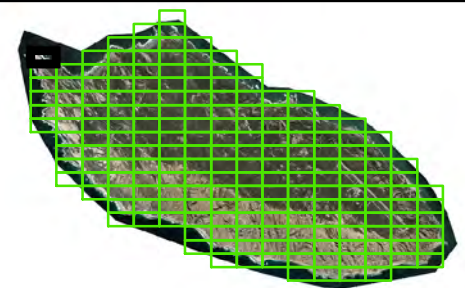
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Vegetation Classification

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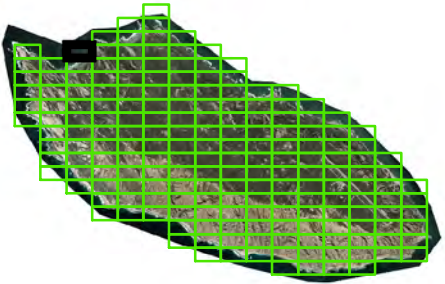
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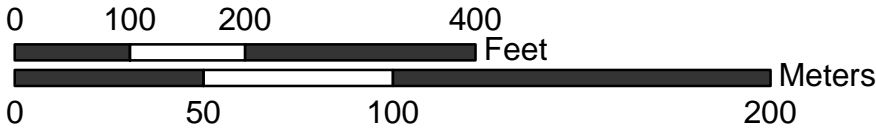
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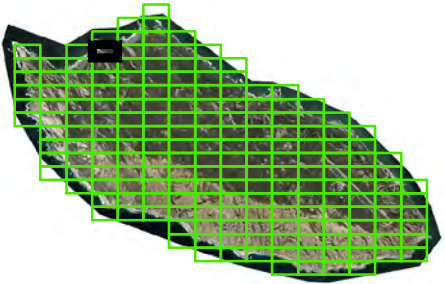
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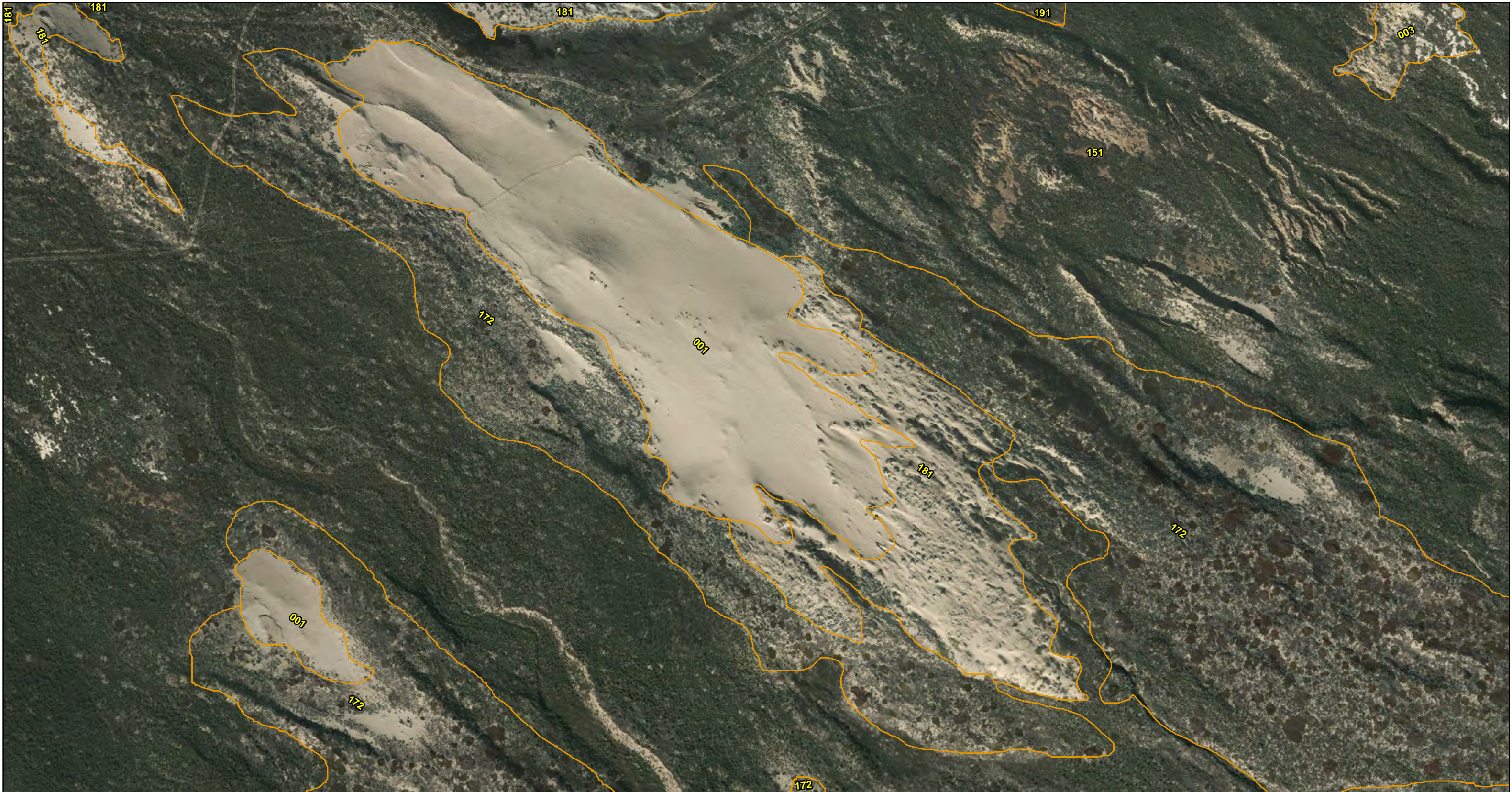
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NBVC San Nicolas Island  
Vegetation Classification

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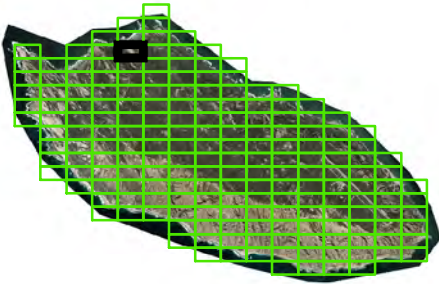
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Vegetation Classification

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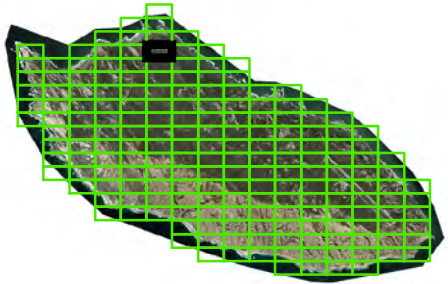
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Vegetation Classification

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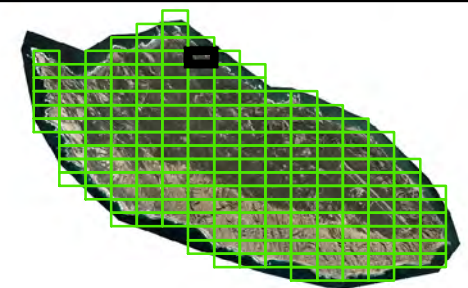
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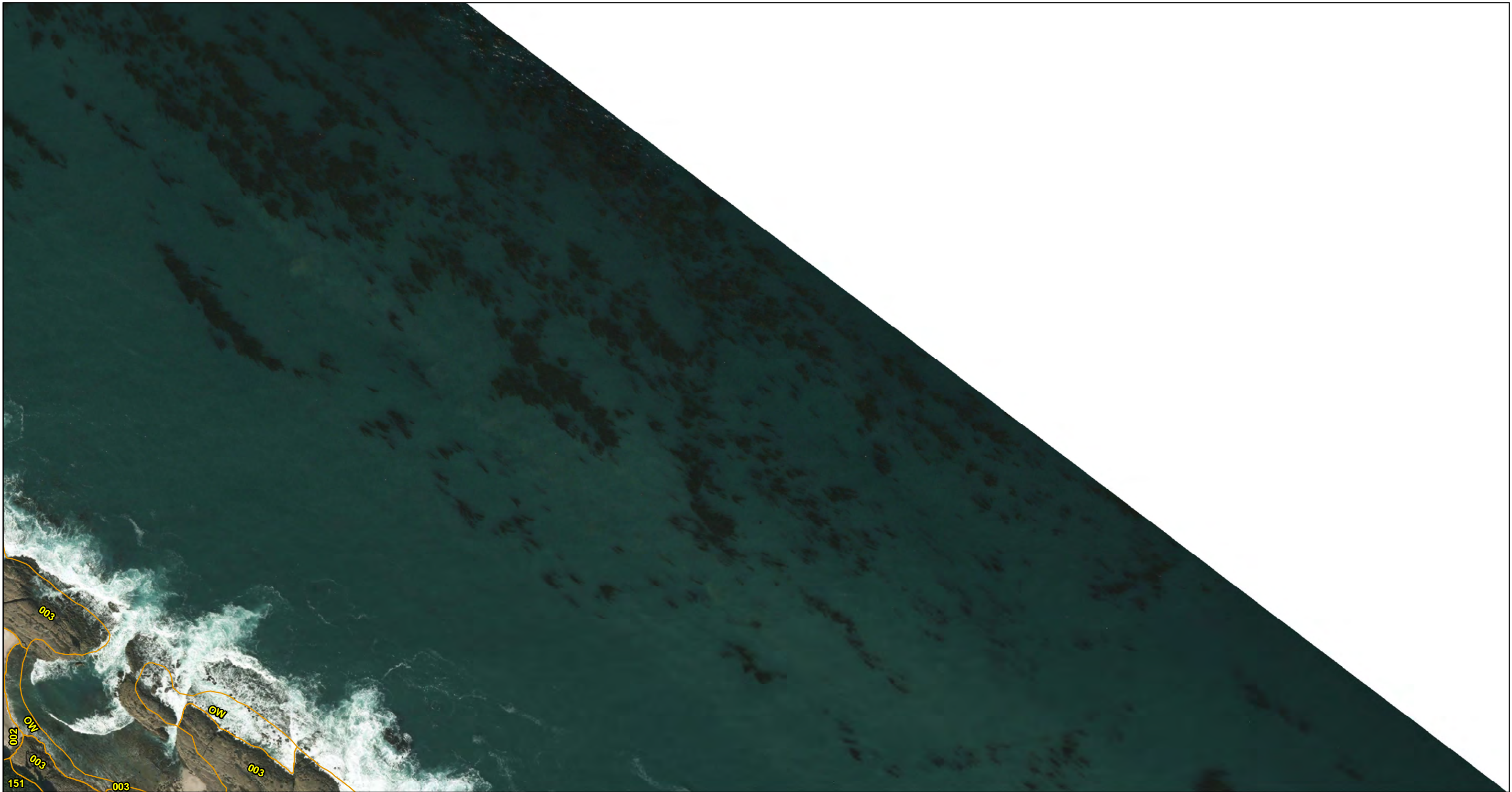
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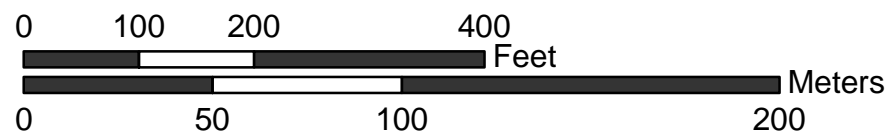
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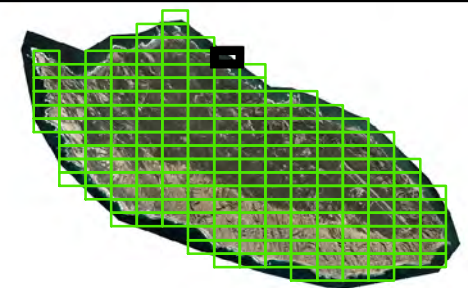
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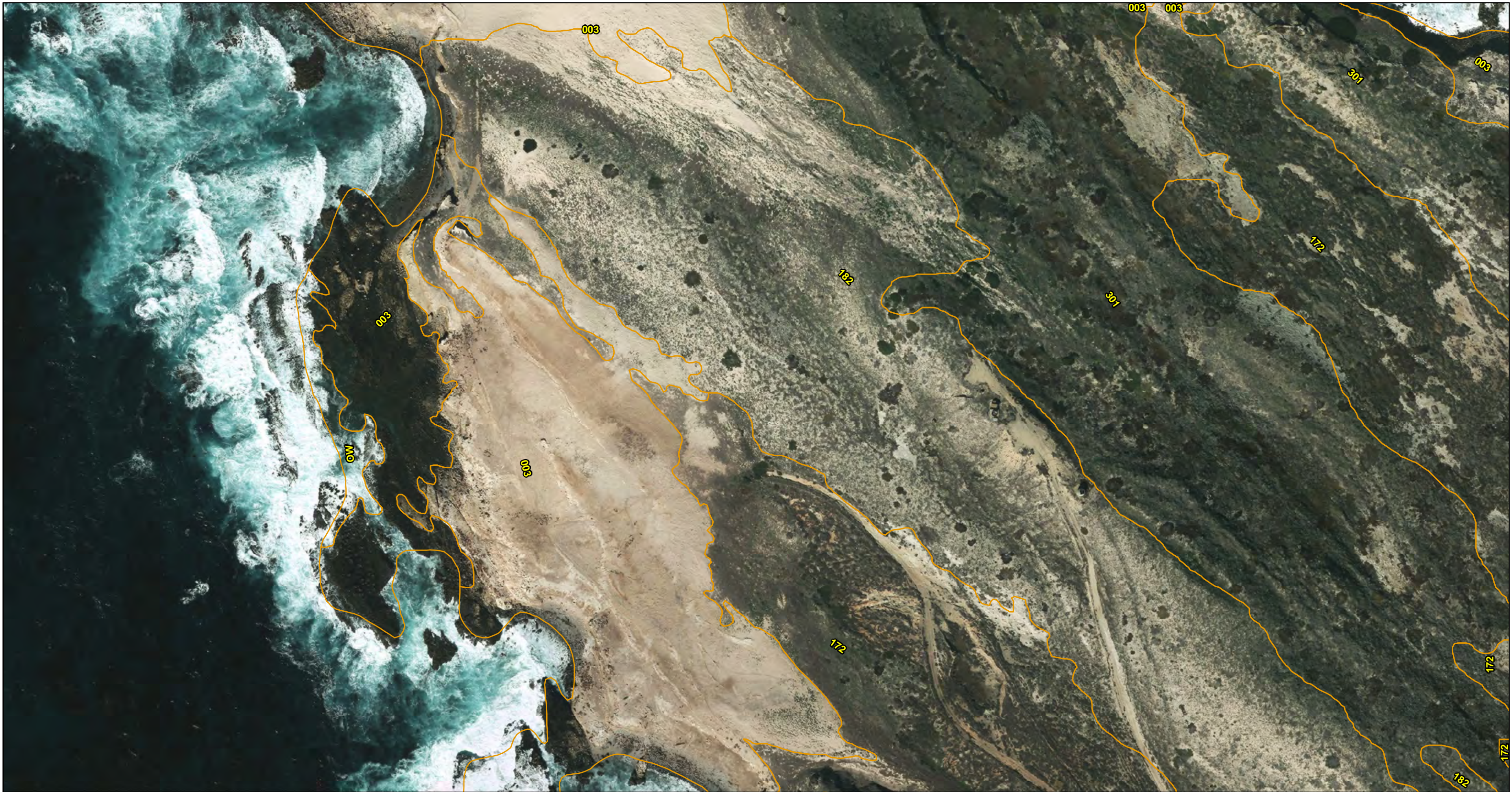
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

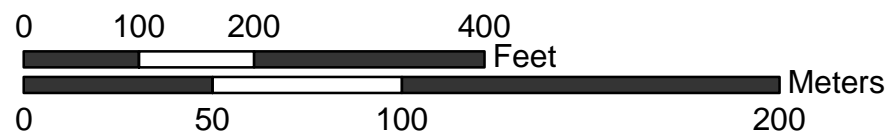
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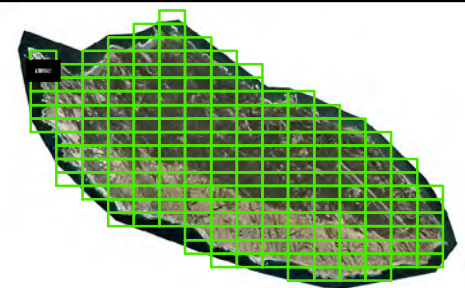
Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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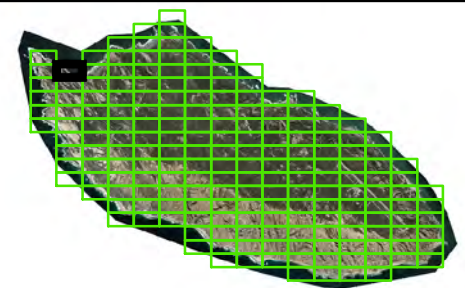
Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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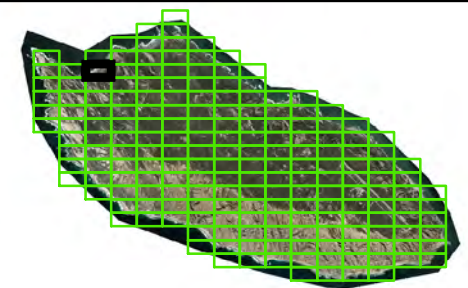
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Vegetation Classification

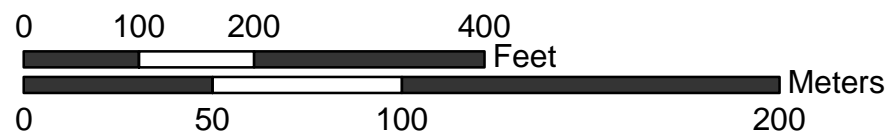
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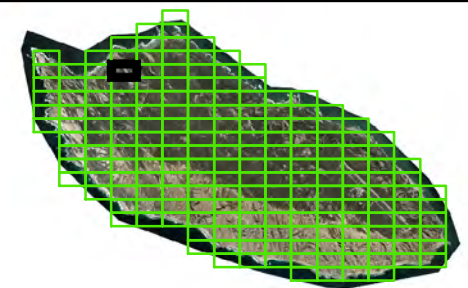
Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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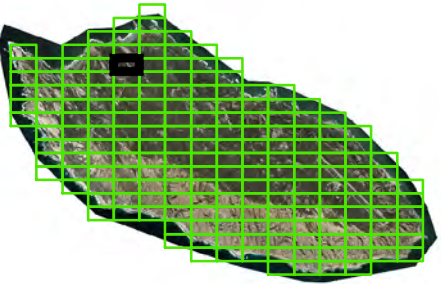
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Vegetation Classification

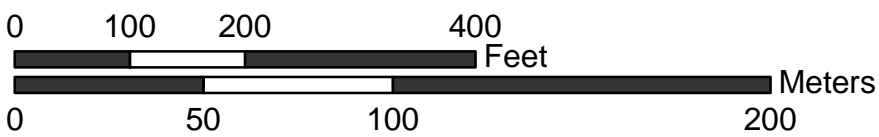
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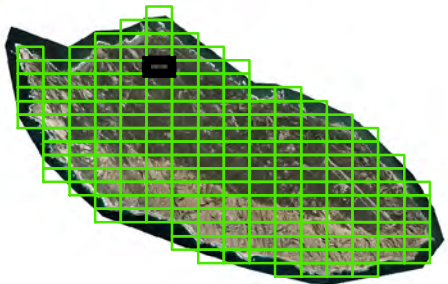
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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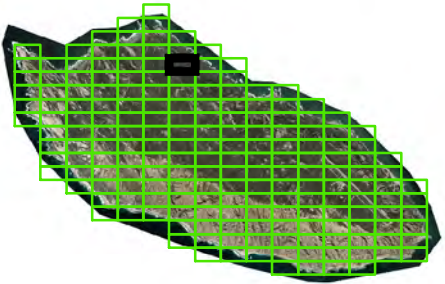
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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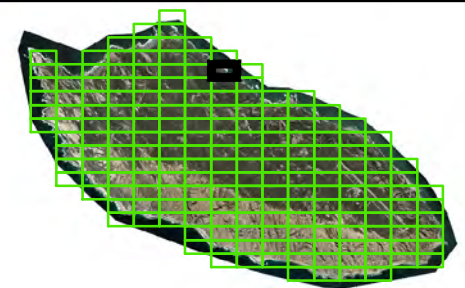
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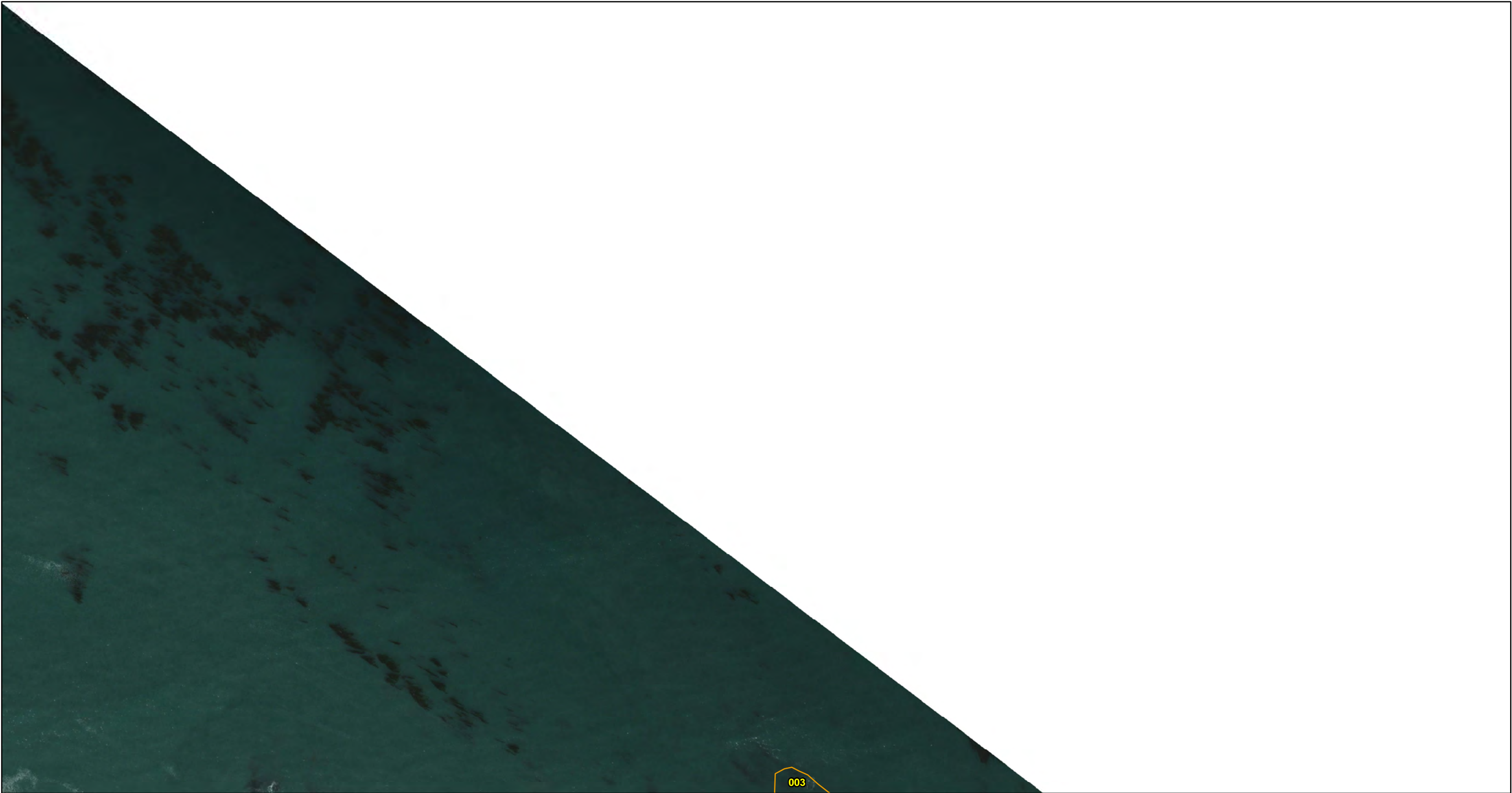
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Vegetation Classification

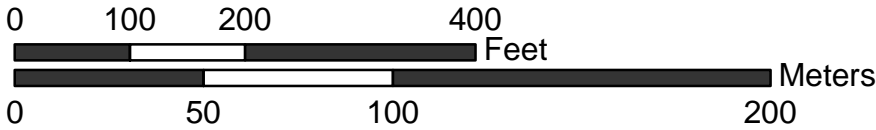
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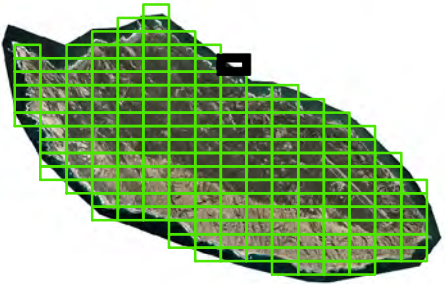
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NBVC San Nicolas Island  
Vegetation Classification

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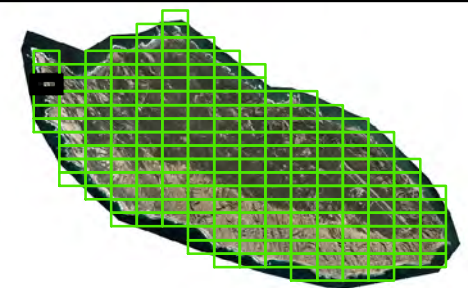
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Vegetation Classification

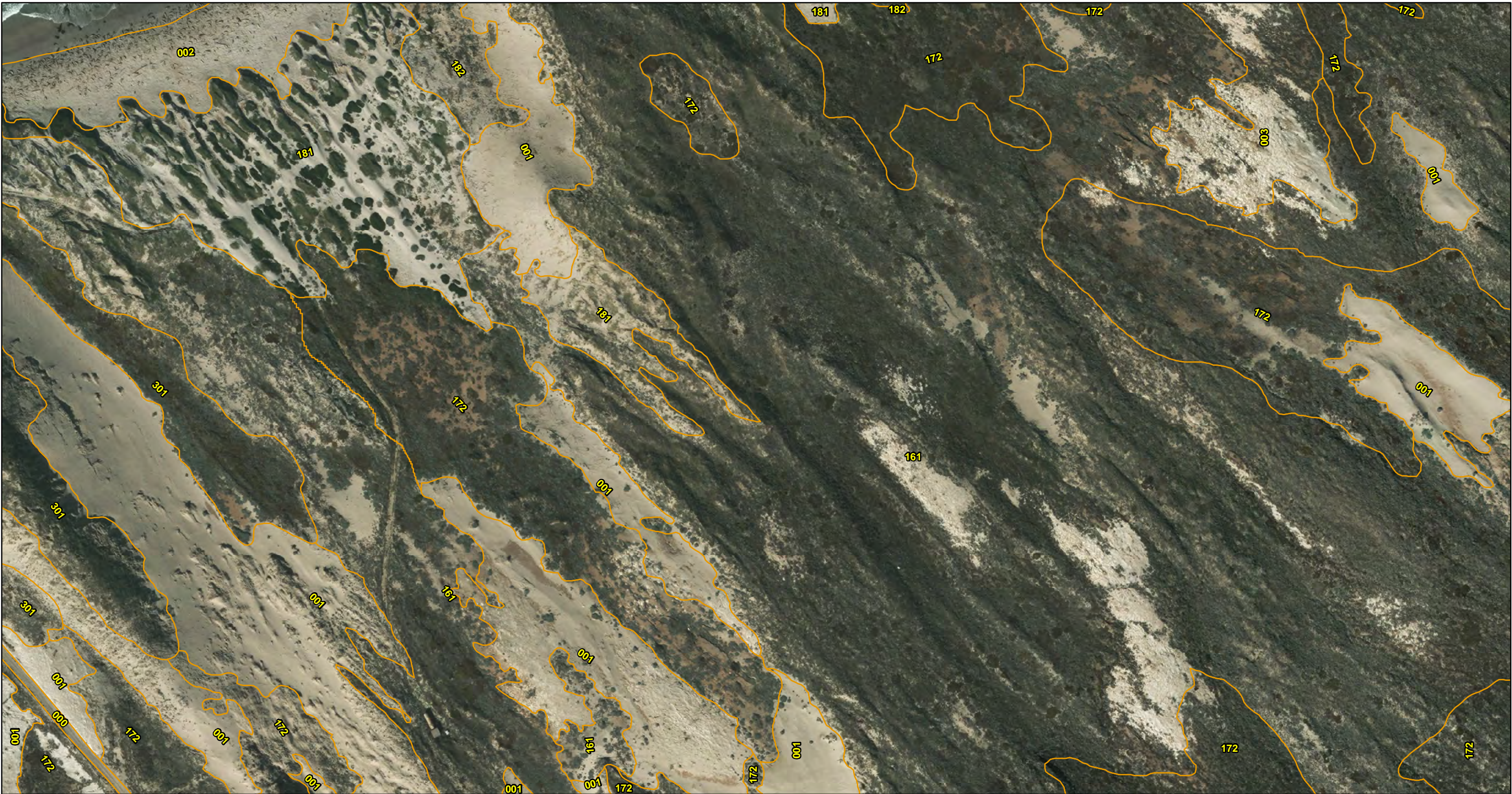
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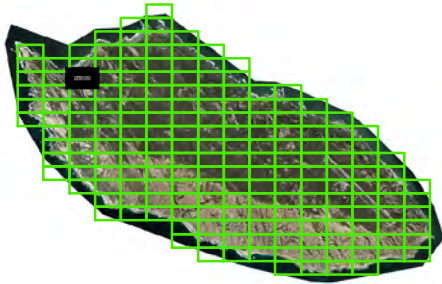
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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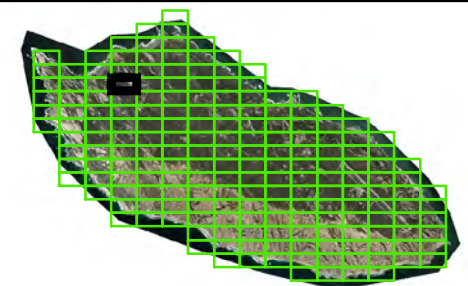
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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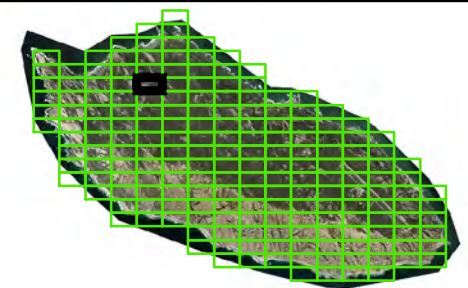
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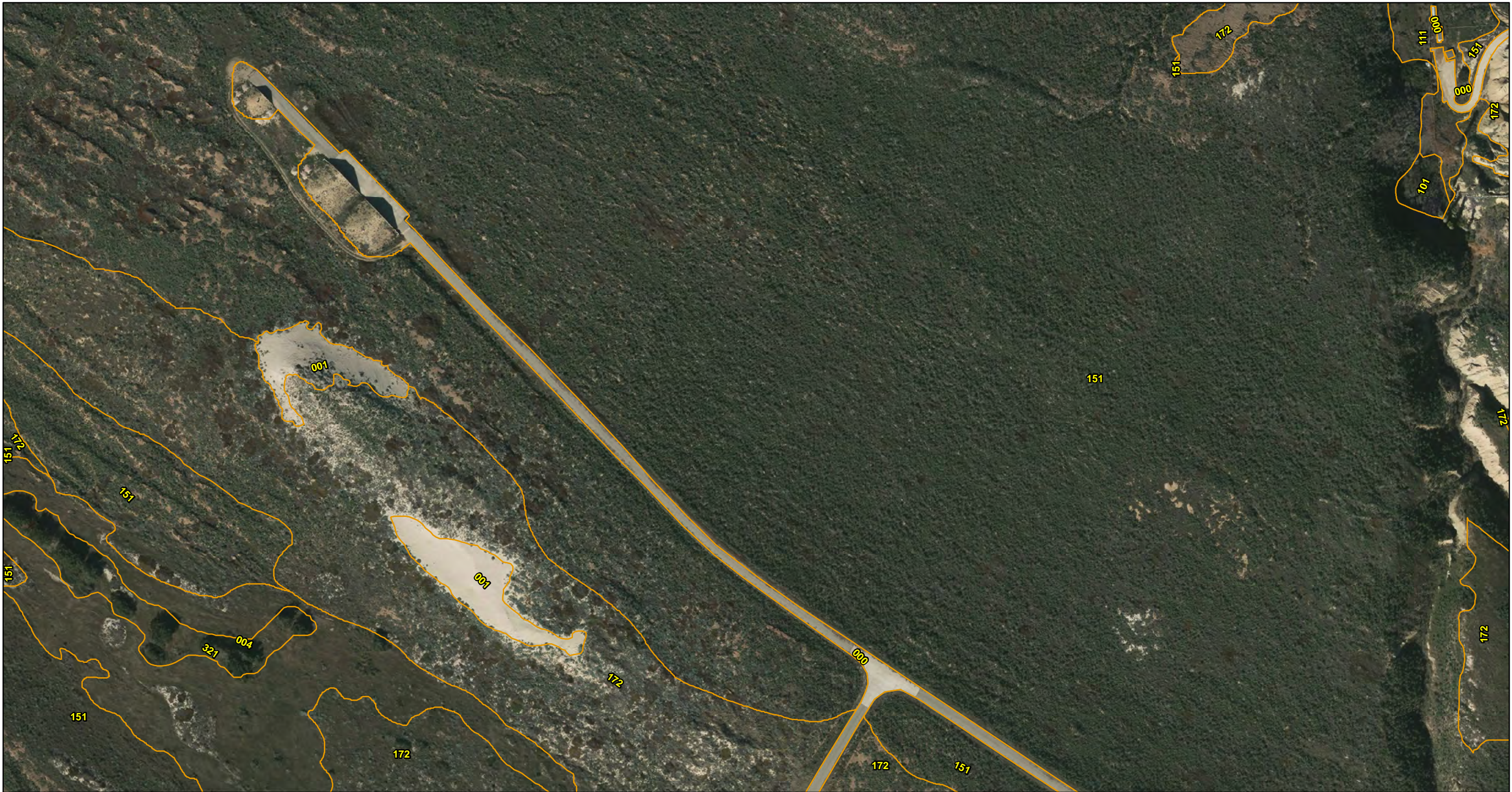
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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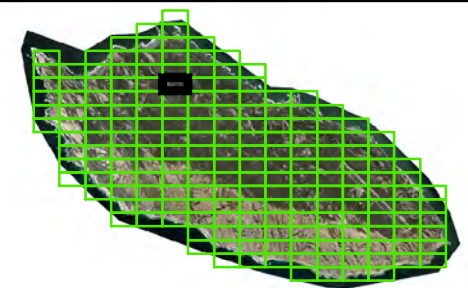
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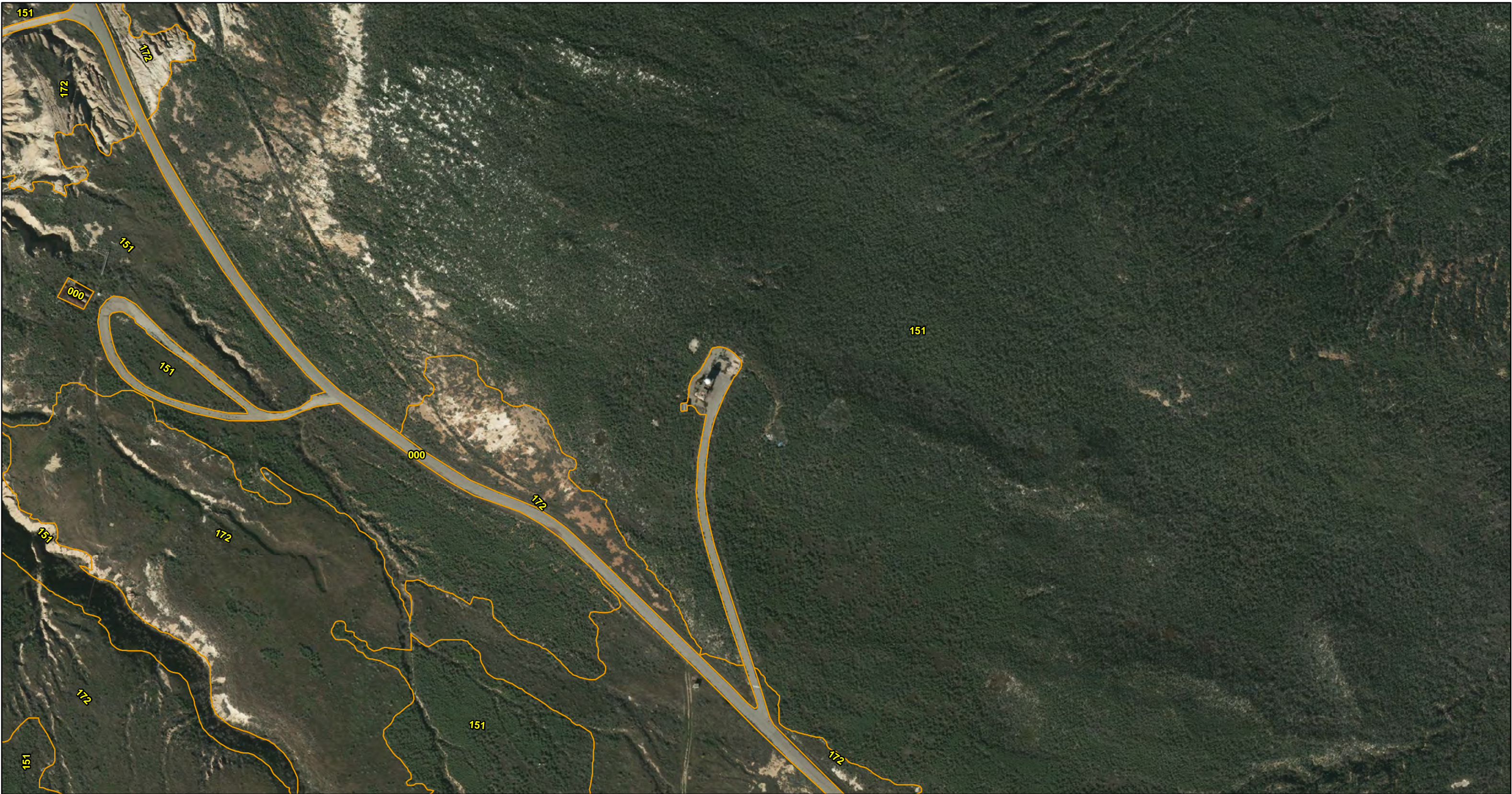
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Vegetation Classification

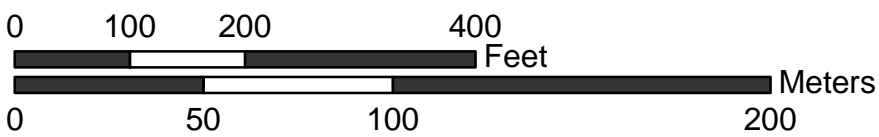
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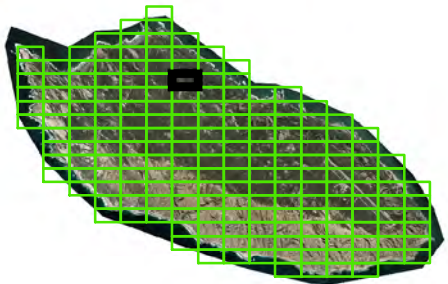
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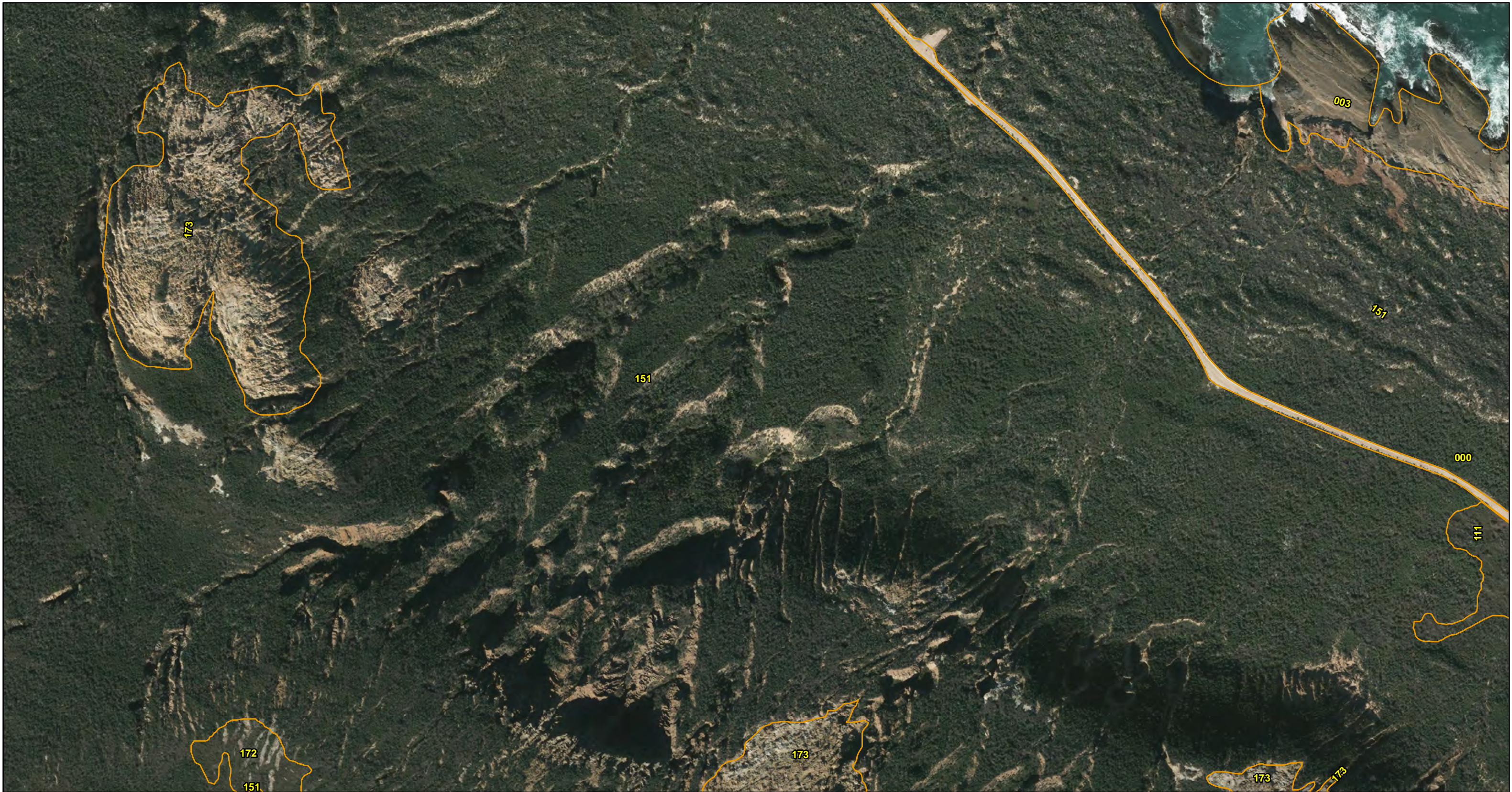
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NBVC San Nicolas Island  
Vegetation Classification

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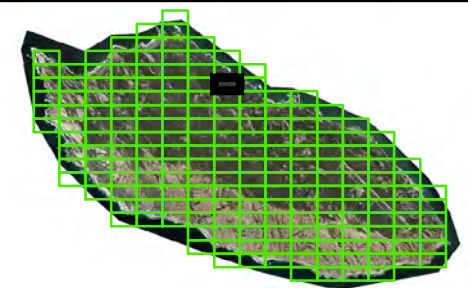
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NBVC San Nicolas Island  
Vegetation Classification

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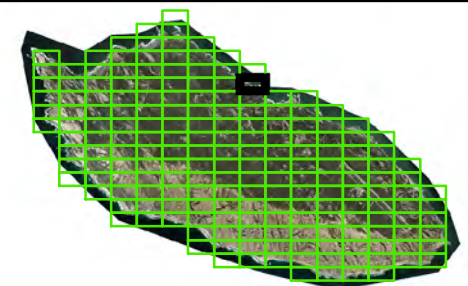
Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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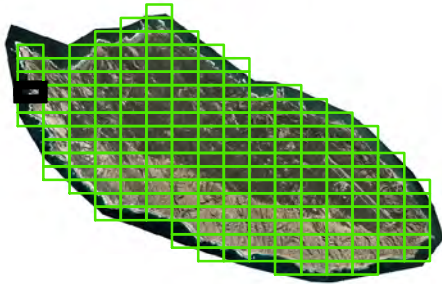
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Vegetation Classification

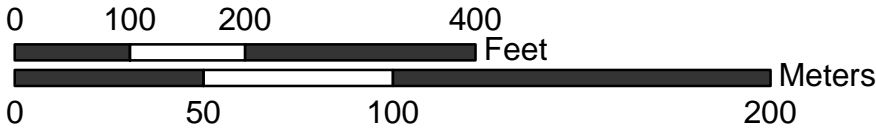
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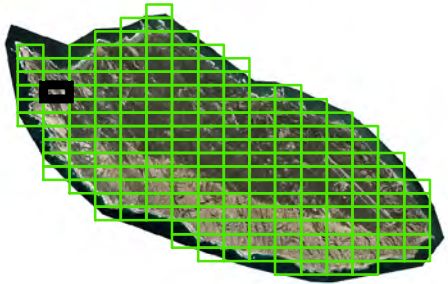
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Vegetation Classification

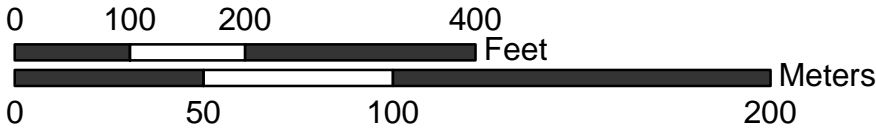
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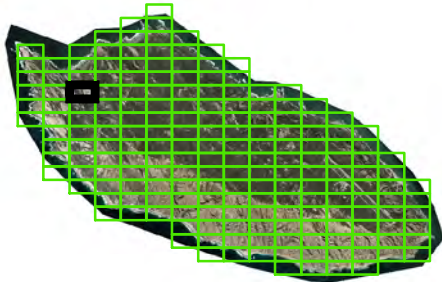
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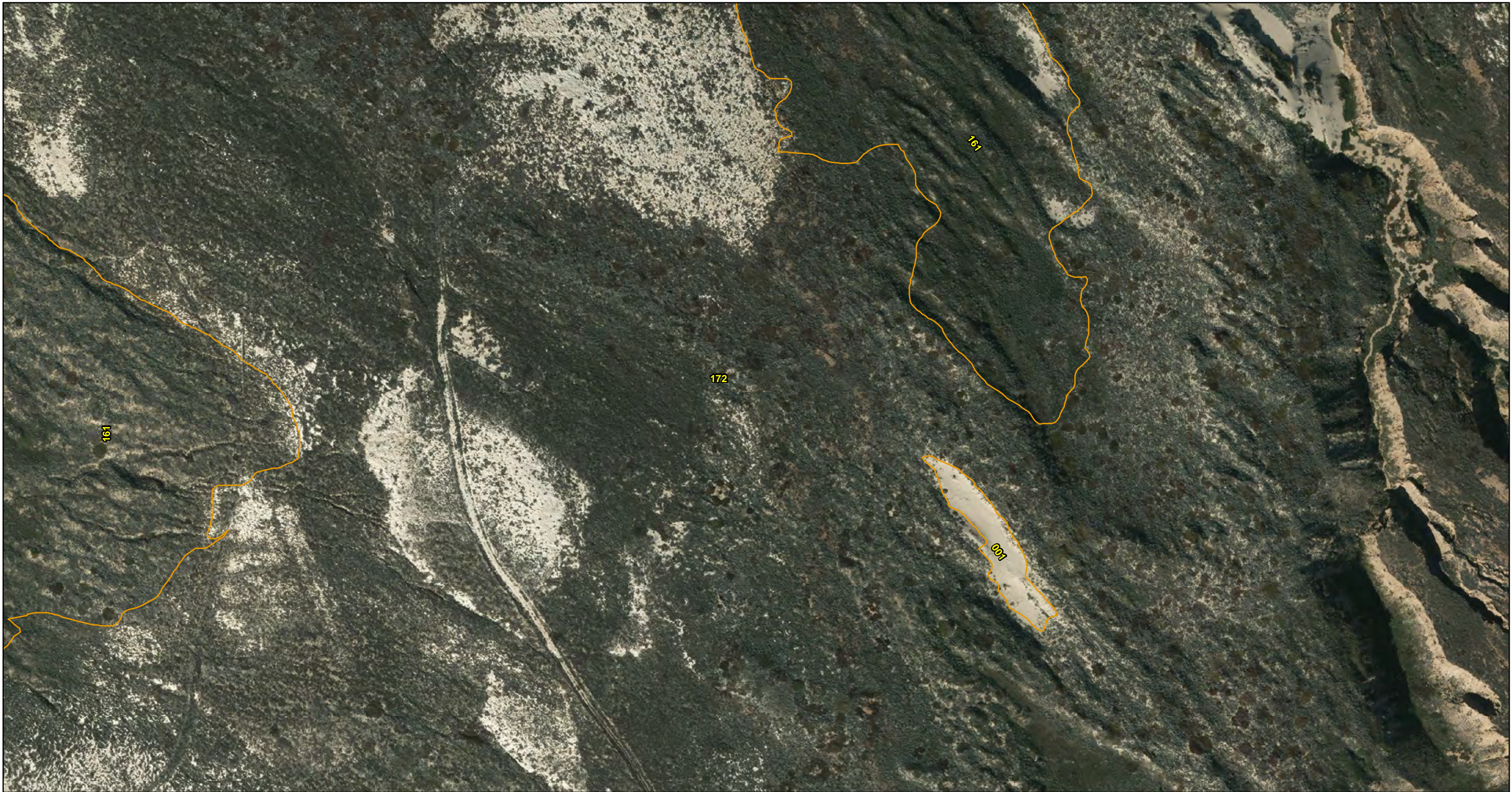
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NBVC San Nicolas Island  
Vegetation Classification

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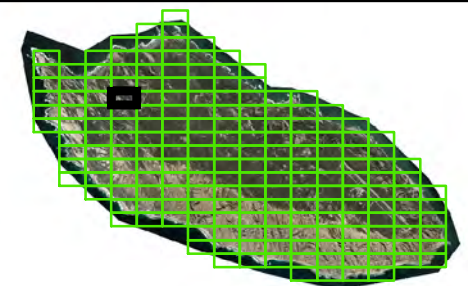
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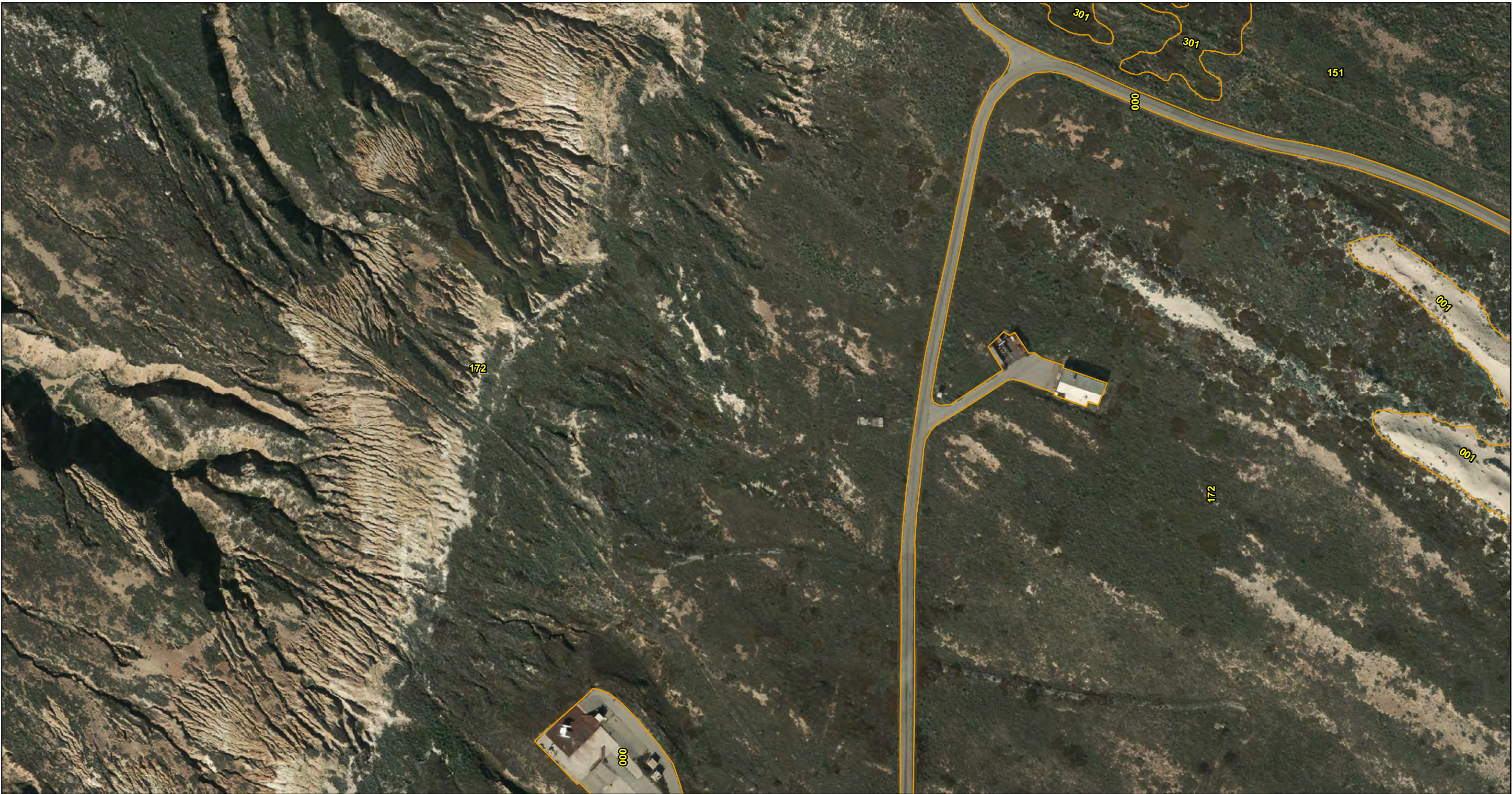
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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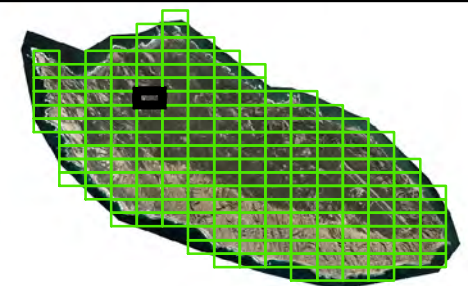
 Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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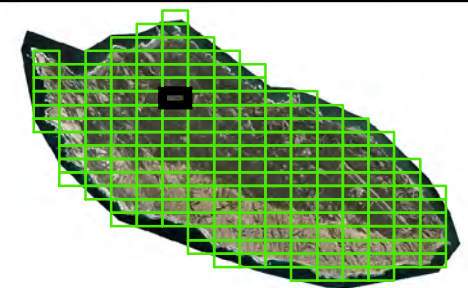
Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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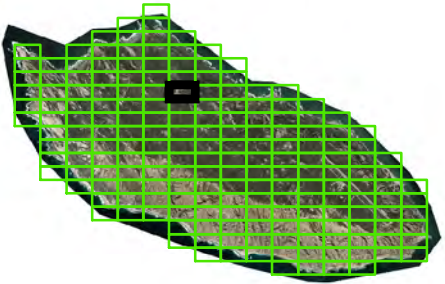
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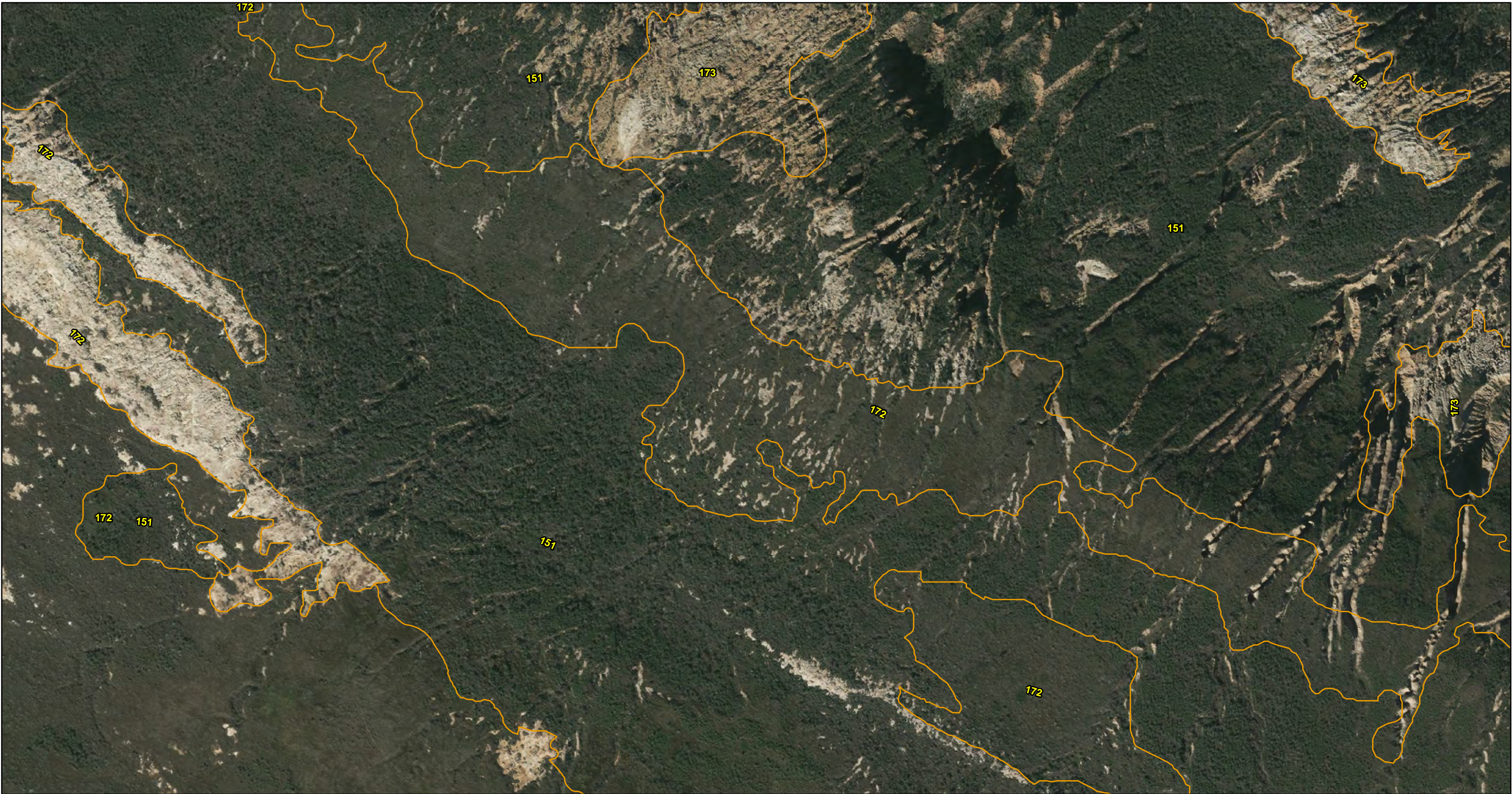
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NBVC San Nicolas Island  
Vegetation Classification

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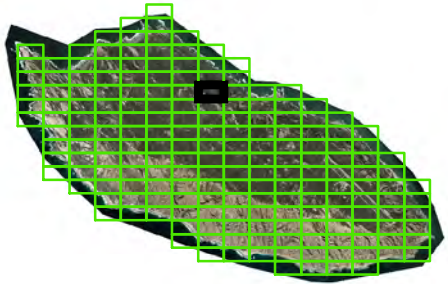
Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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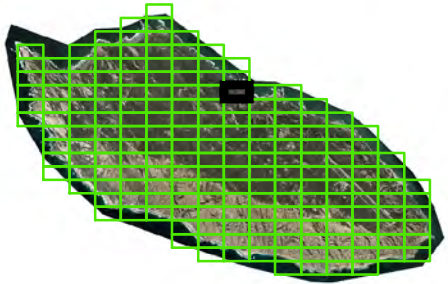
Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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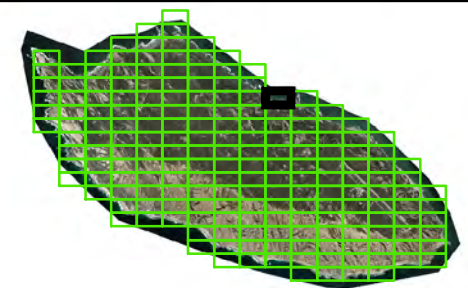
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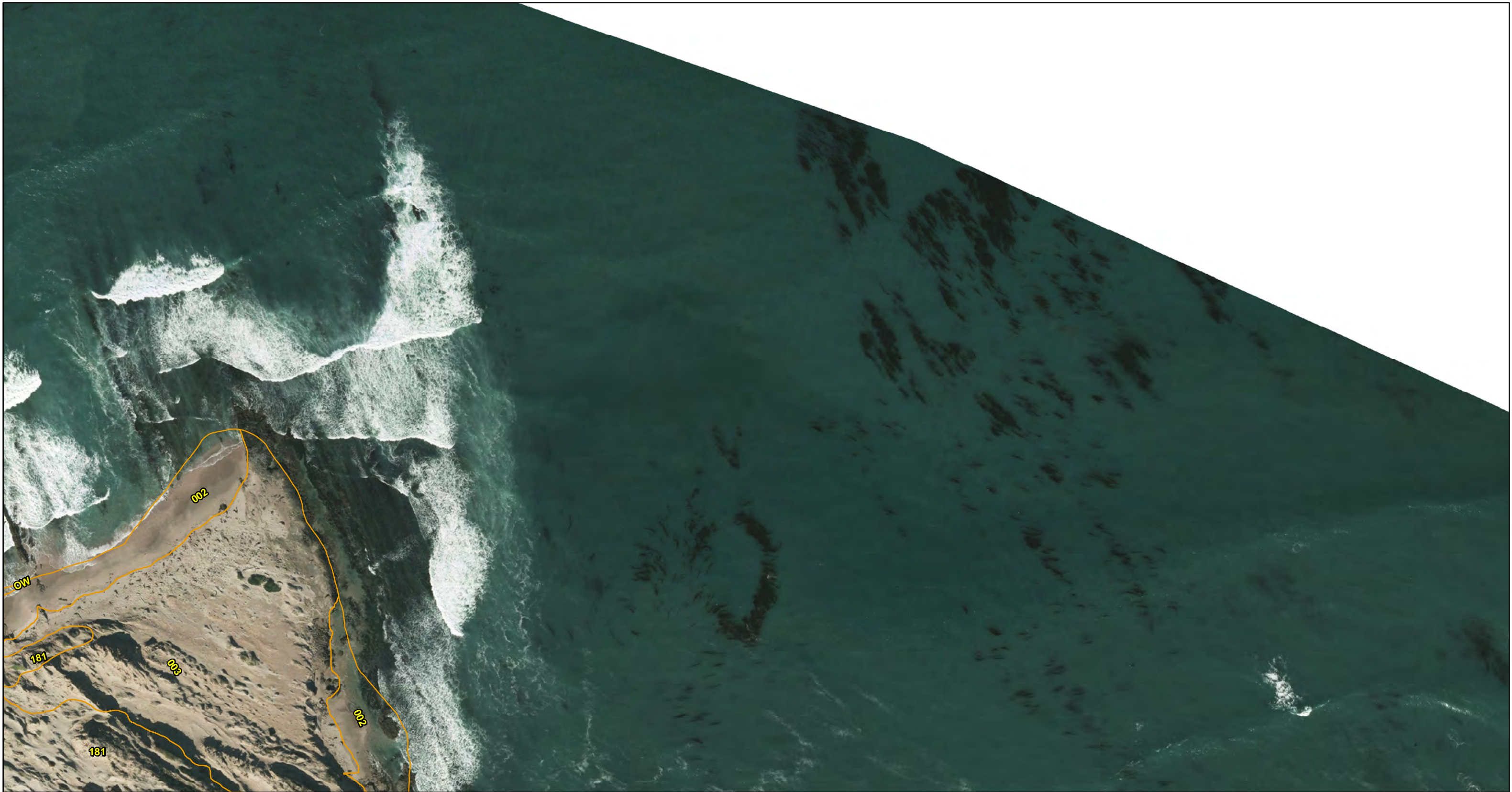
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NBVC San Nicolas Island  
Vegetation Classification

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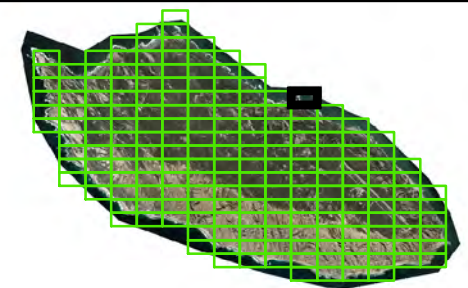
 Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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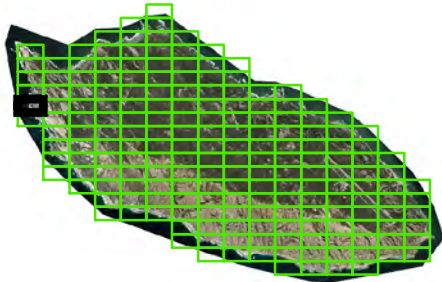
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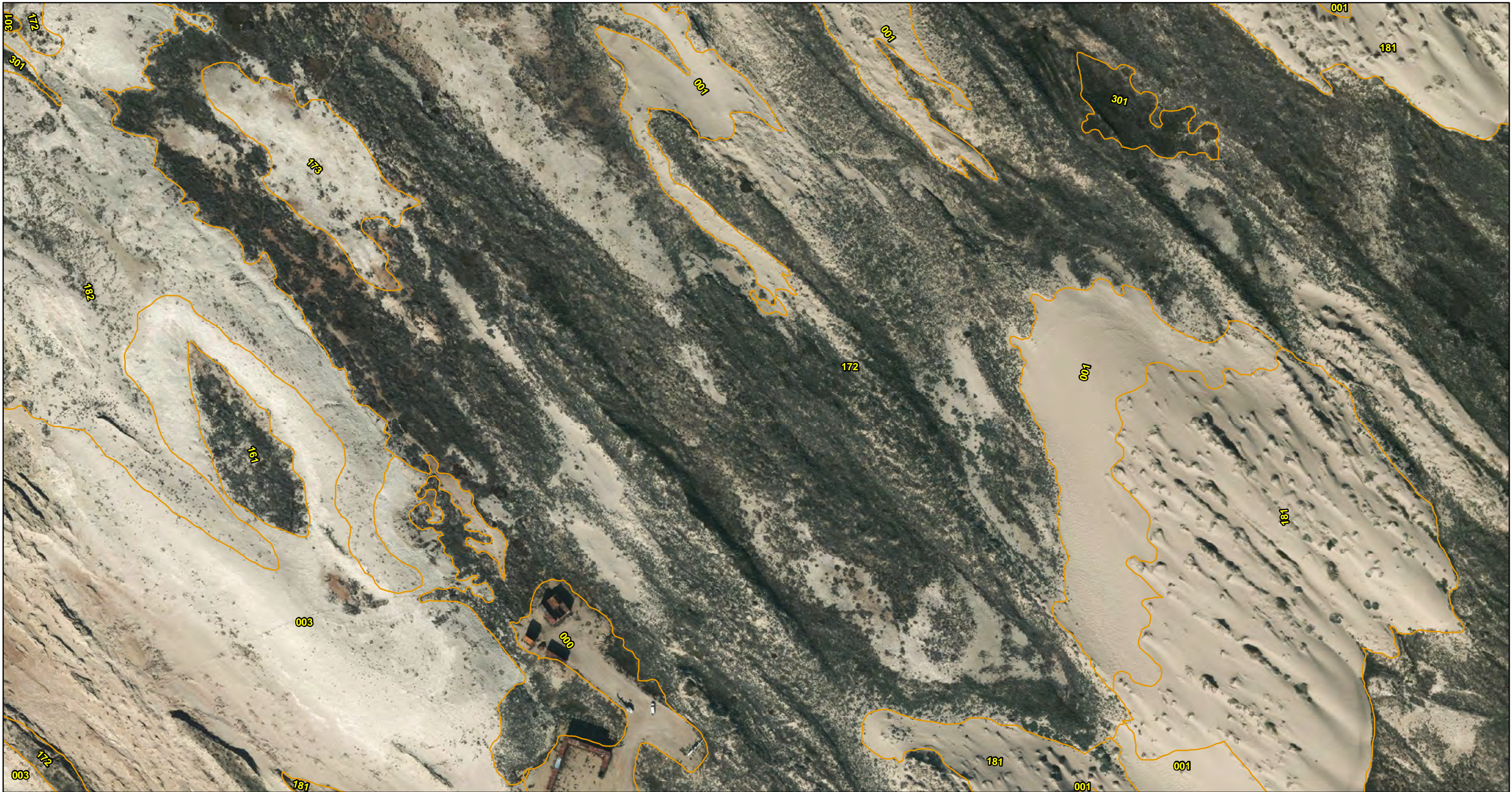
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Vegetation Classification

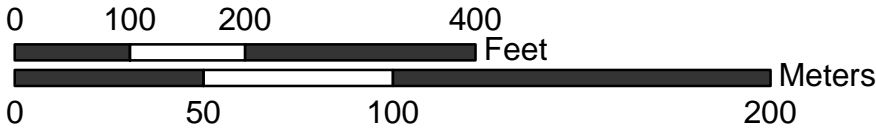
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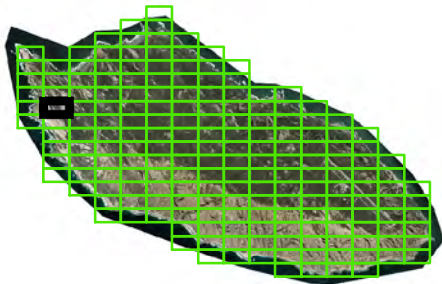
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Vegetation Classification

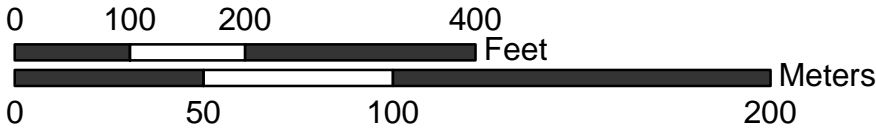
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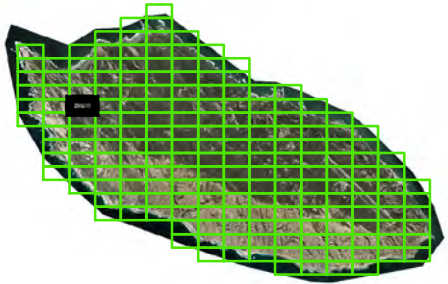
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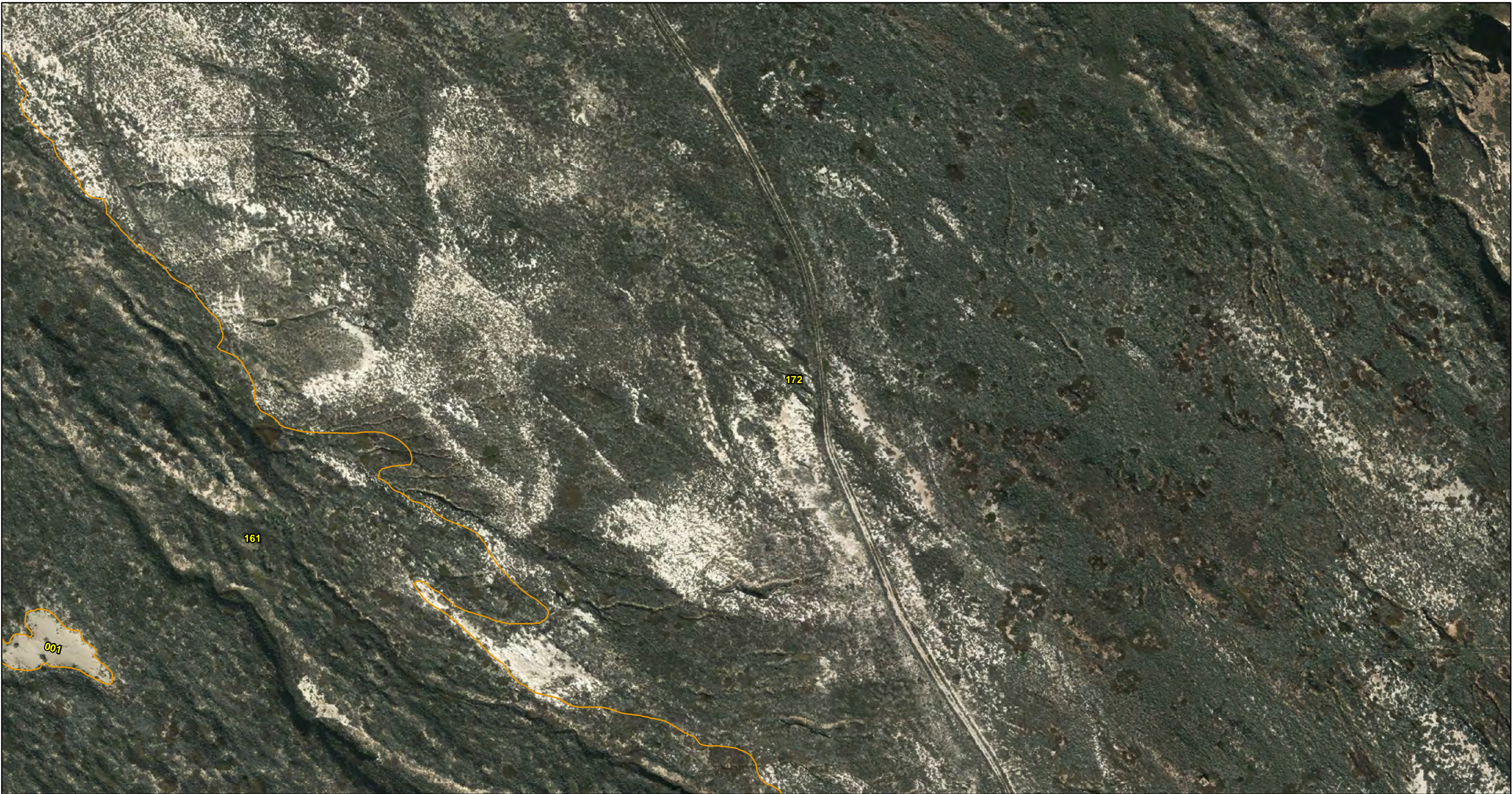
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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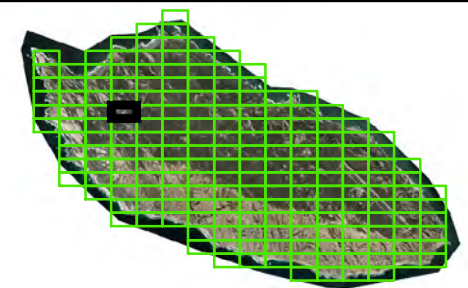
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Vegetation Classification

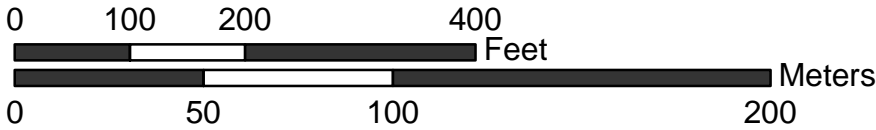
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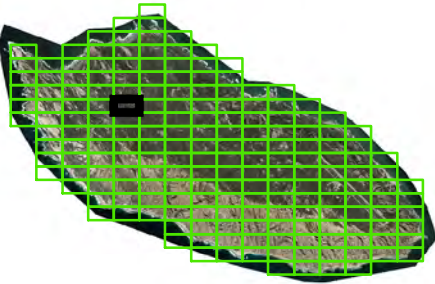
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Vegetation Classification

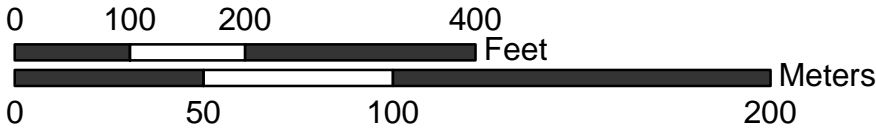
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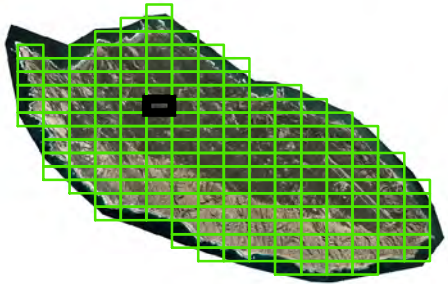
Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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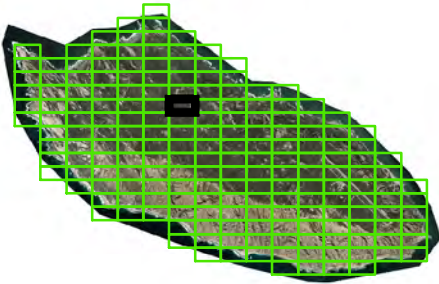
 Vegetation Classification Types



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Vegetation Classification

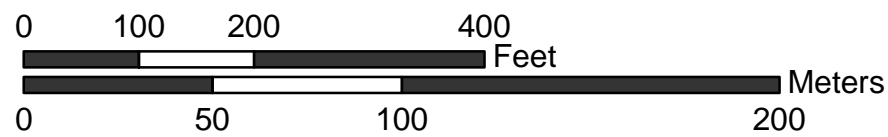
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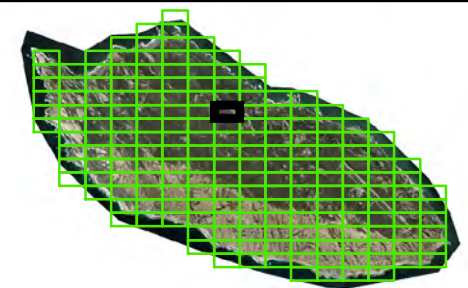
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Vegetation Classification

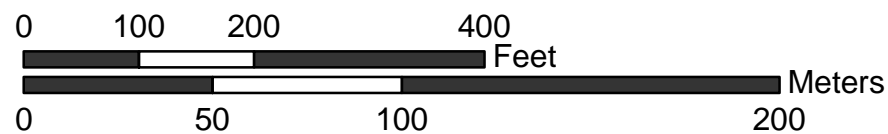
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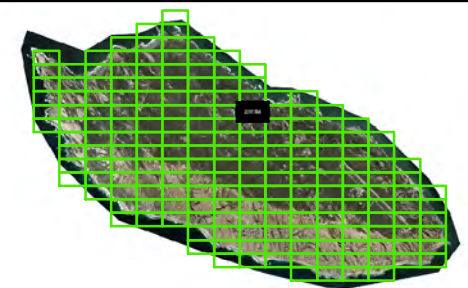
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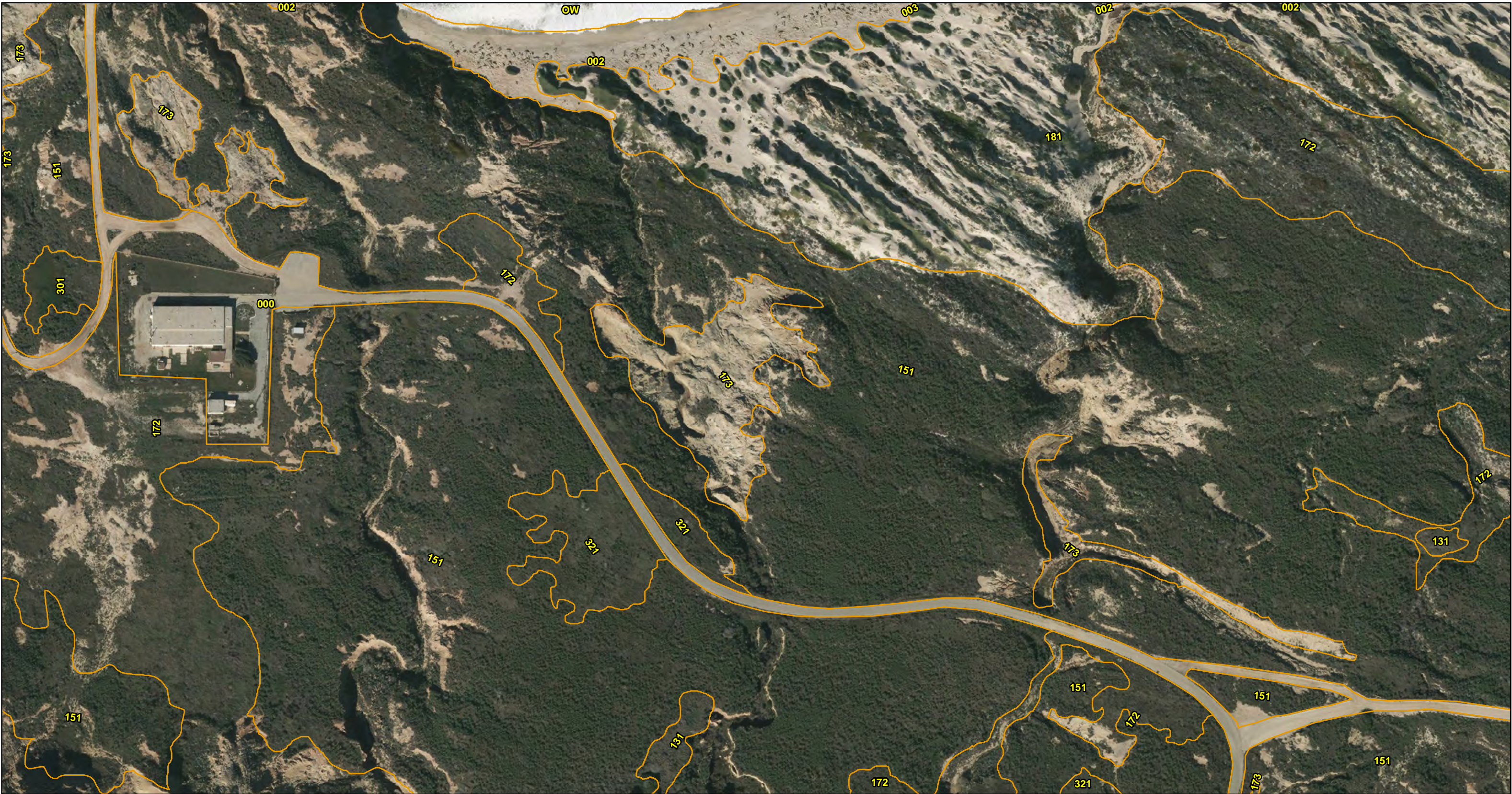
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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Vegetation Classification Types



Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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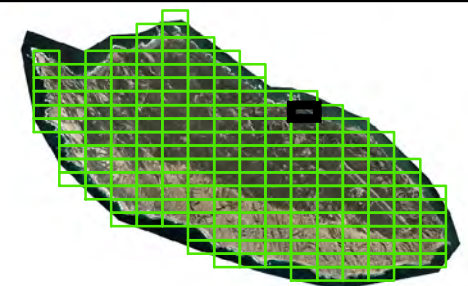
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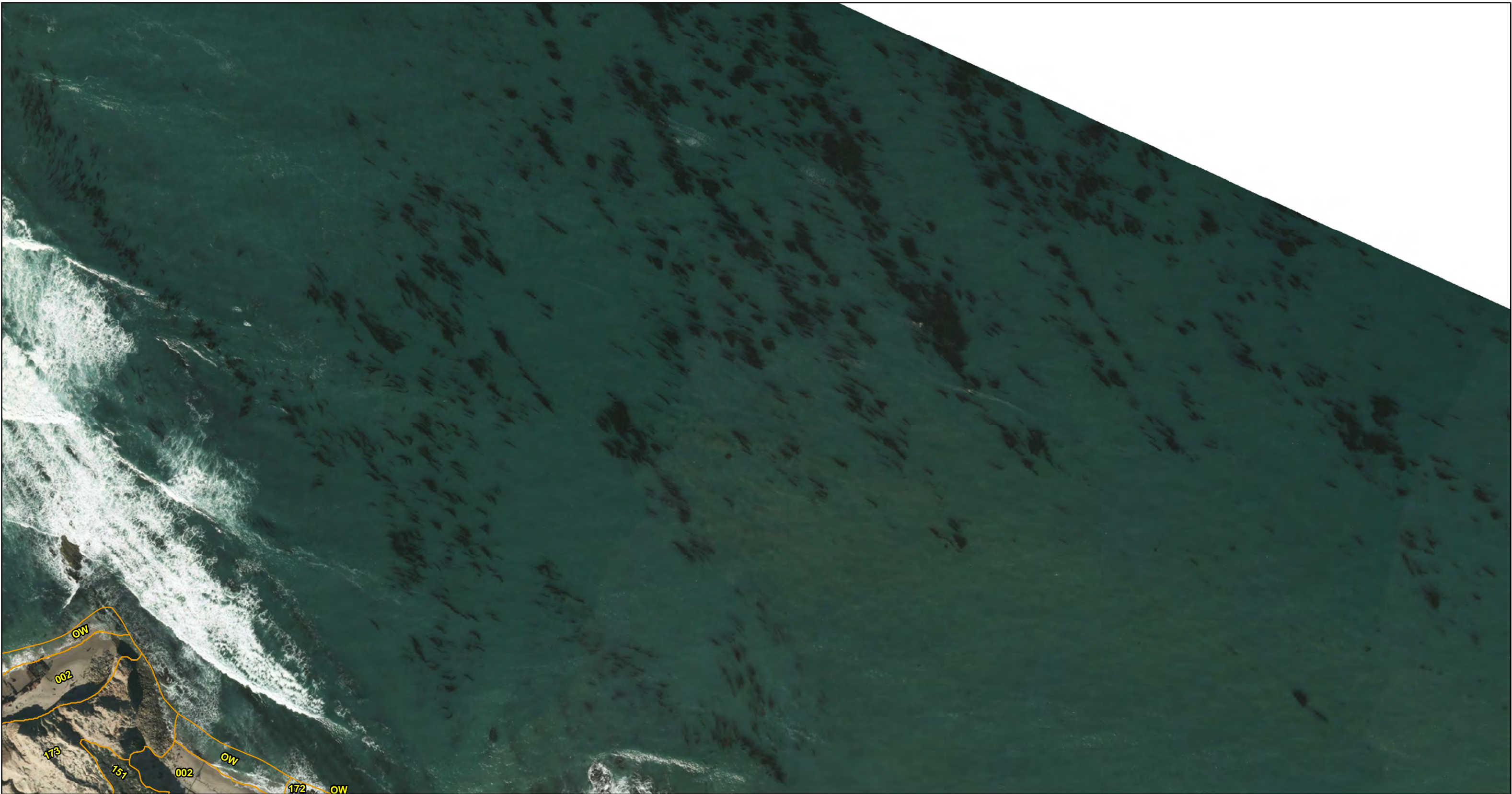
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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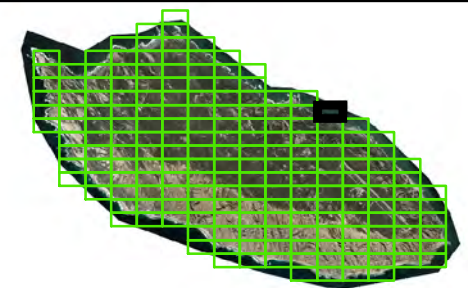
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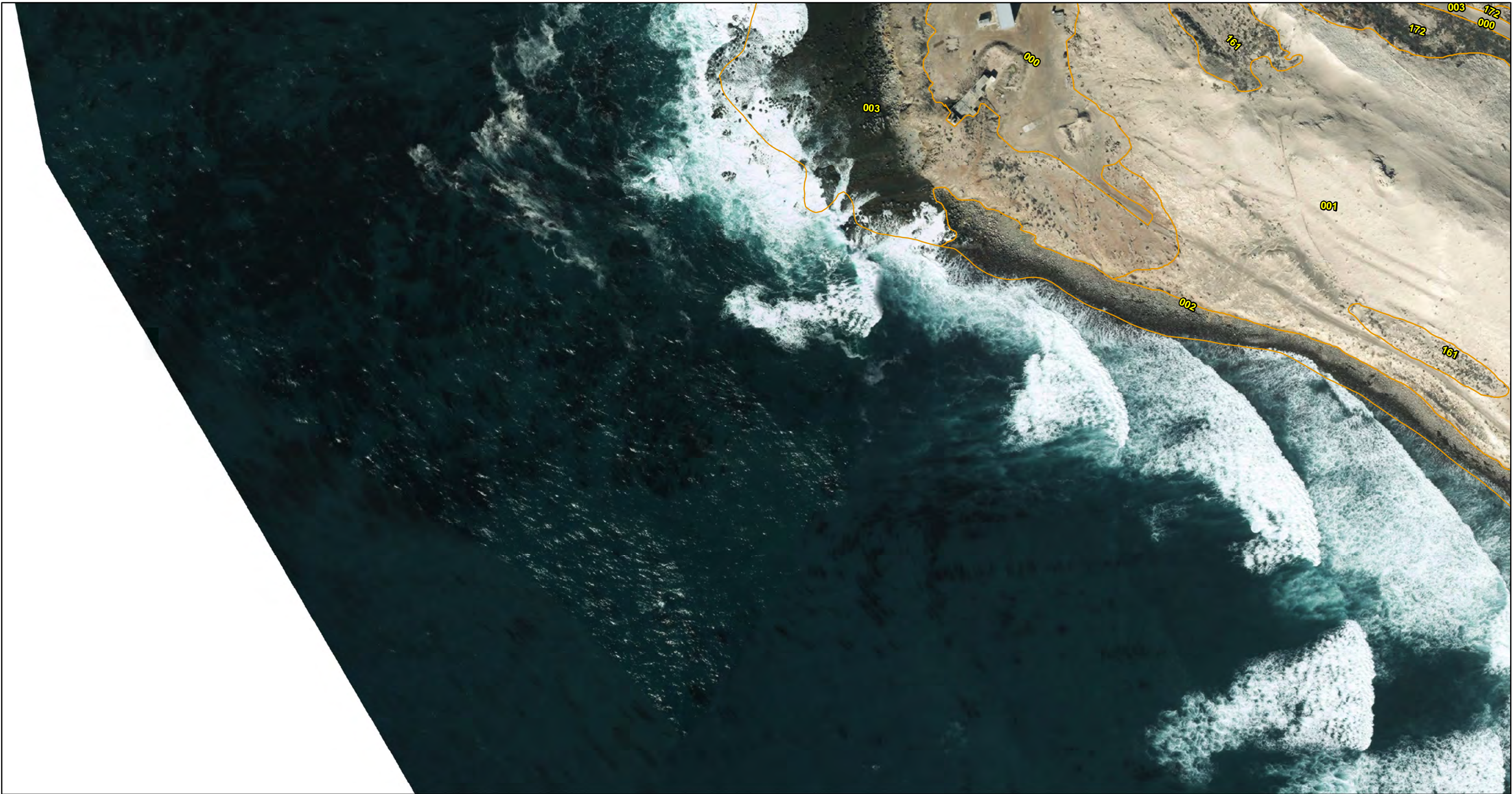
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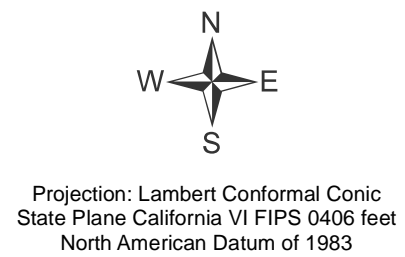
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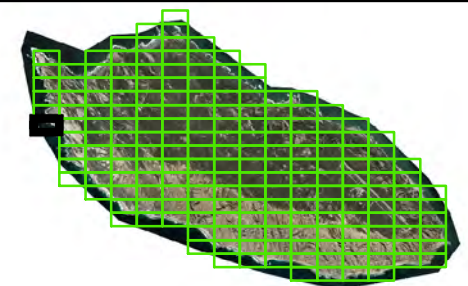


 Vegetation Classification Types



NBVC San Nicolas Island  
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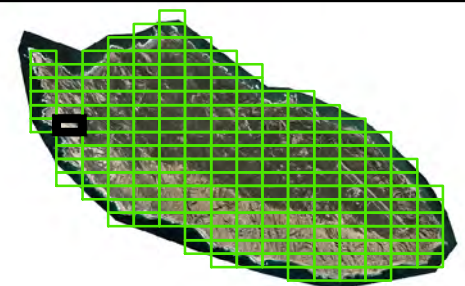
Vegetation Classification Types



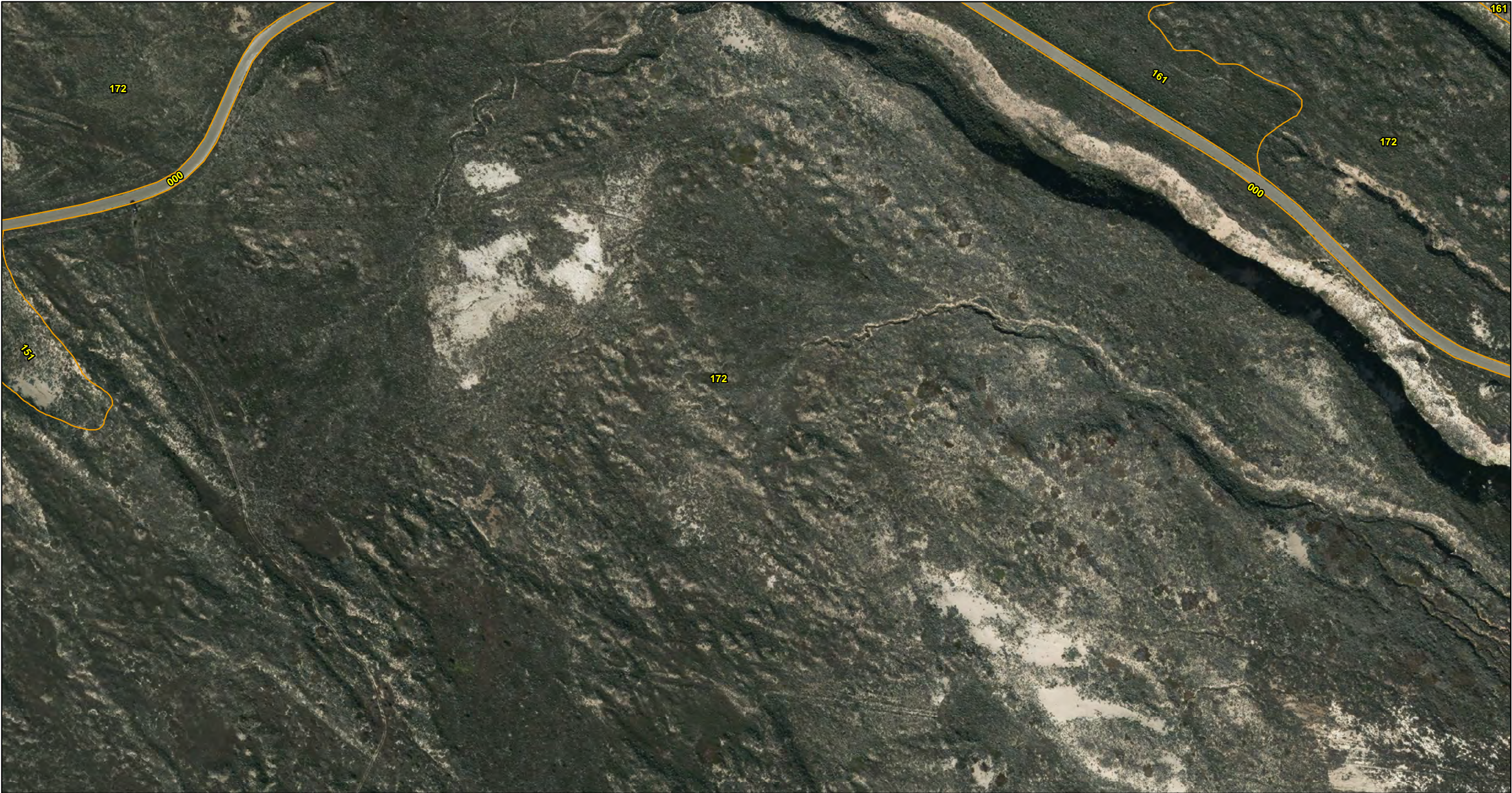
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State Plane California VI FIPS 0406 feet  
North American Datum of 1983

NBVC San Nicolas Island  
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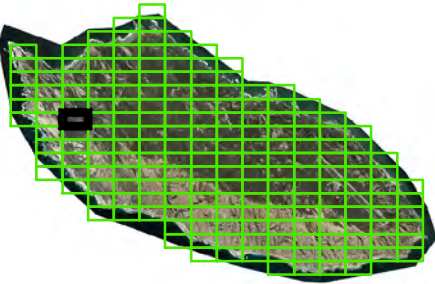
 Vegetation Classification Types



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North American Datum of 1983

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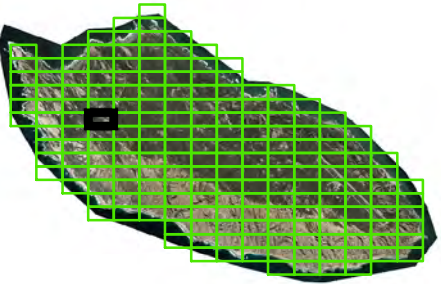
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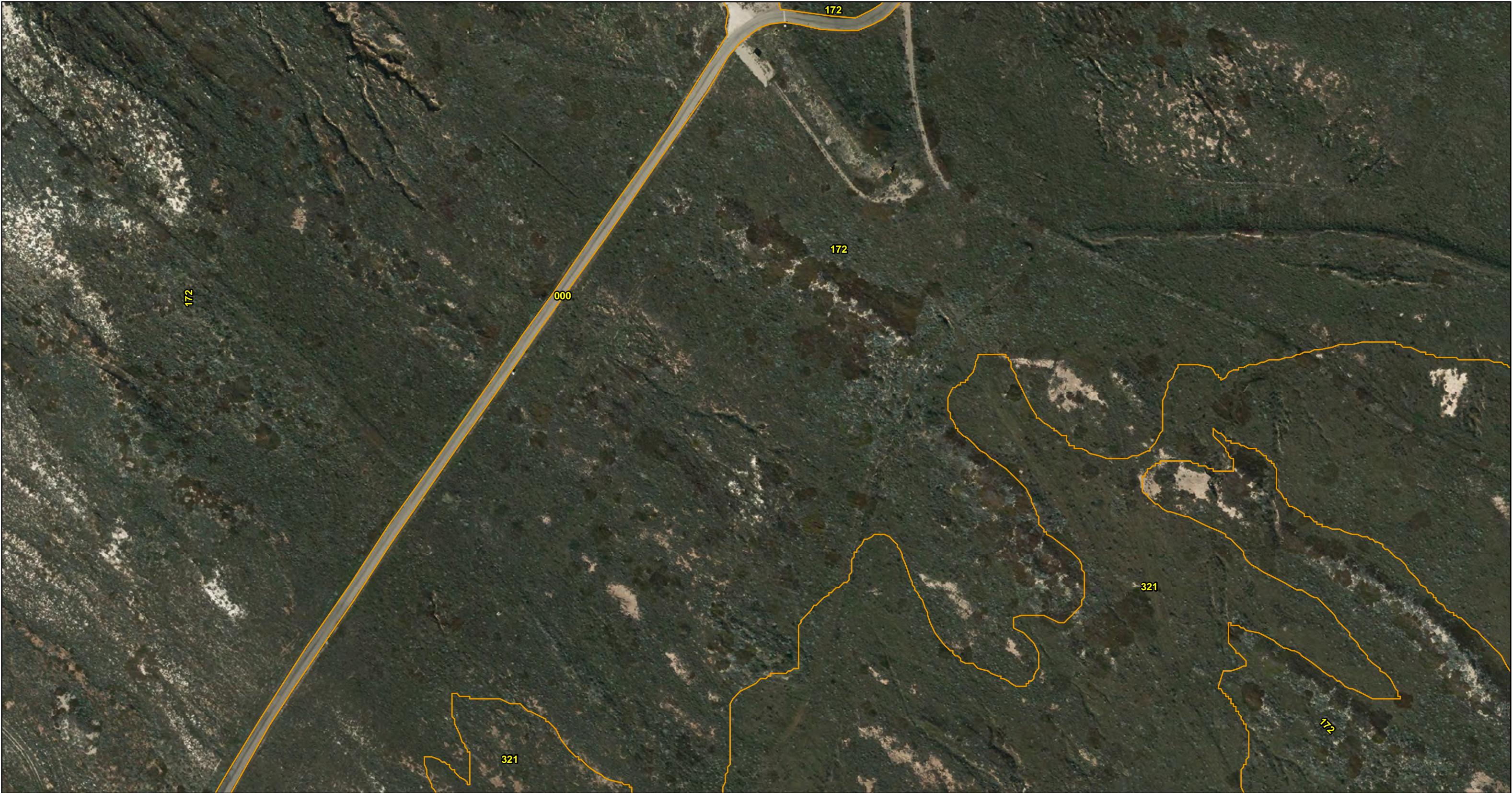
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NBVC San Nicolas Island  
Vegetation Classification

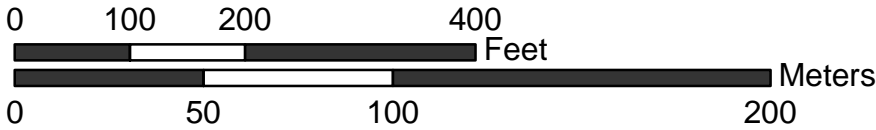
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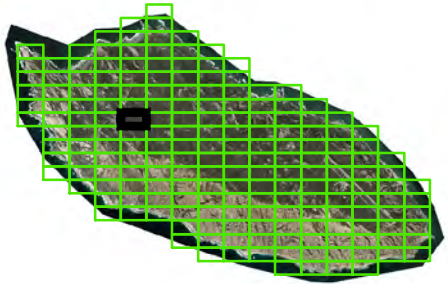
 Vegetation Classification Types



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North American Datum of 1983

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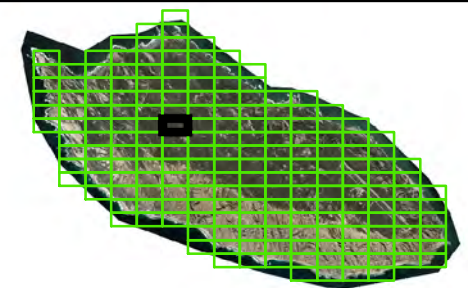
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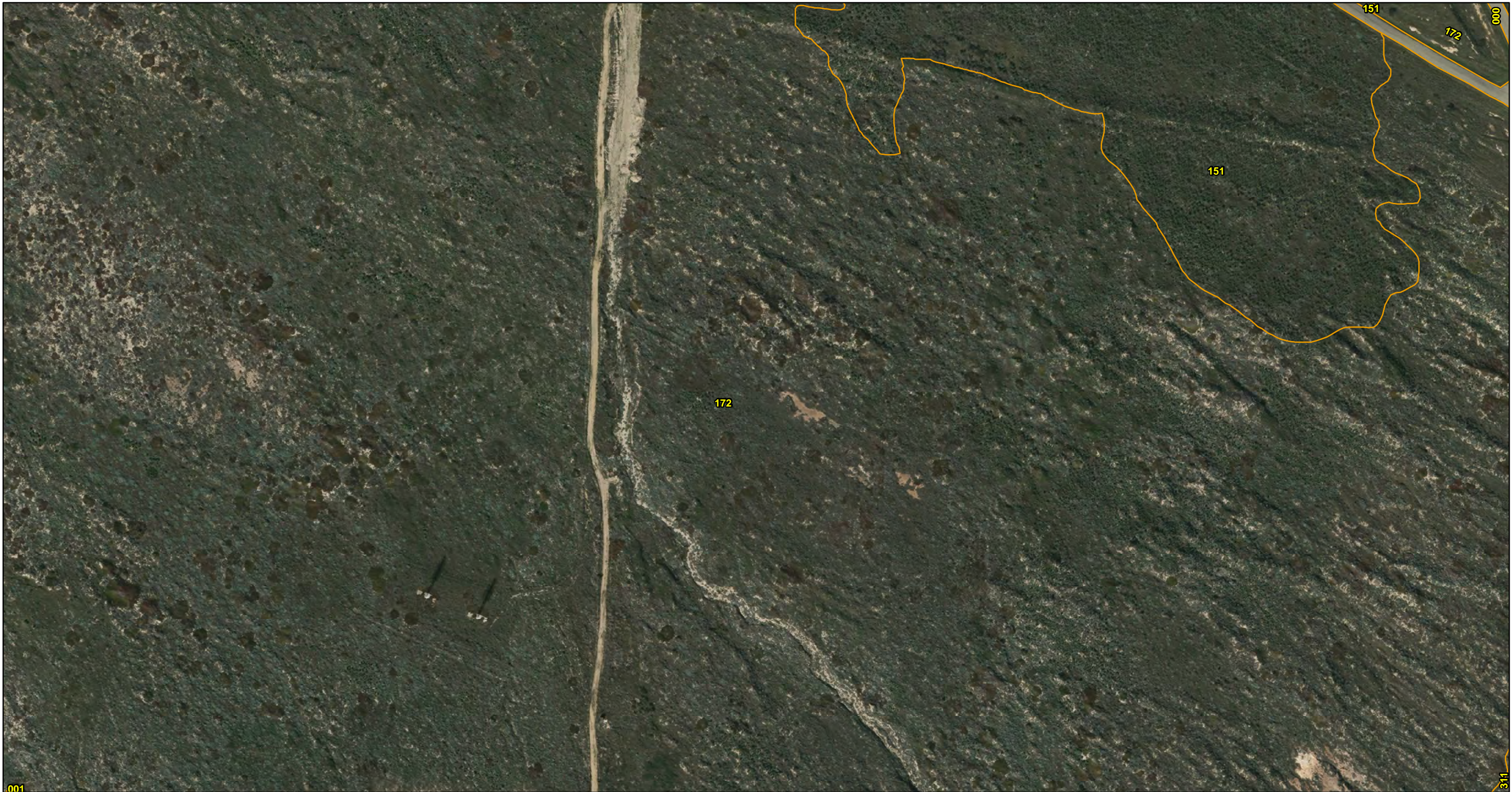
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North American Datum of 1983

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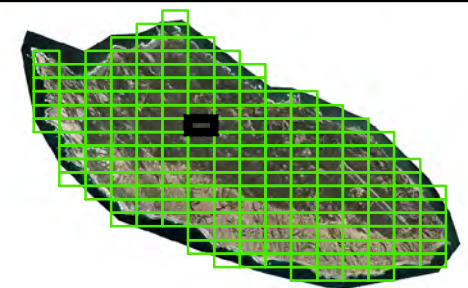
 Vegetation Classification Types



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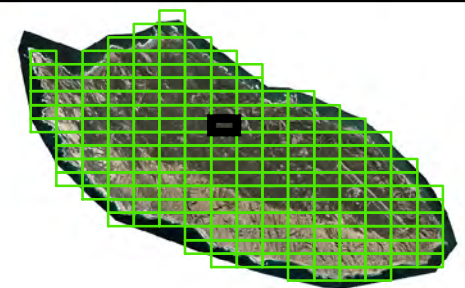
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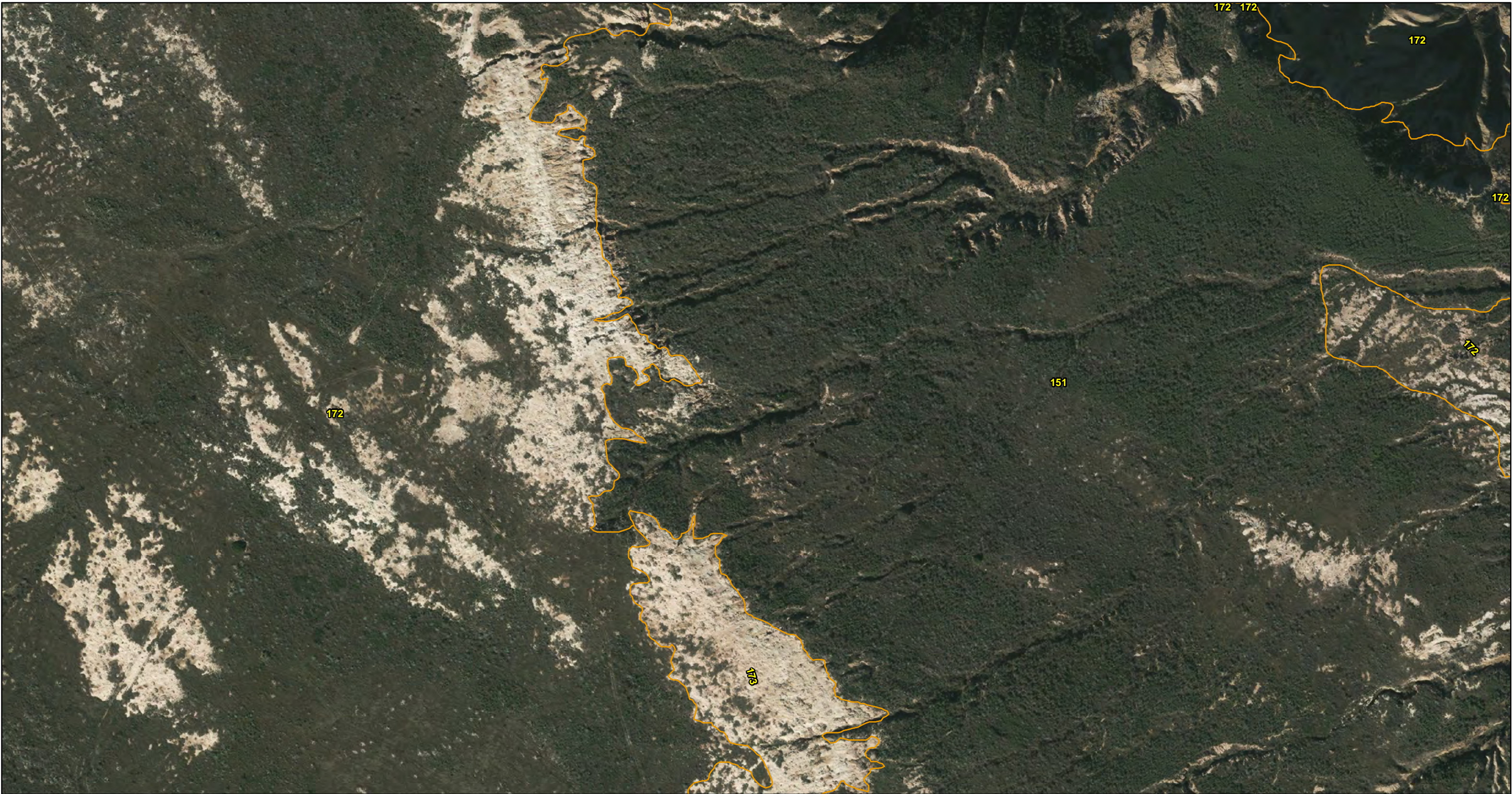
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North American Datum of 1983

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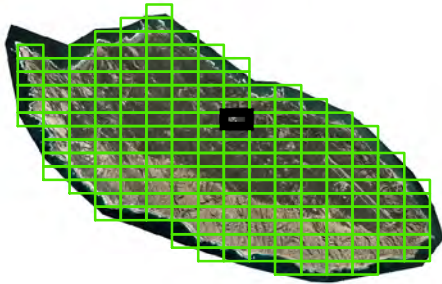
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North American Datum of 1983

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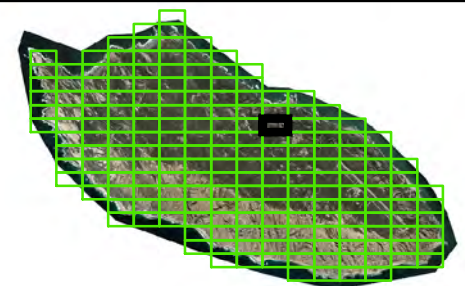
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NBVC San Nicolas Island  
Vegetation Classification

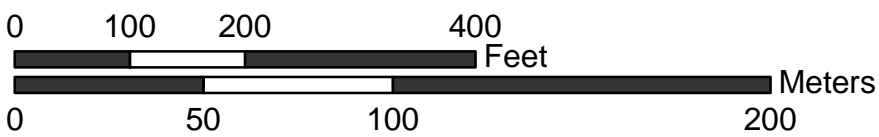
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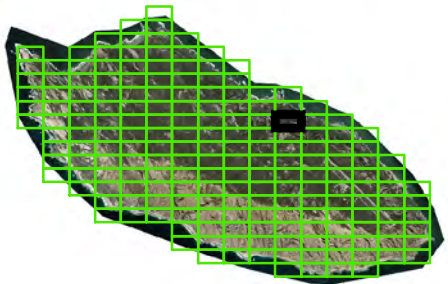
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North American Datum of 1983

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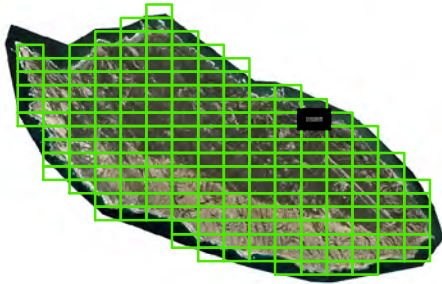
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North American Datum of 1983

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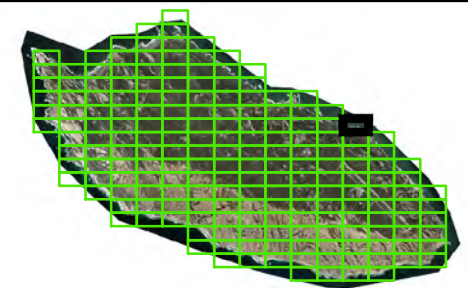
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North American Datum of 1983

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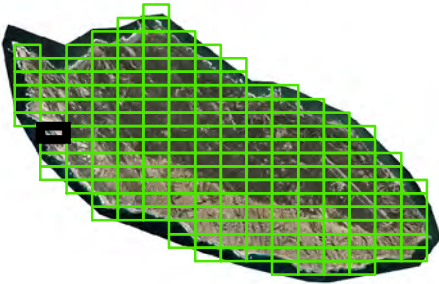
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North American Datum of 1983

NBVC San Nicolas Island  
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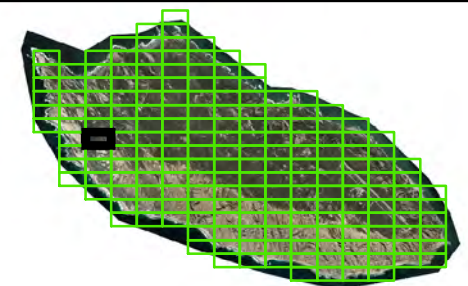
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NBVC San Nicolas Island  
Vegetation Classification

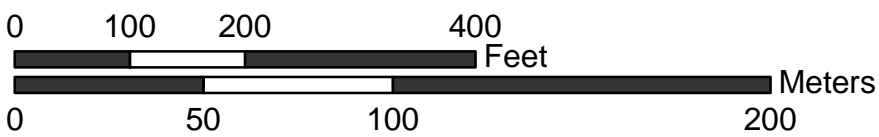
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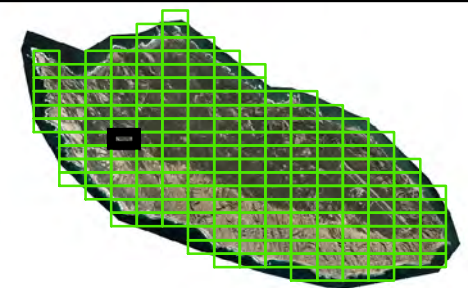
 Vegetation Classification Types



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North American Datum of 1983

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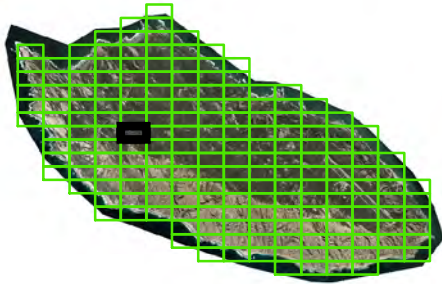
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Vegetation Classification

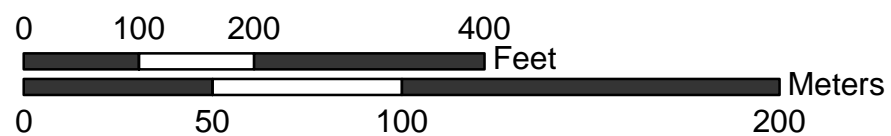
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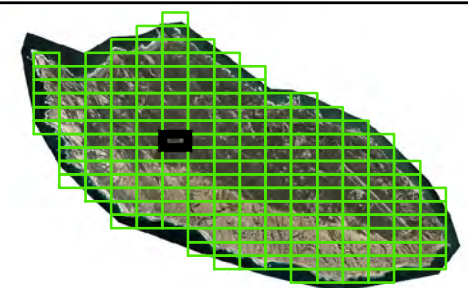
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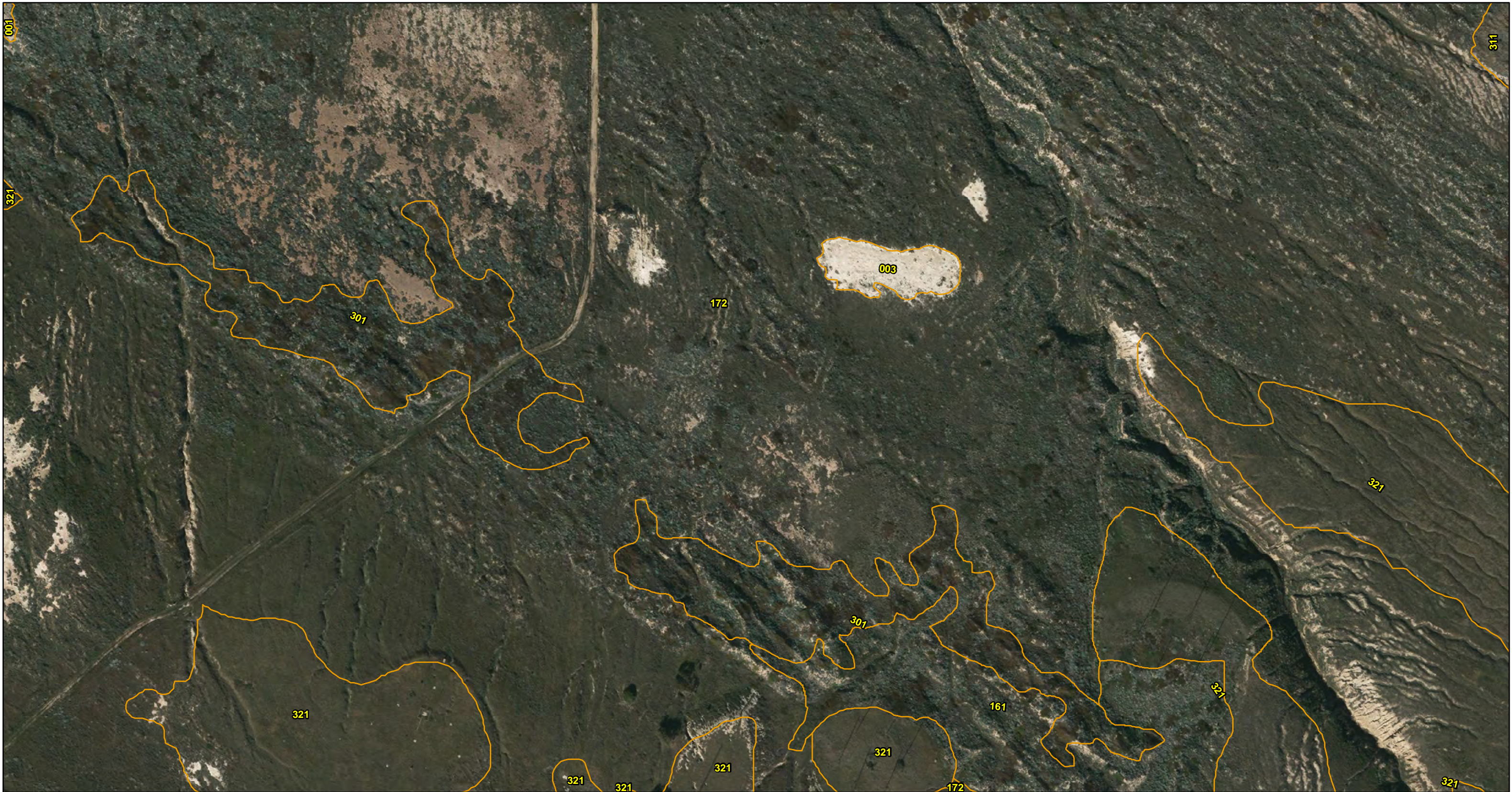
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North American Datum of 1983

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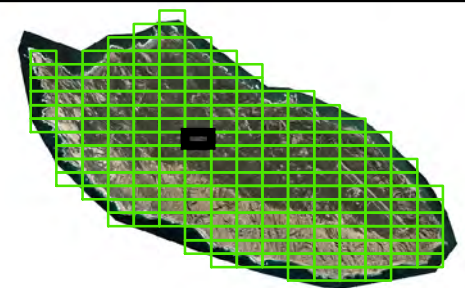
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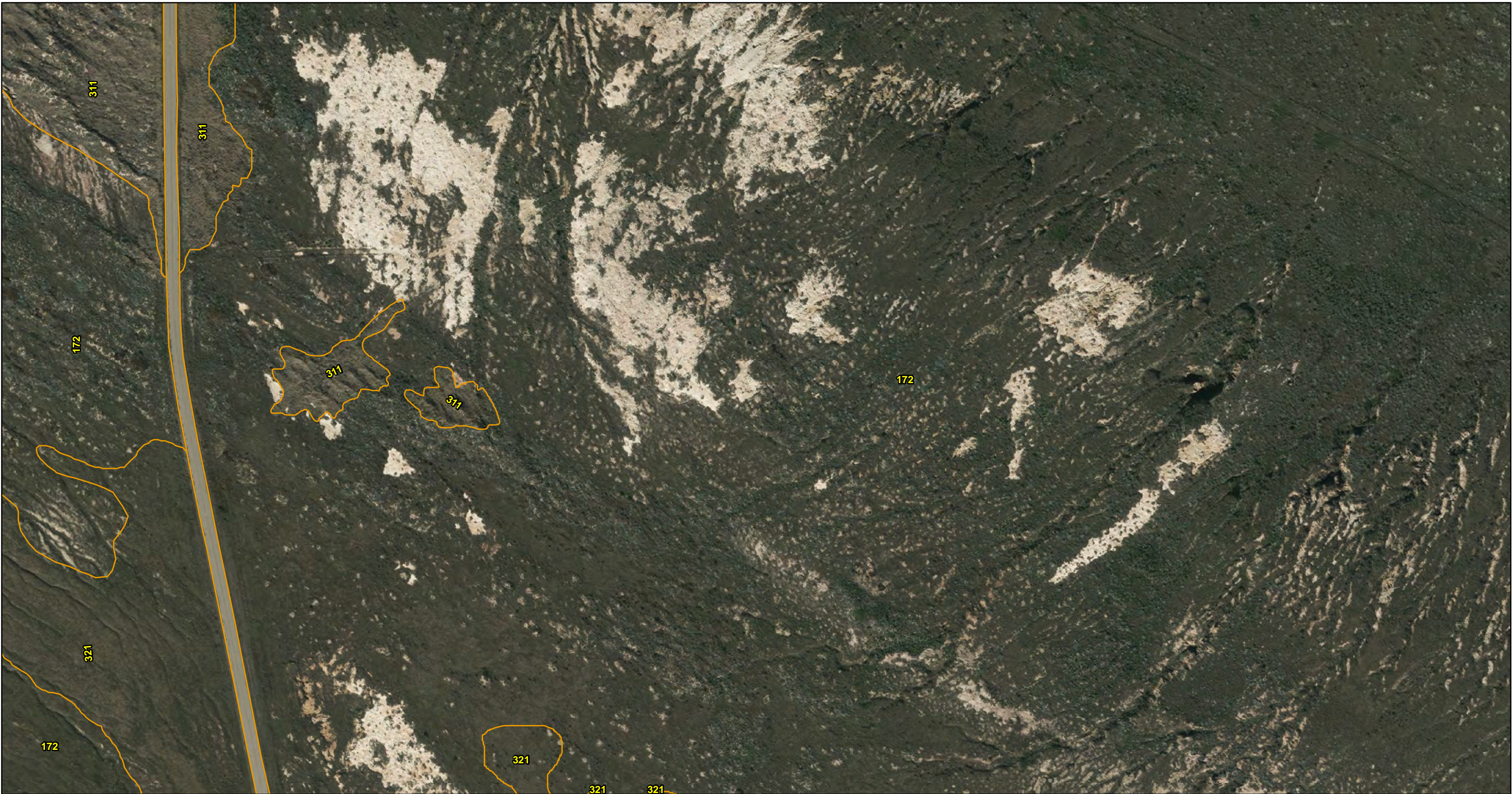
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Vegetation Classification

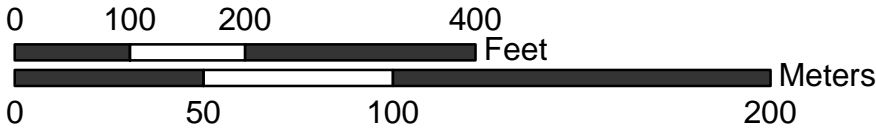
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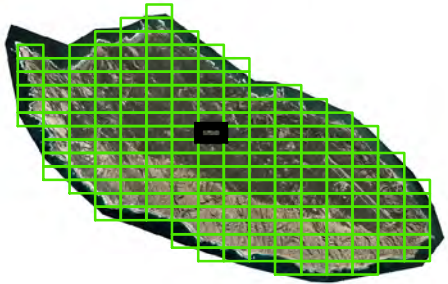
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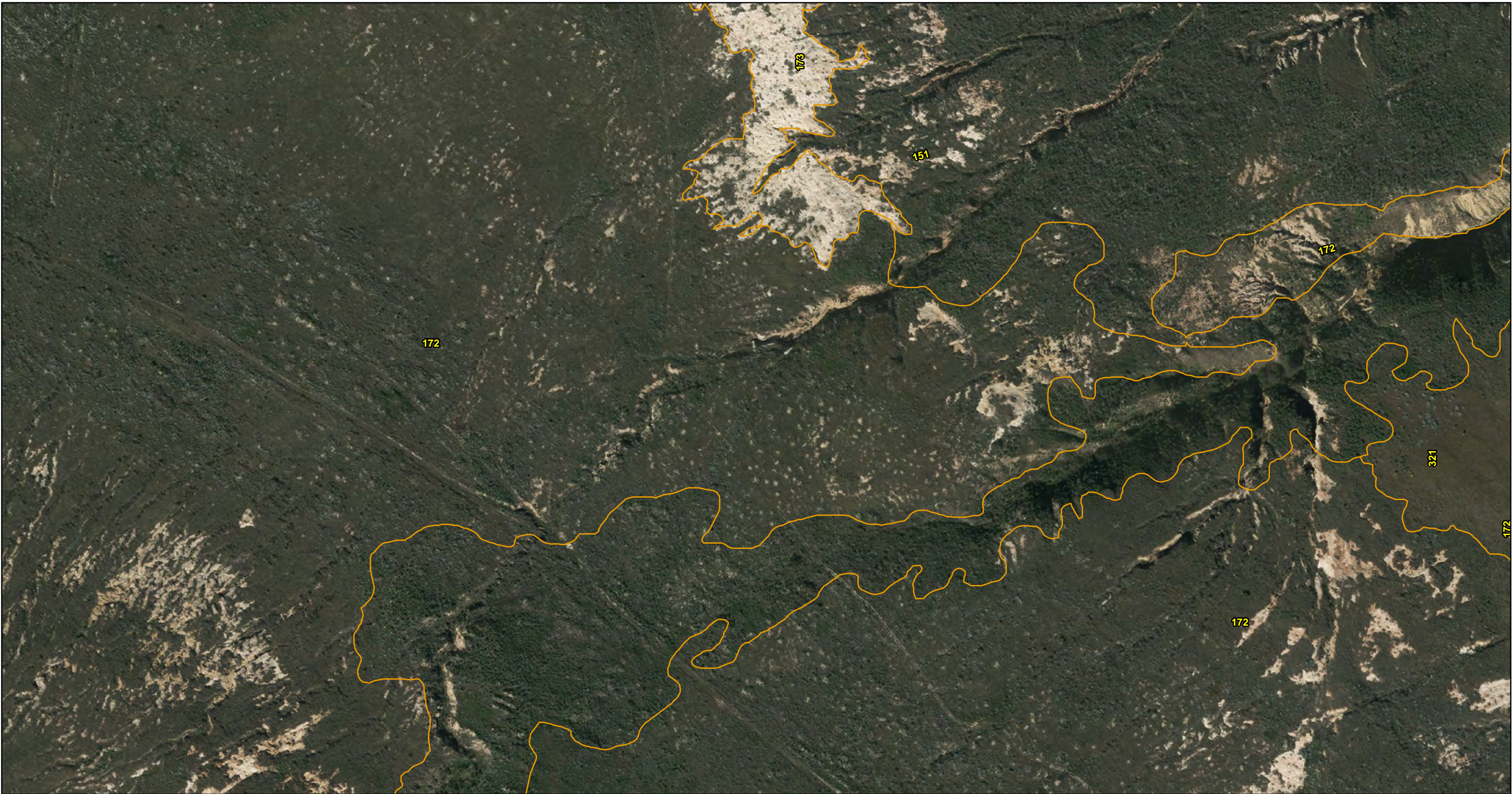
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North American Datum of 1983

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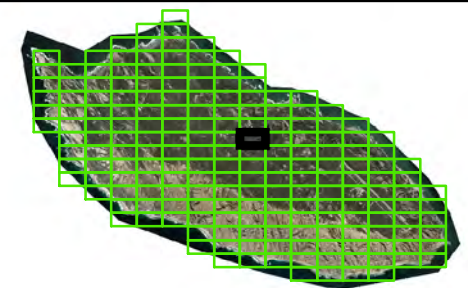
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Vegetation Classification

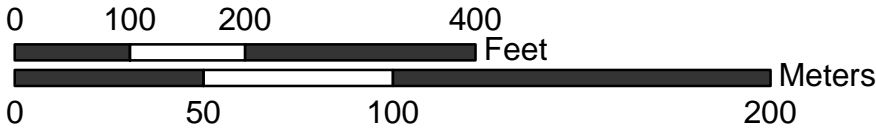
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State Plane California VI FIPS 0406 feet  
North American Datum of 1983

NBVC San Nicolas Island  
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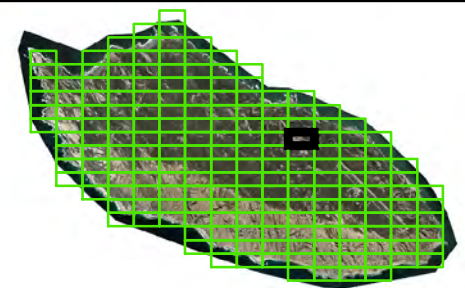
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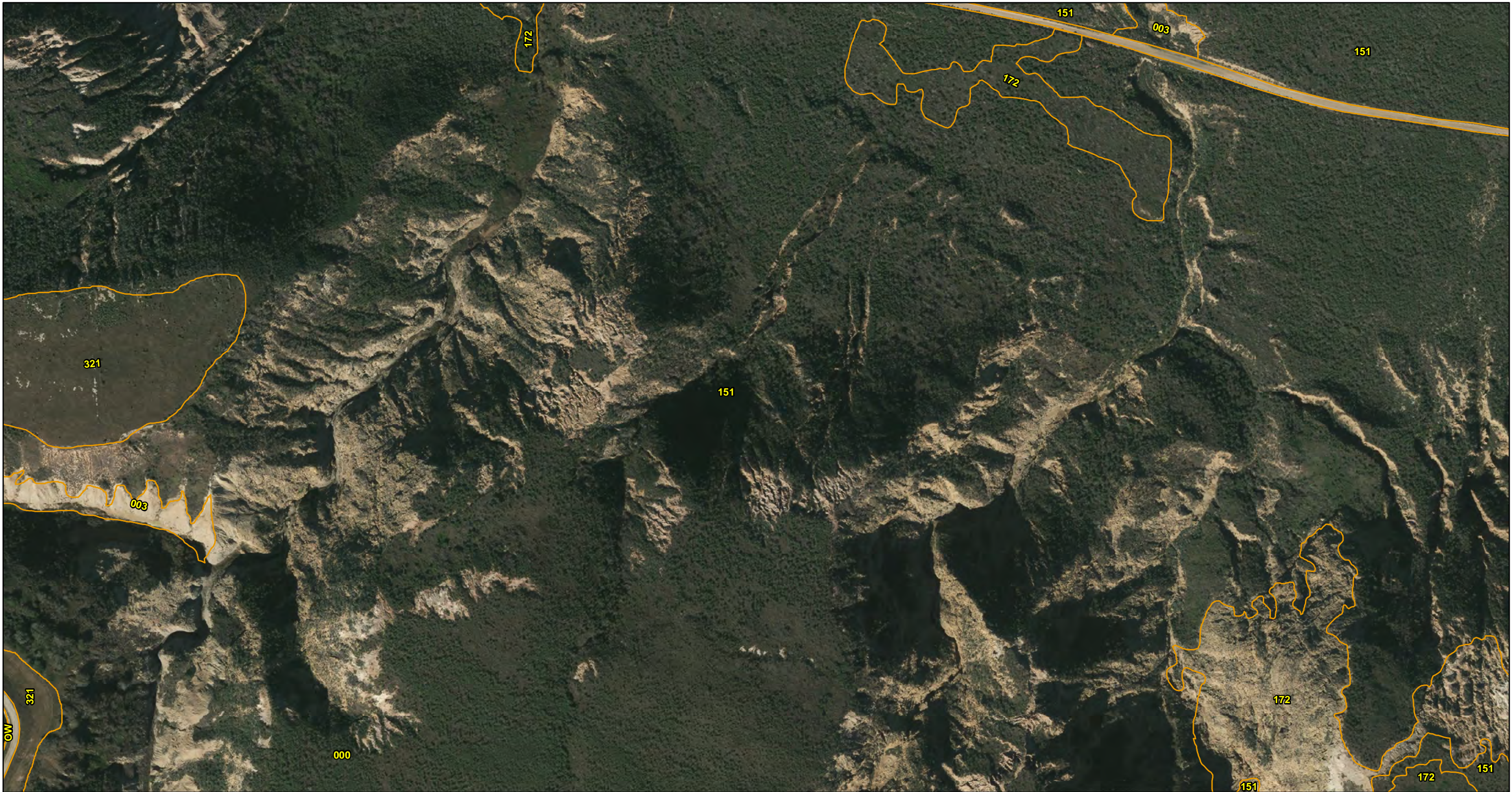
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North American Datum of 1983

NBVC San Nicolas Island  
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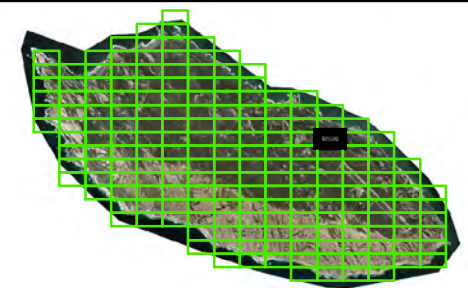
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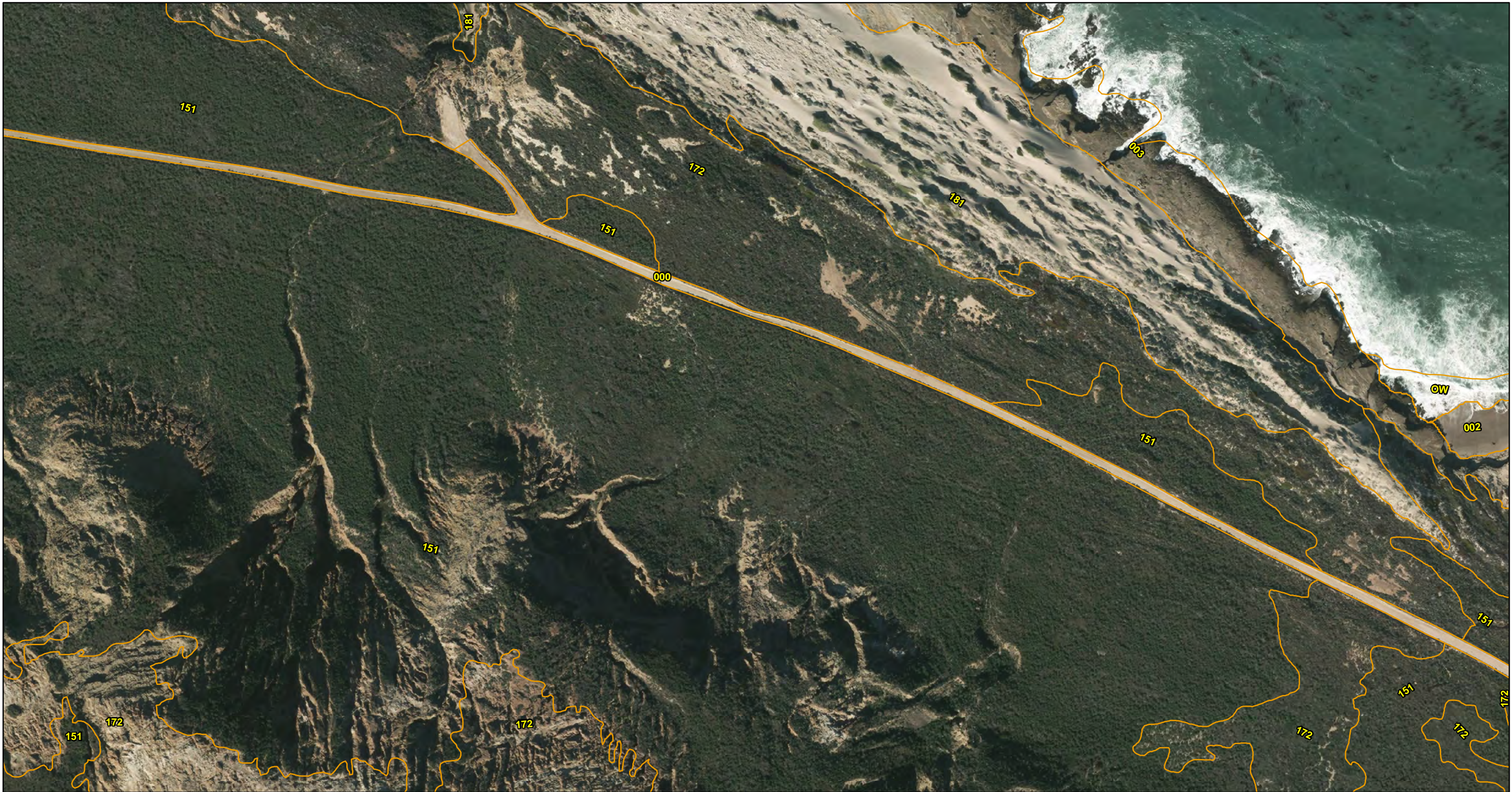
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North American Datum of 1983

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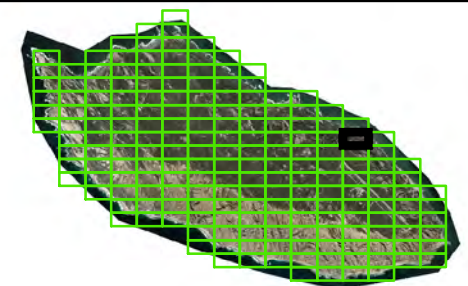
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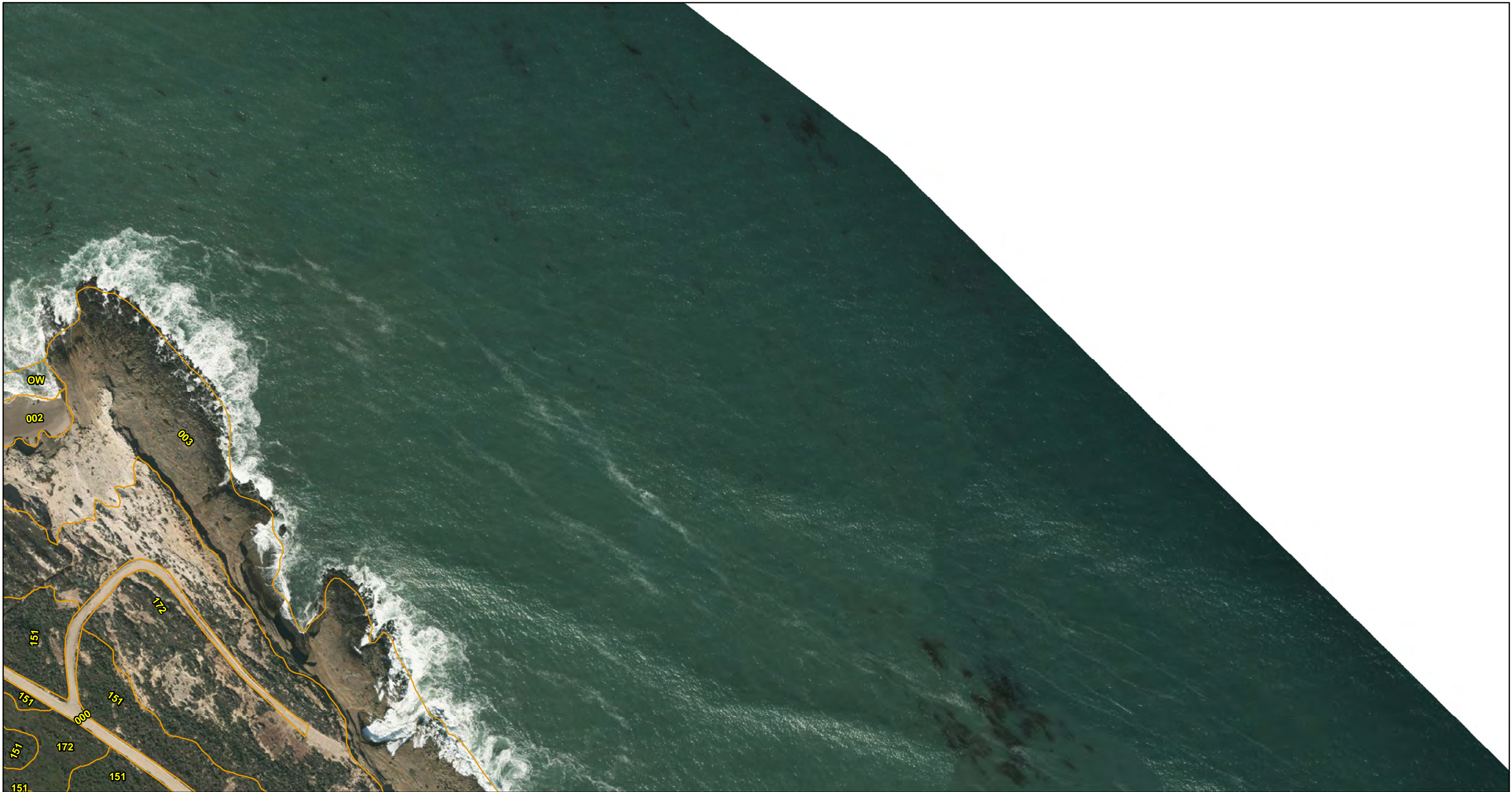
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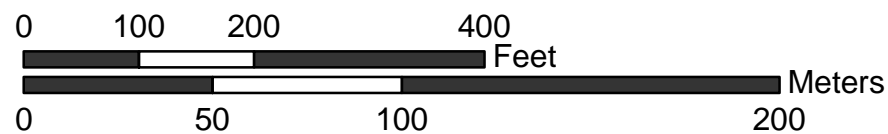
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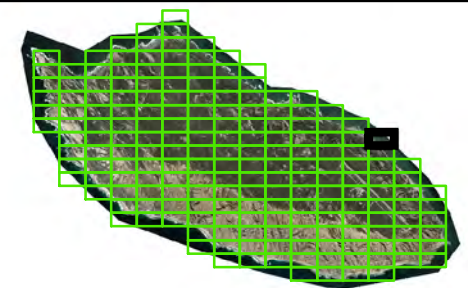
Vegetation Classification Types



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State Plane California VI FIPS 0406 feet  
North American Datum of 1983

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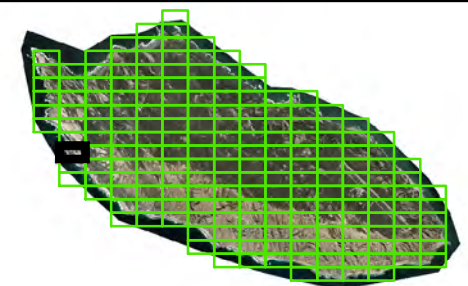
 Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
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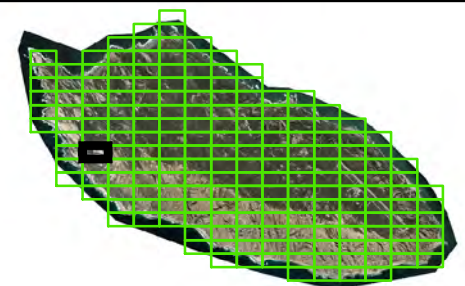
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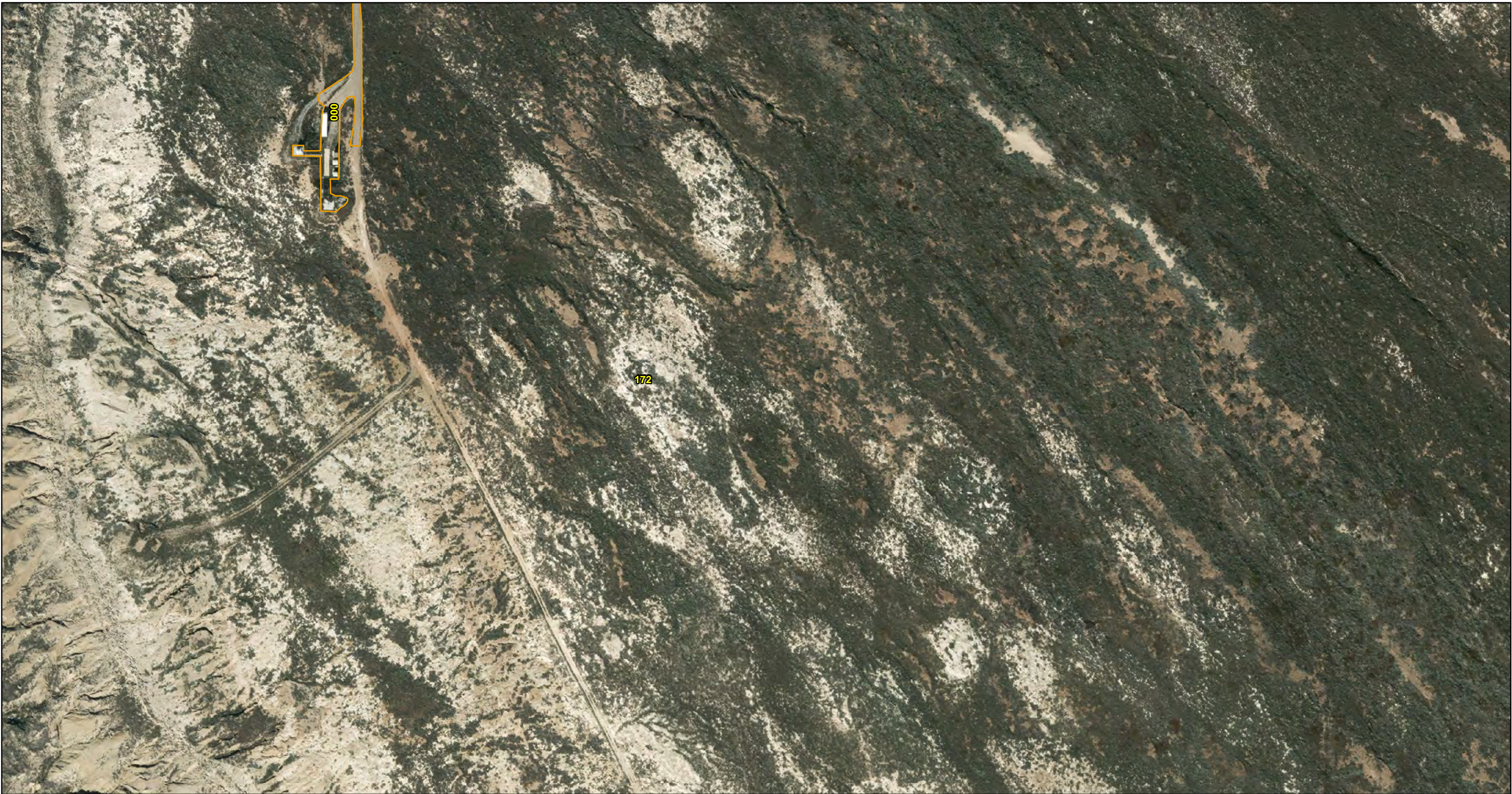
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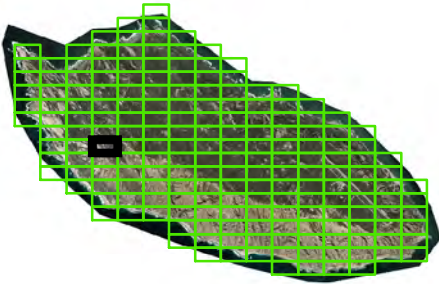
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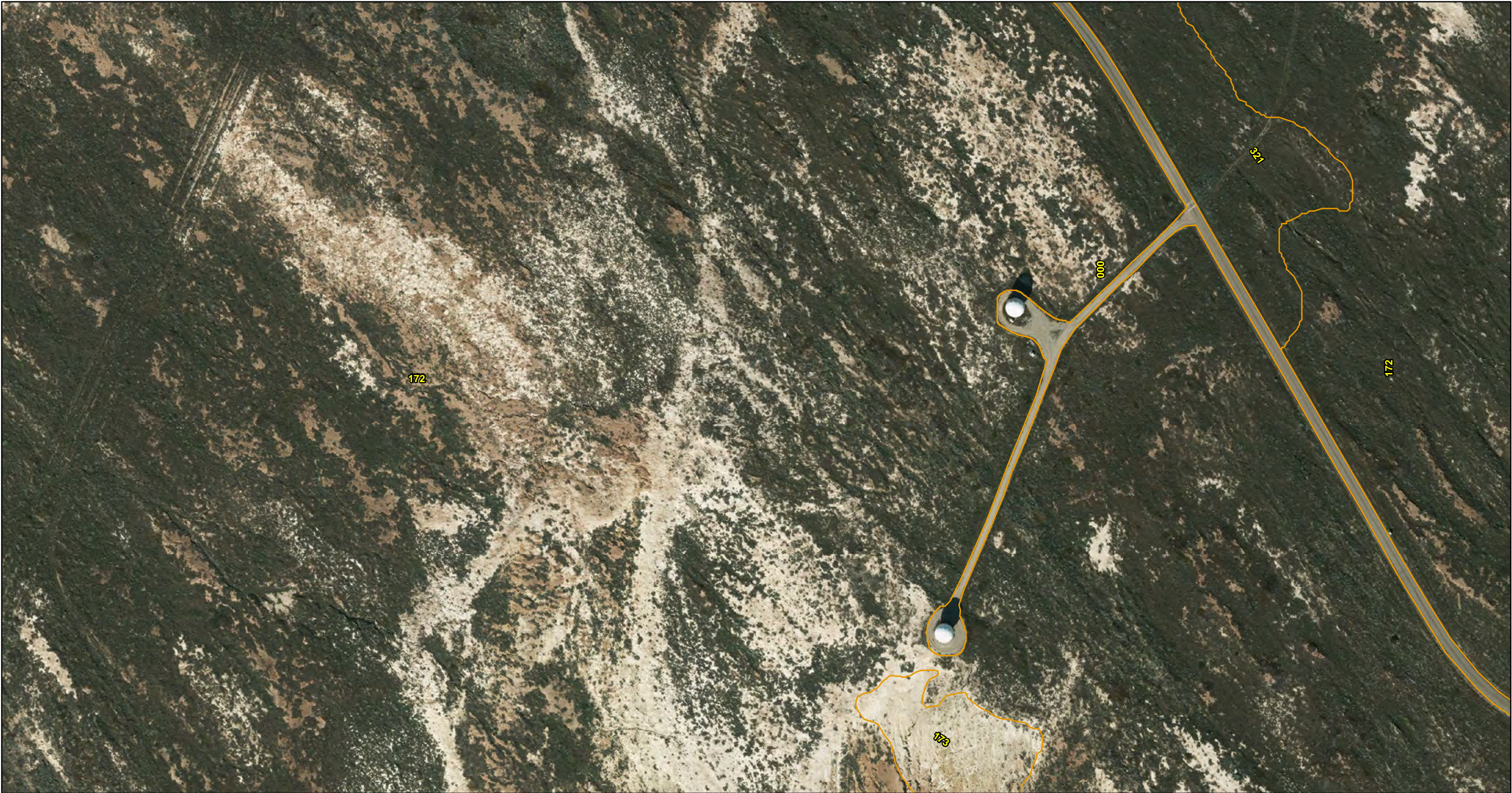
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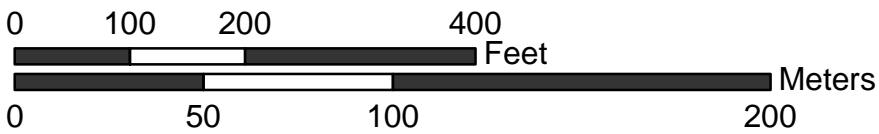
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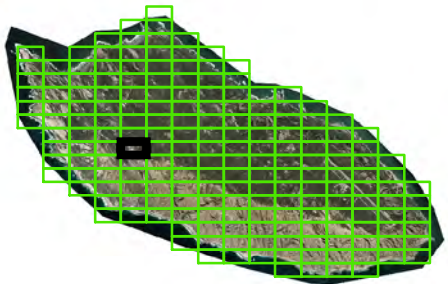
 Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
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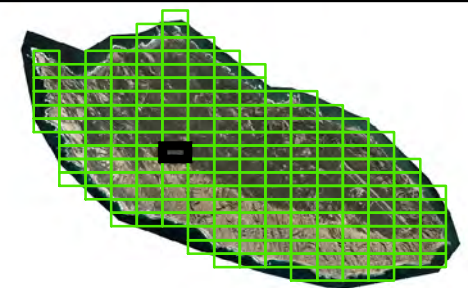
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Vegetation Classification

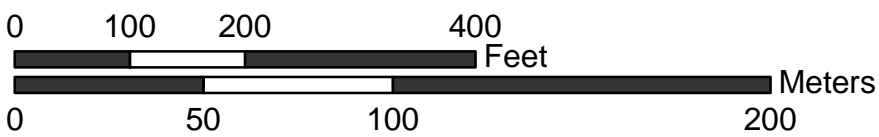
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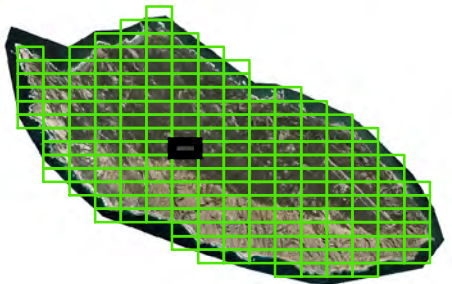
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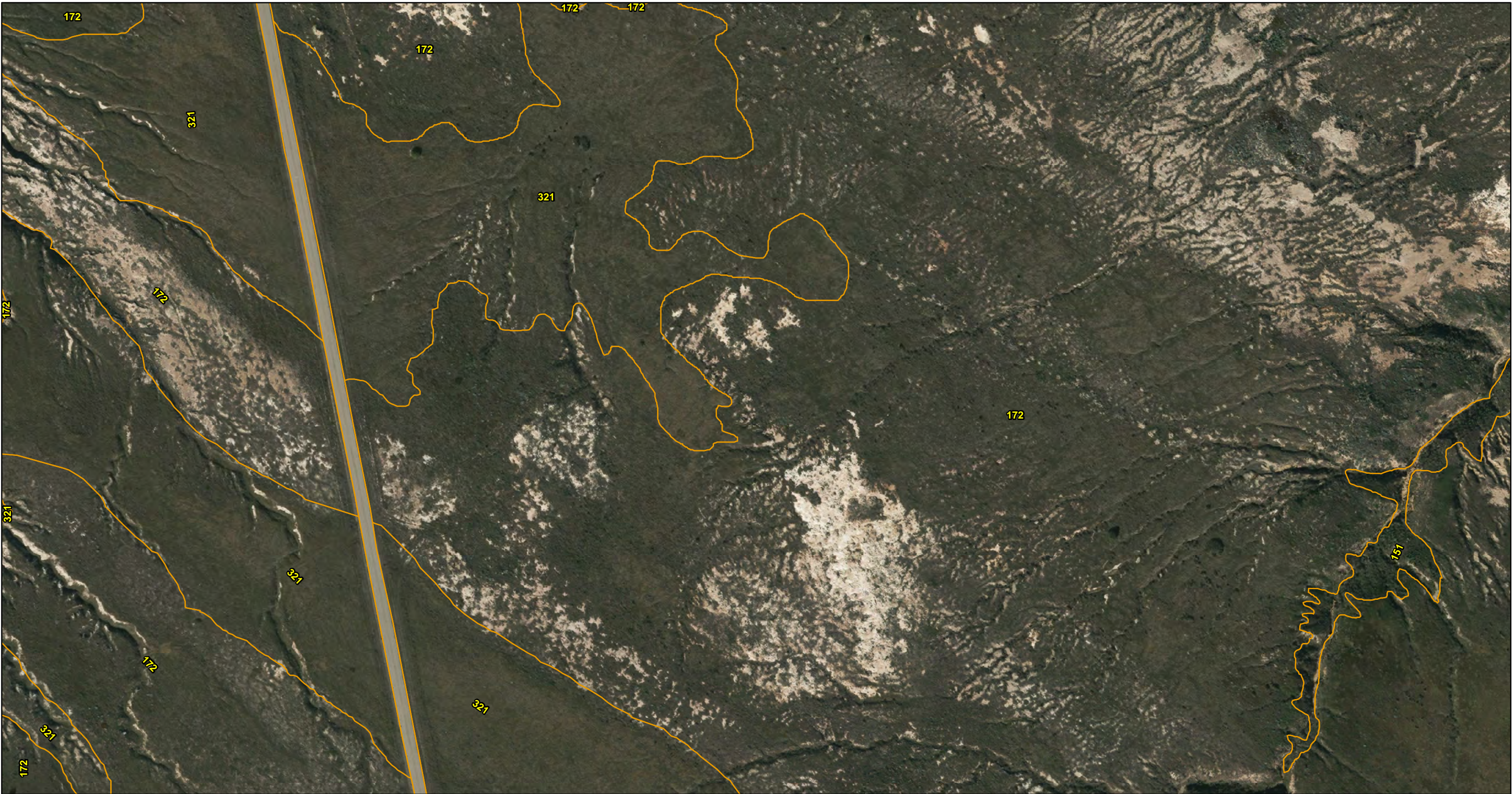
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Vegetation Classification

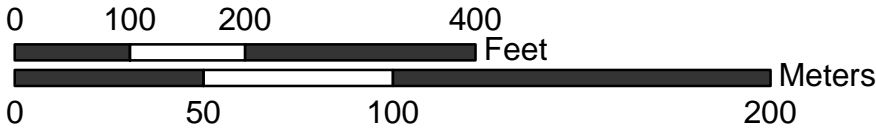
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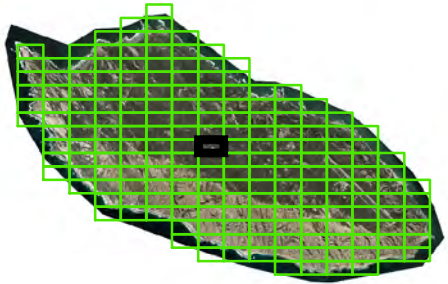
Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
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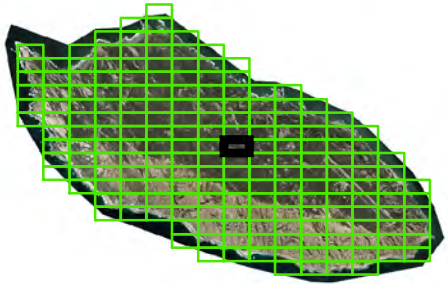
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Vegetation Classification

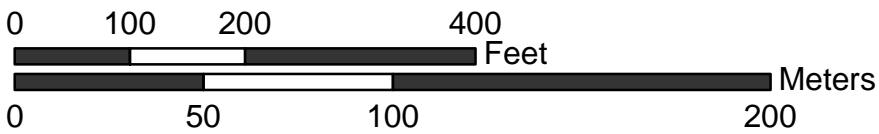
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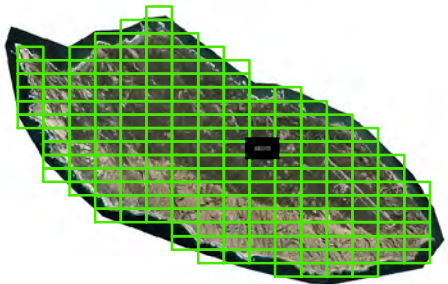
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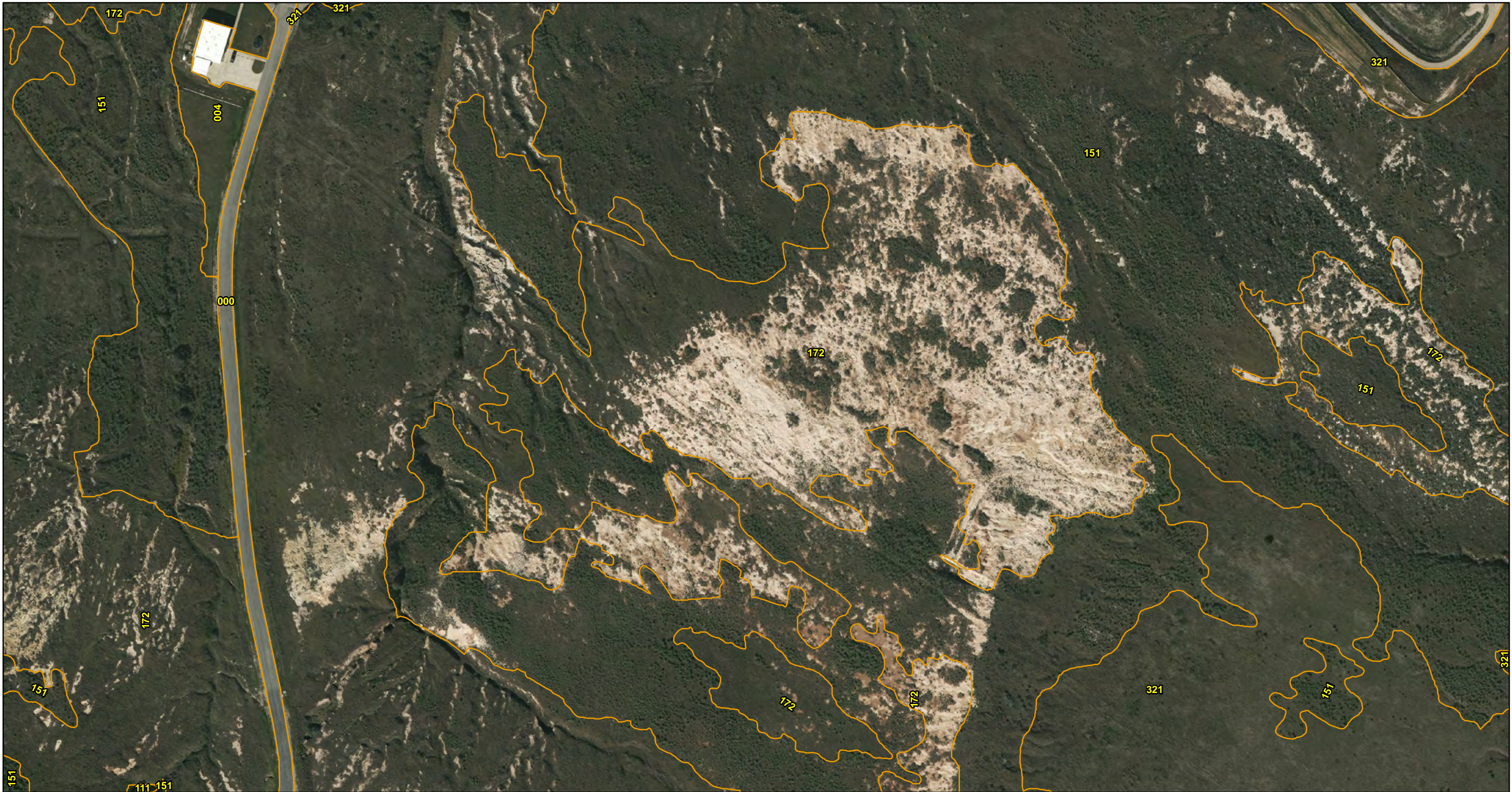
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NBVC San Nicolas Island  
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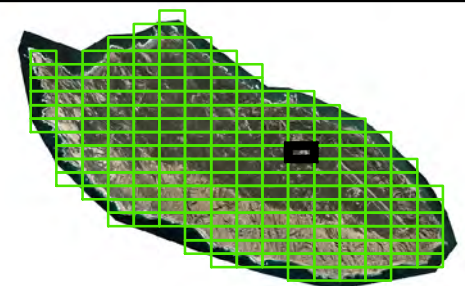
 Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
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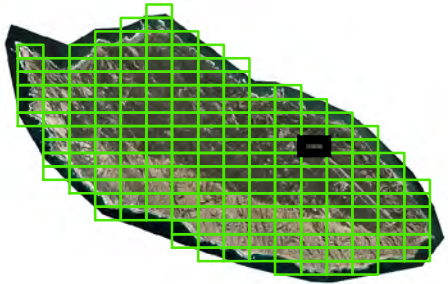
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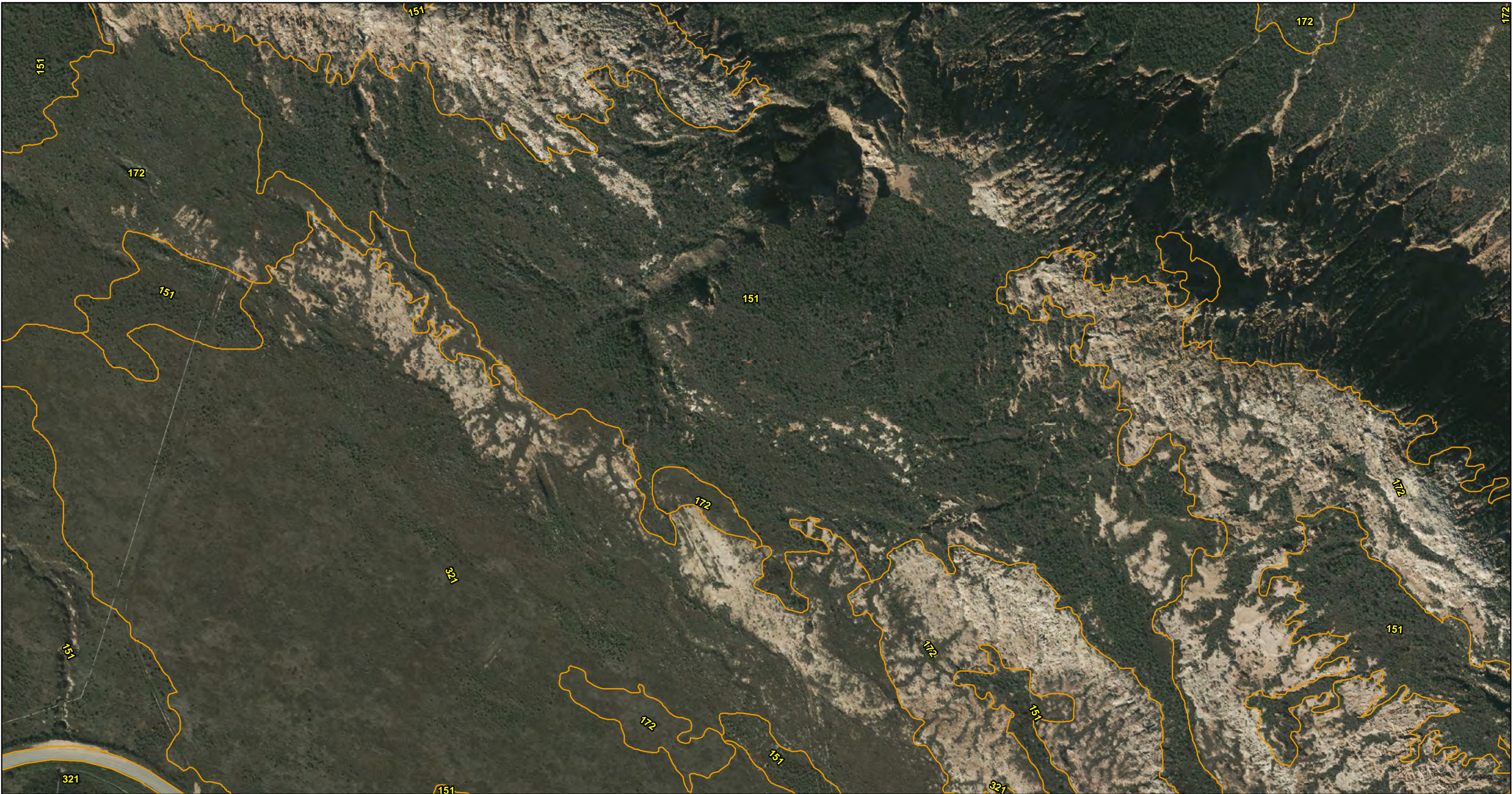
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North American Datum of 1983

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Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
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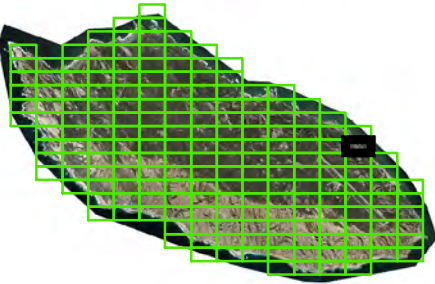
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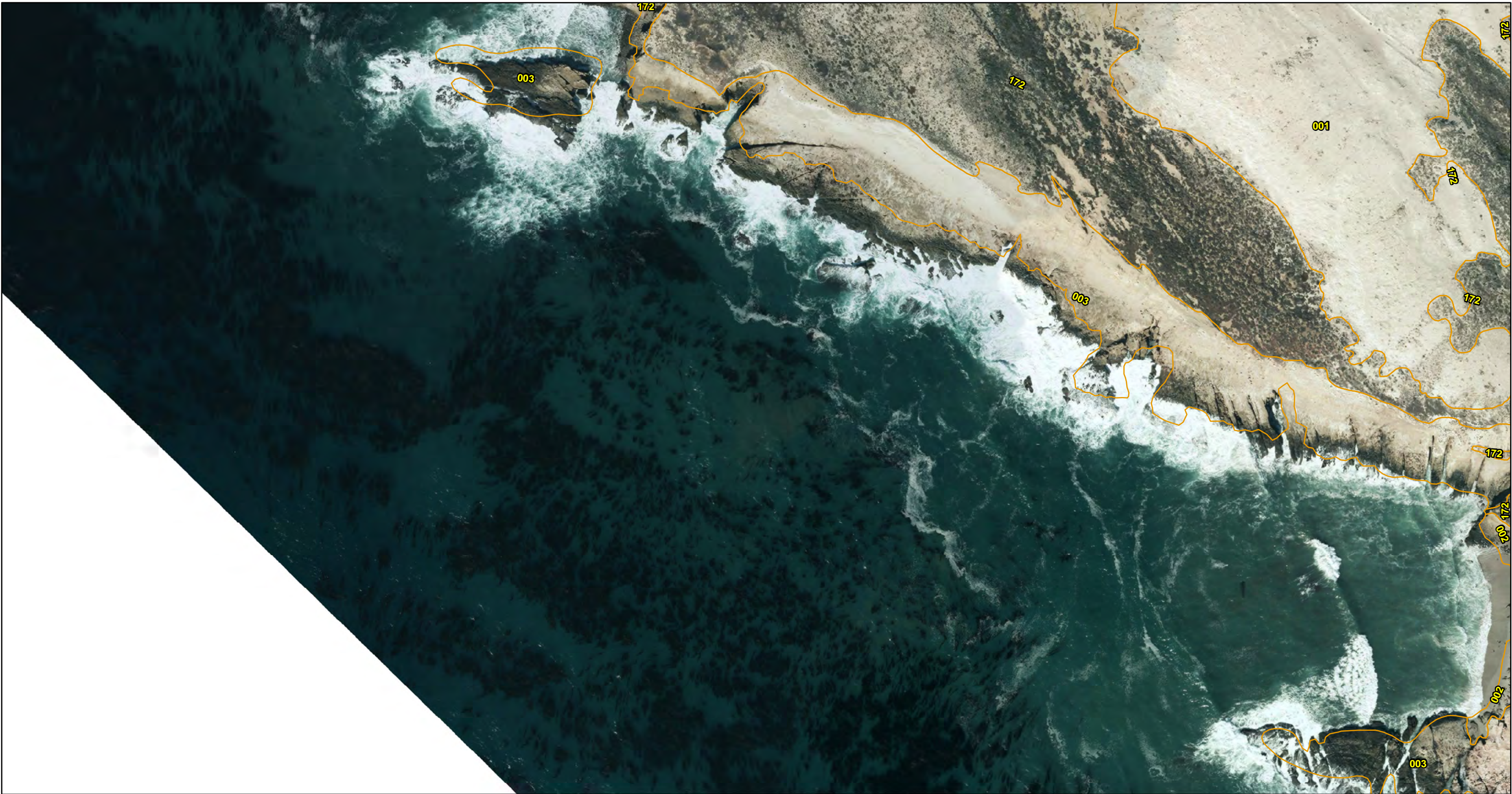
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NBVC San Nicolas Island  
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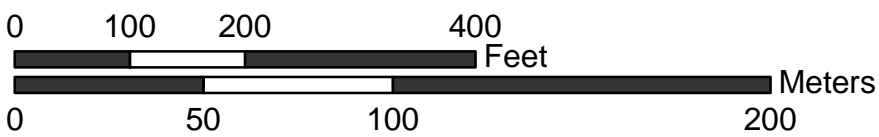
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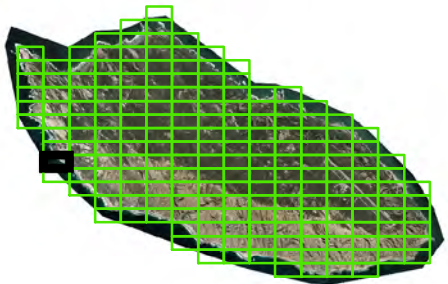
 Vegetation Classification Types



Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
North American Datum of 1983

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Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
North American Datum of 1983

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Vegetation Classification

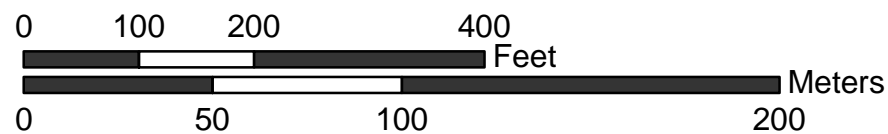
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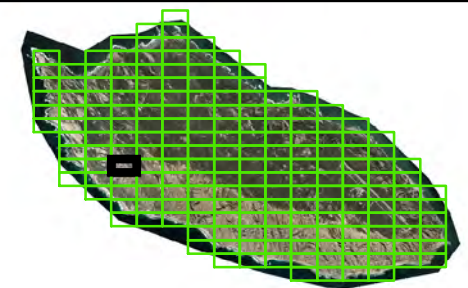
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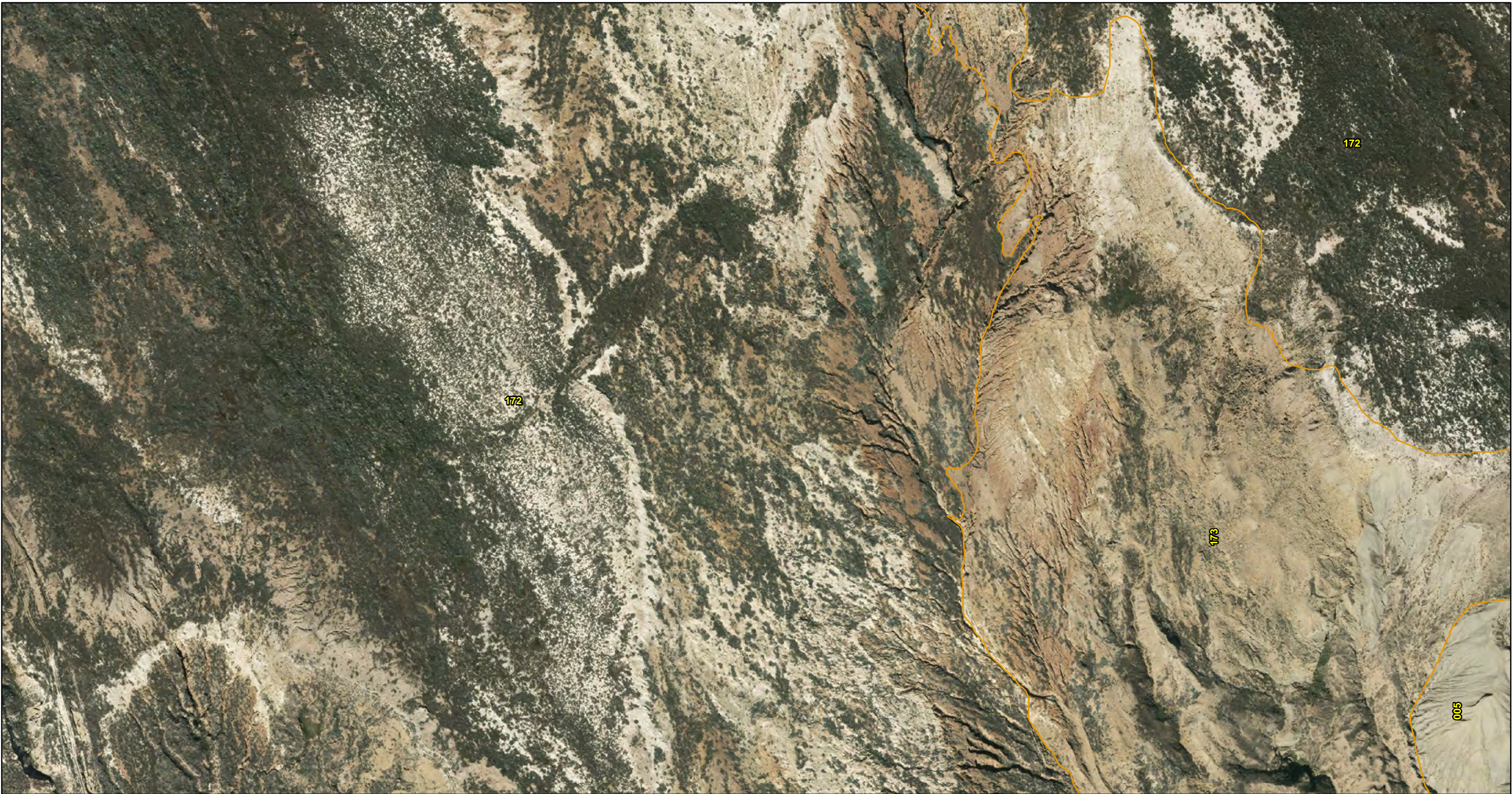
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North American Datum of 1983

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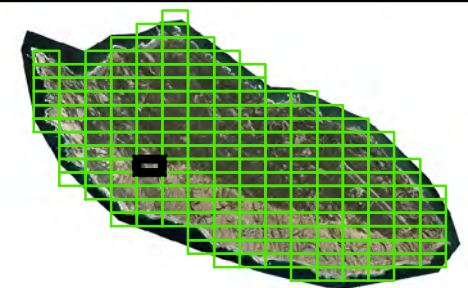
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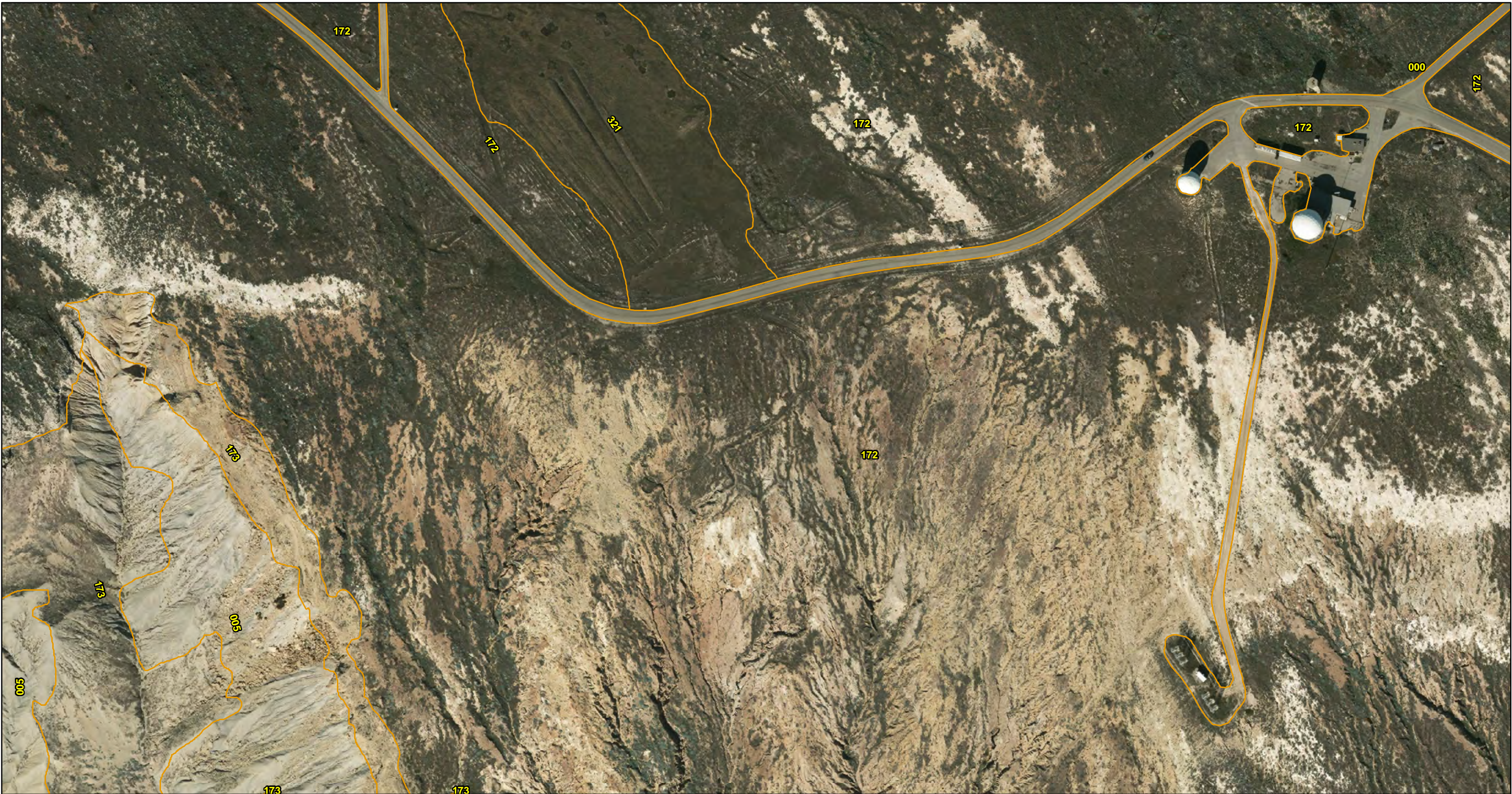
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Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
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Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
North American Datum of 1983

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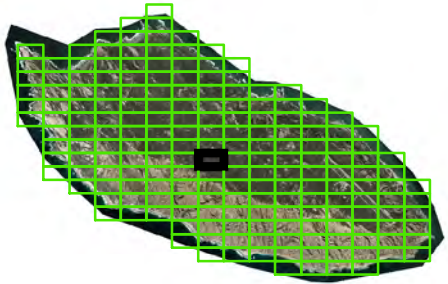
Vegetation Classification Types



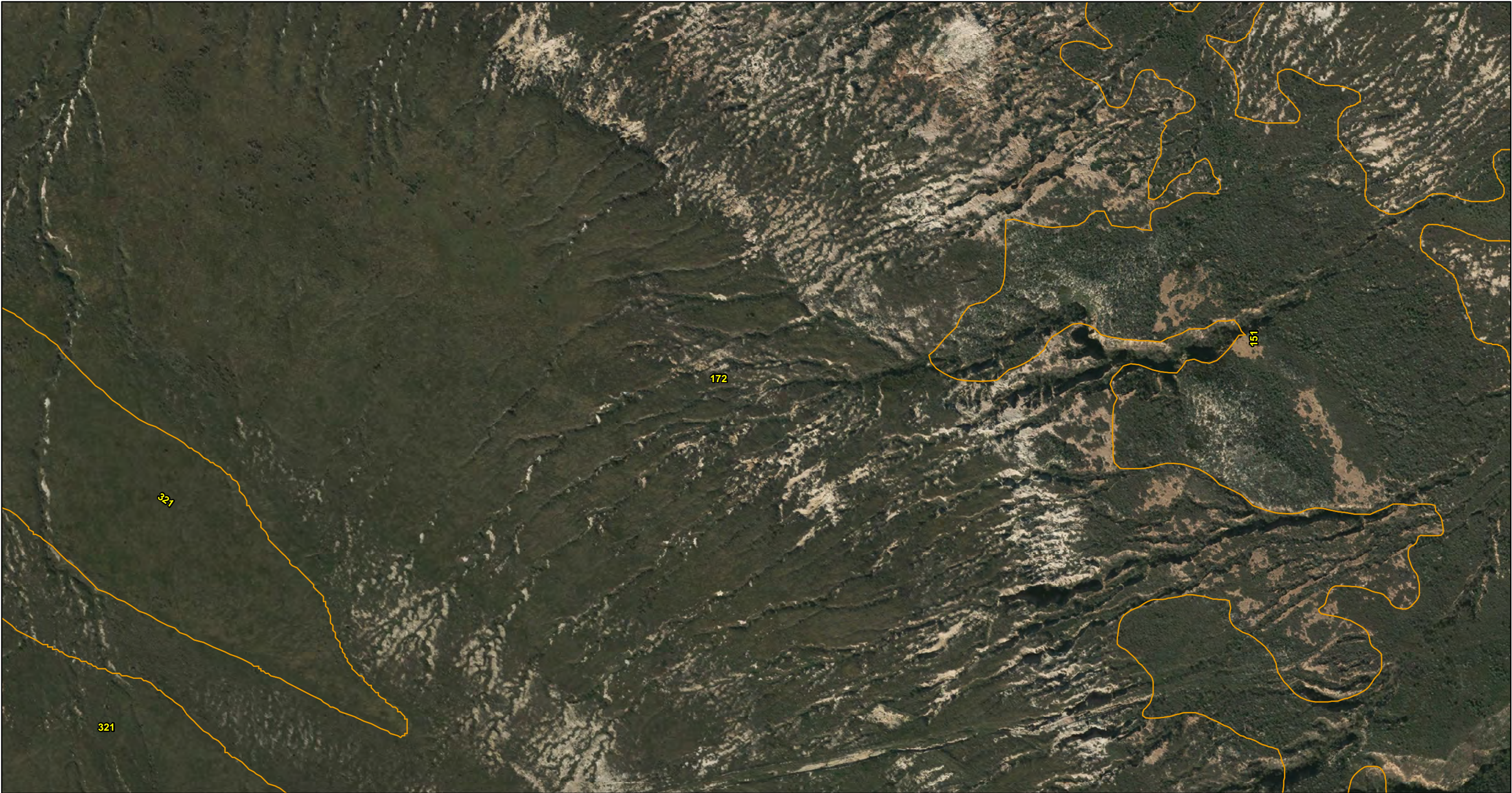
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State Plane California VI FIPS 0406 feet  
North American Datum of 1983

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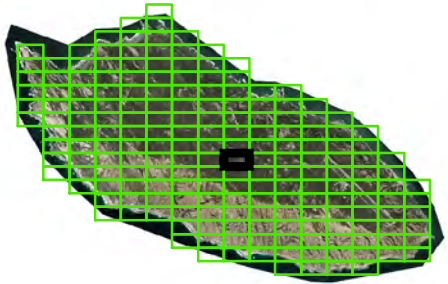
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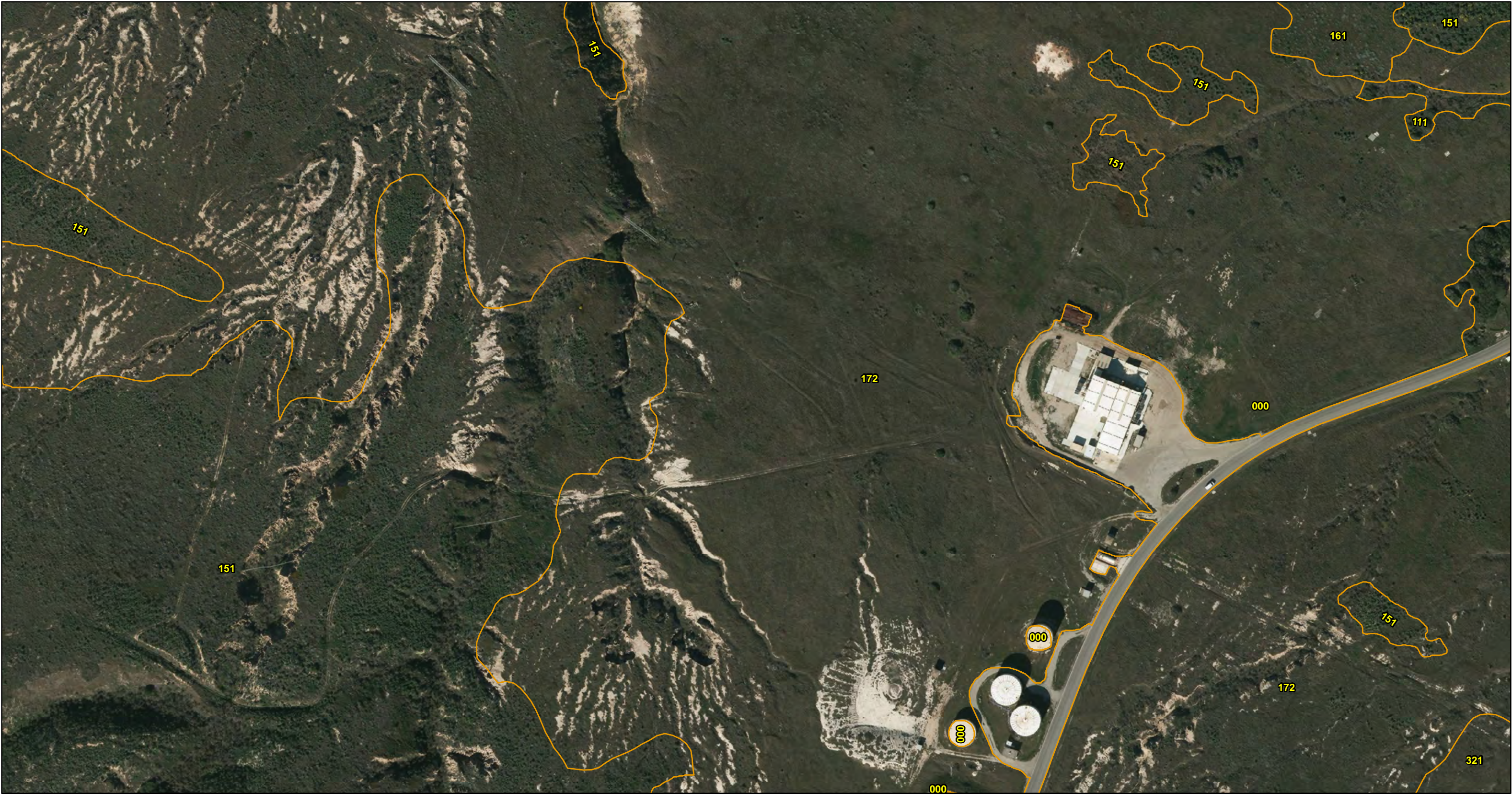
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State Plane California VI FIPS 0406 feet  
North American Datum of 1983

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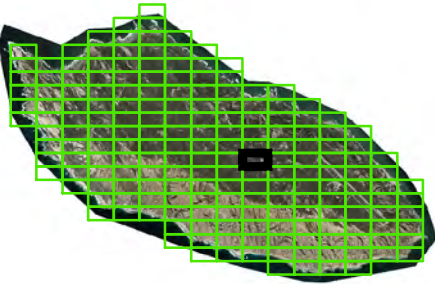
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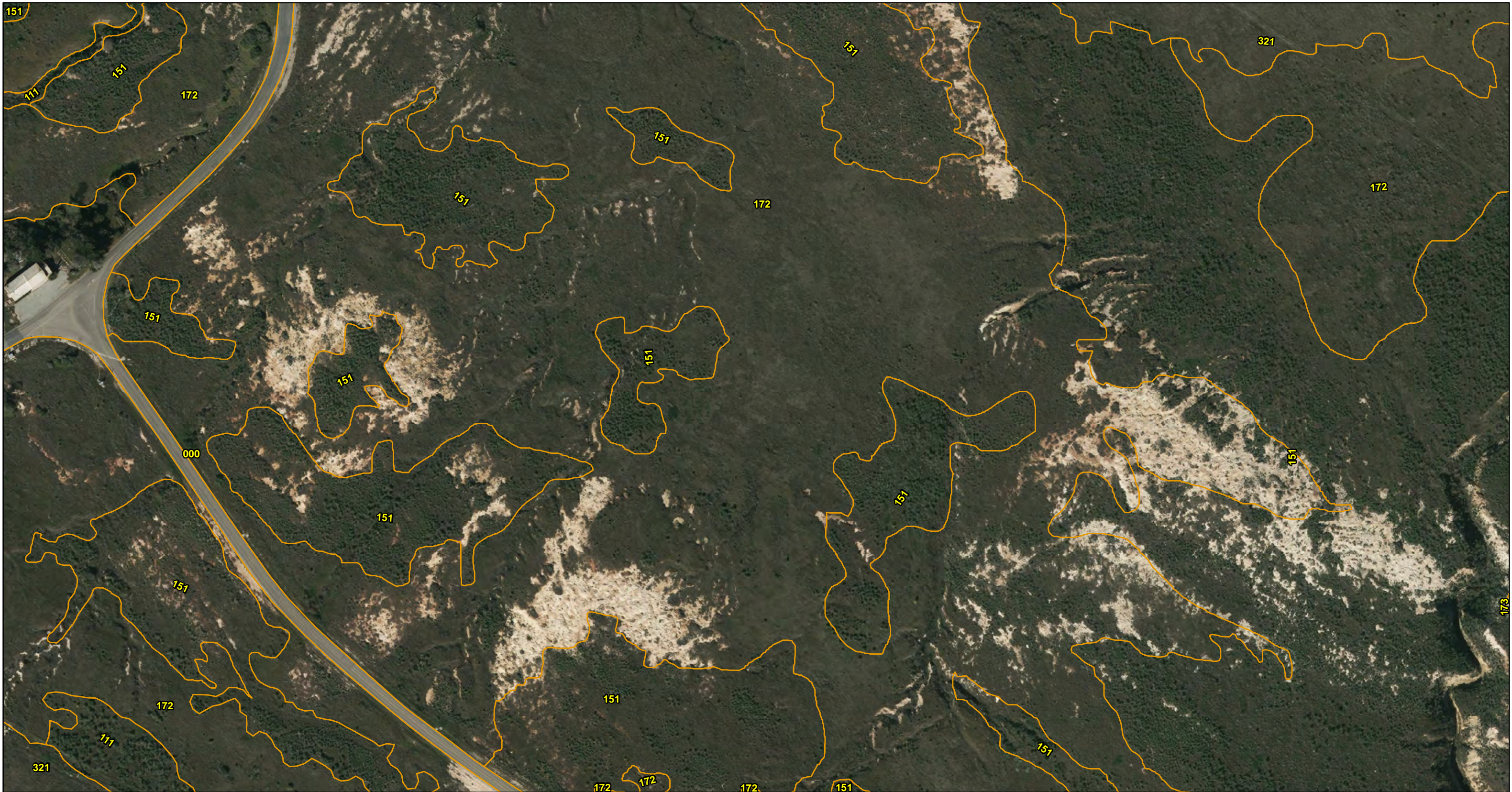
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State Plane California VI FIPS 0406 feet  
North American Datum of 1983

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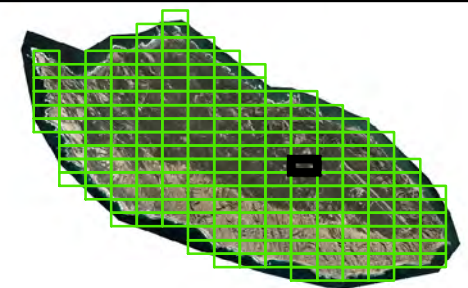
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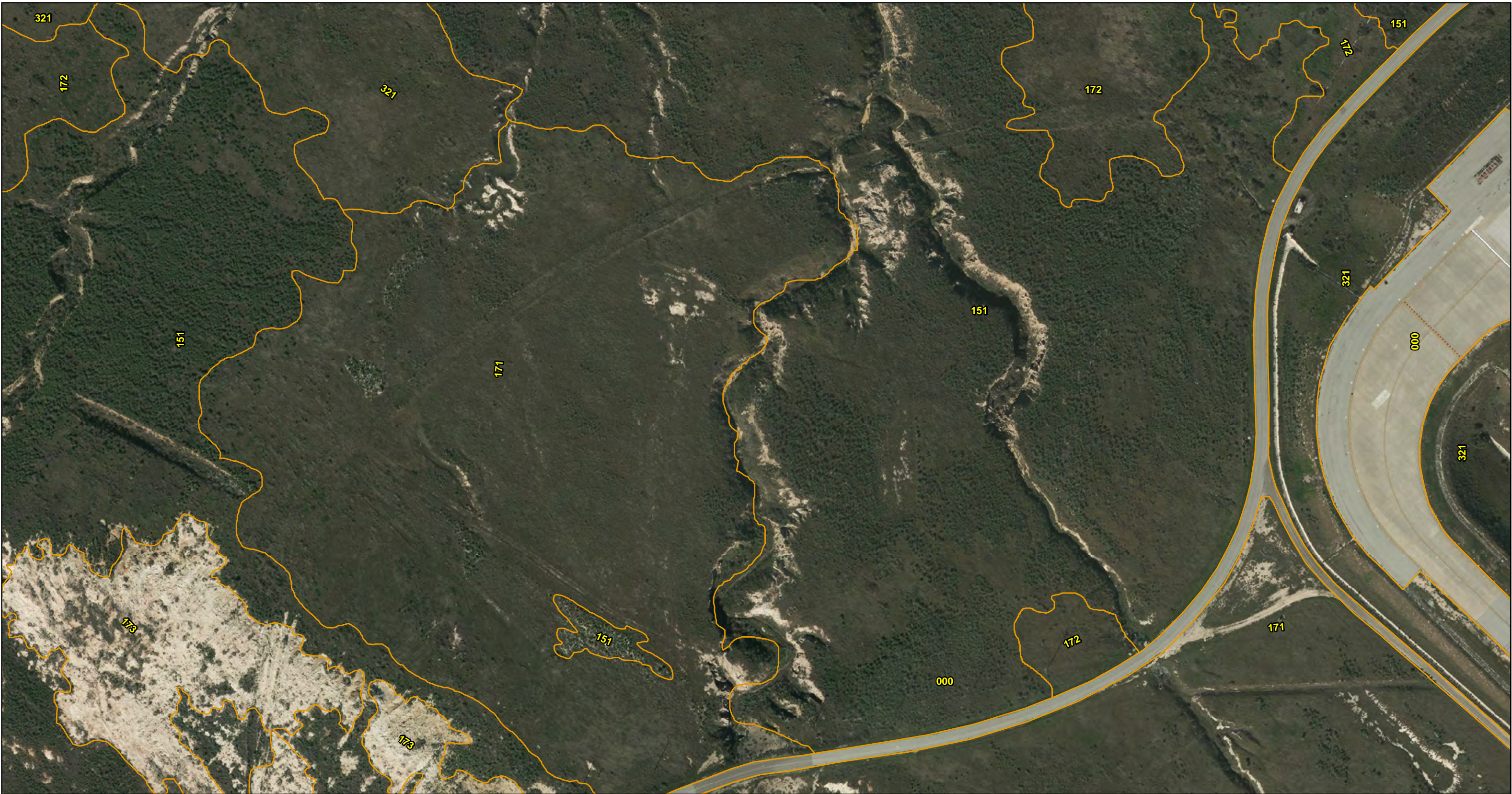
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NBVC San Nicolas Island  
Vegetation Classification

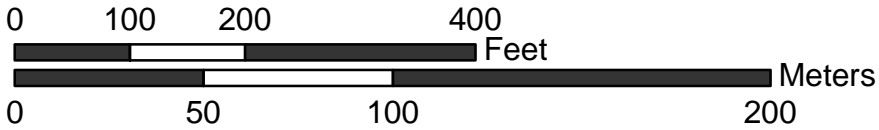
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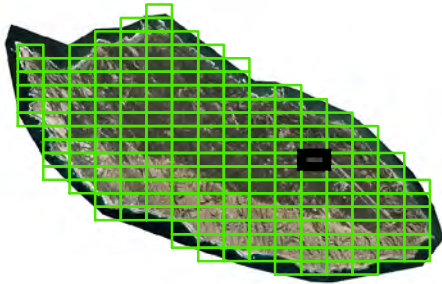
Vegetation Classification Types



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State Plane California VI FIPS 0406 feet  
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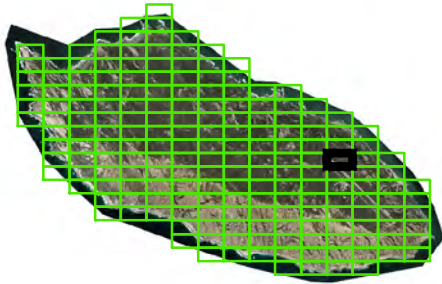
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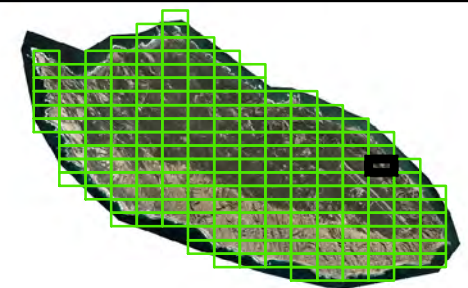
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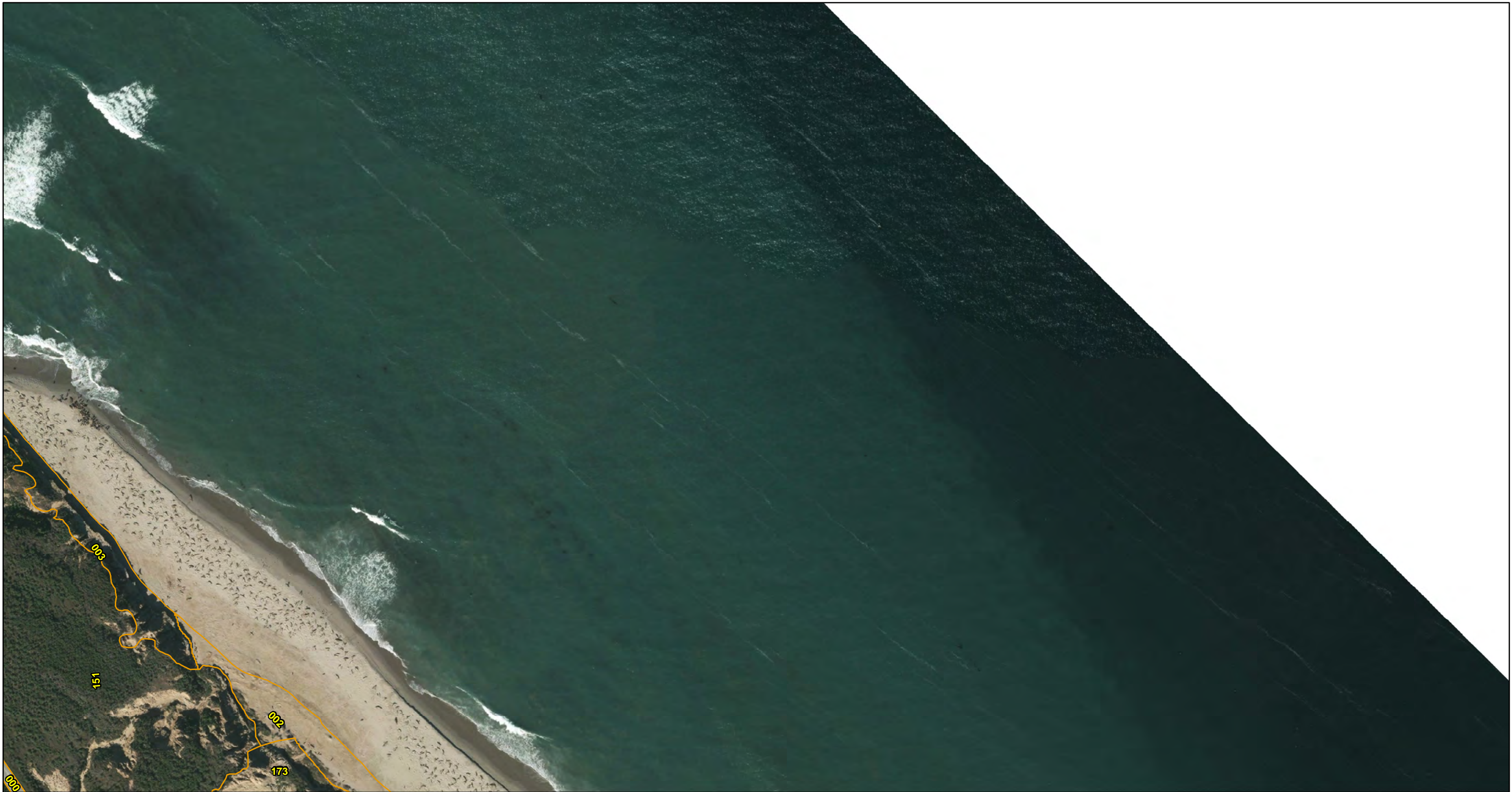
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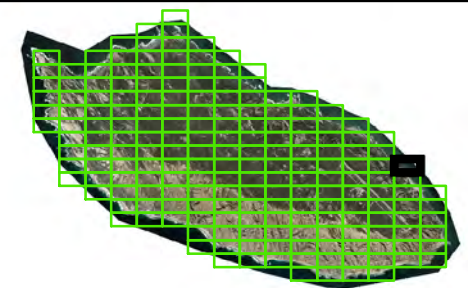
Vegetation Classification Types



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State Plane California VI FIPS 0406 feet  
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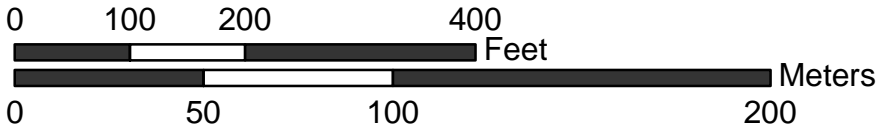




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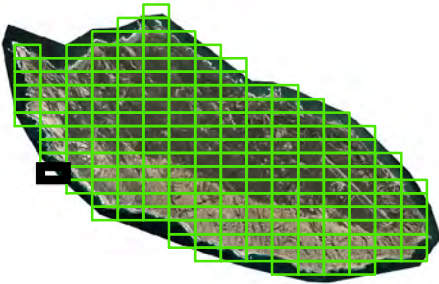
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State Plane California VI FIPS 0406 feet  
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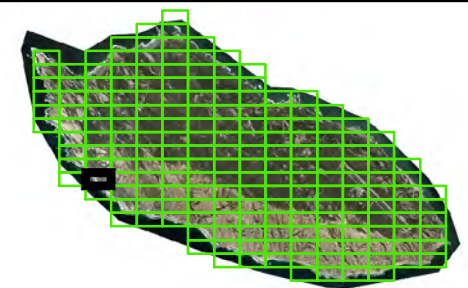
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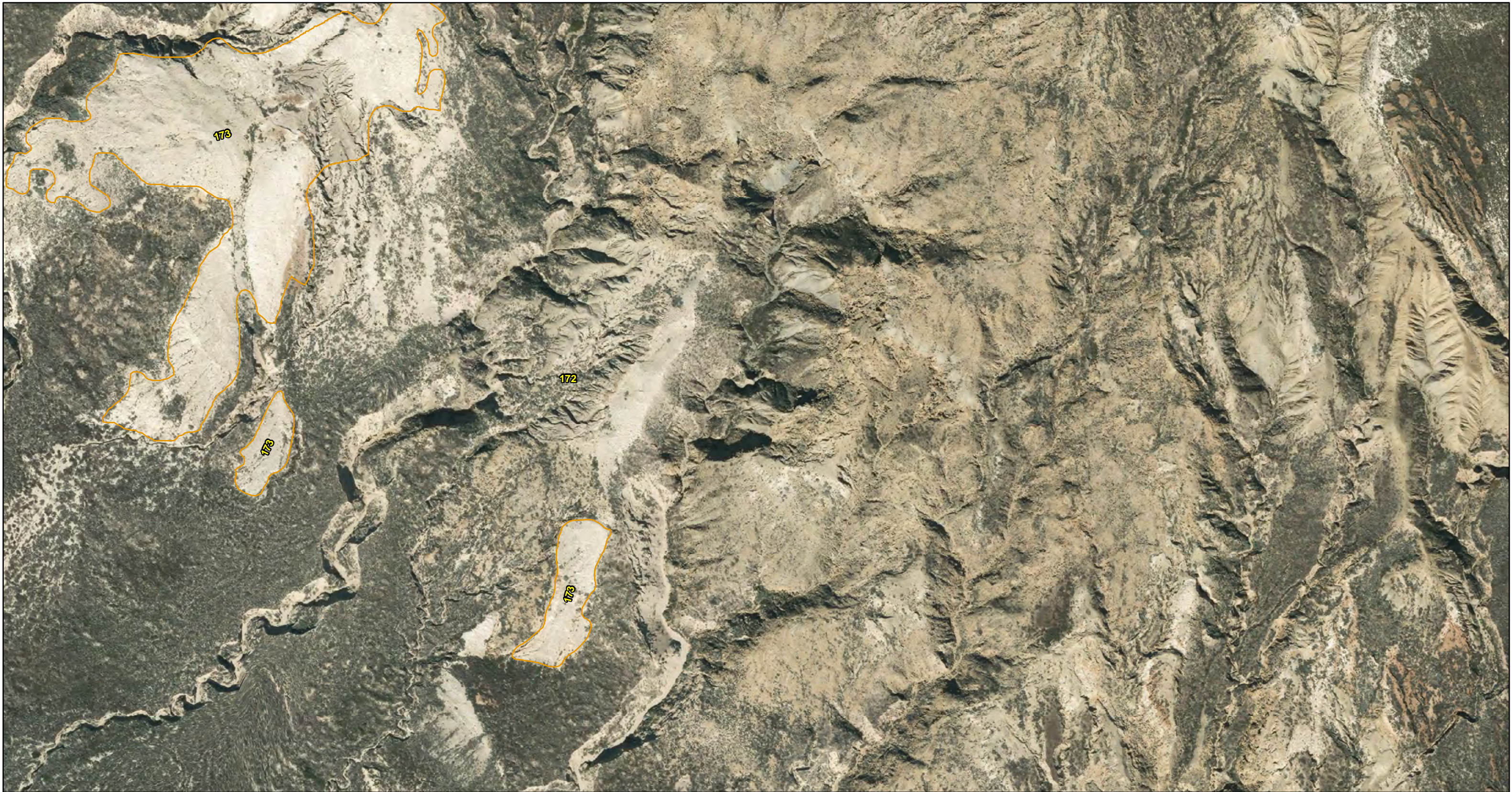
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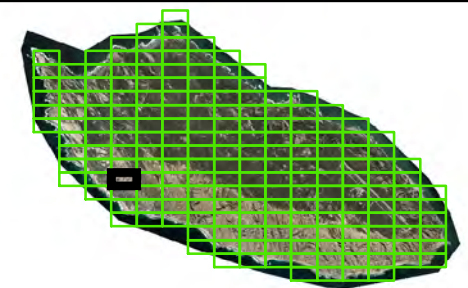
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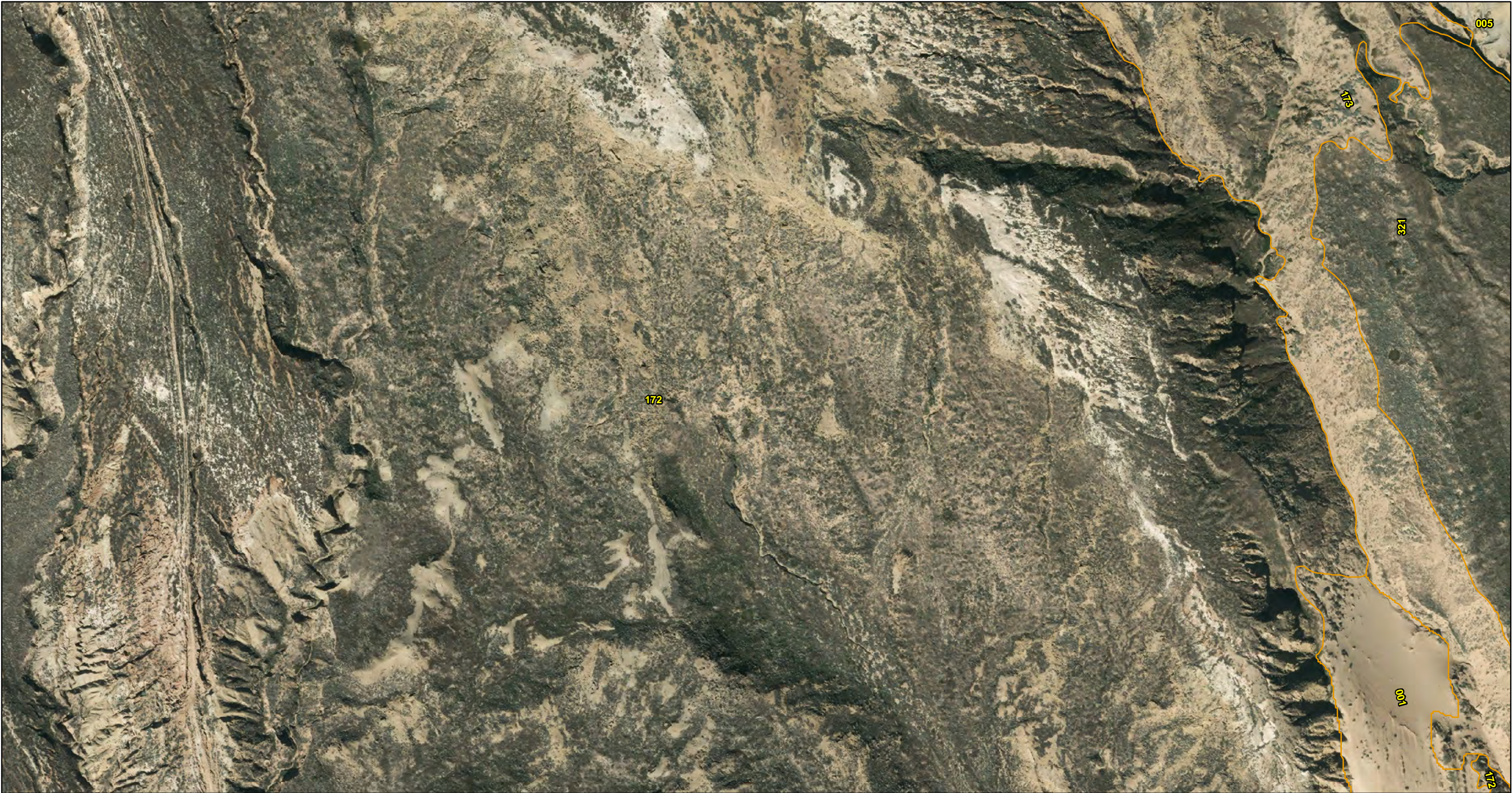
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State Plane California VI FIPS 0406 feet  
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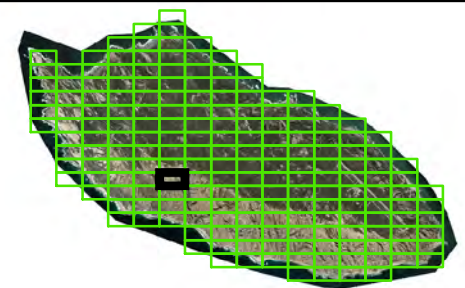
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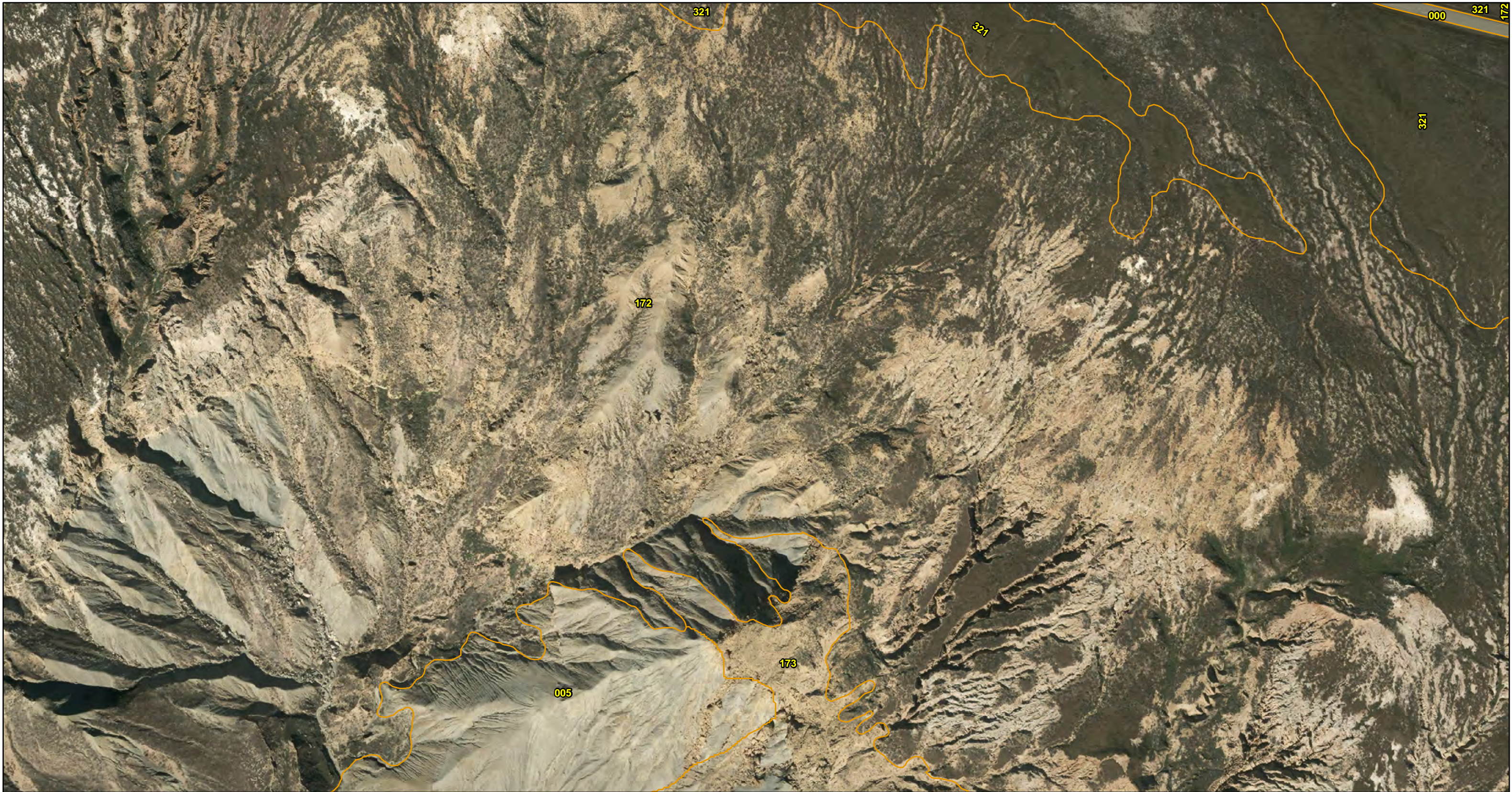
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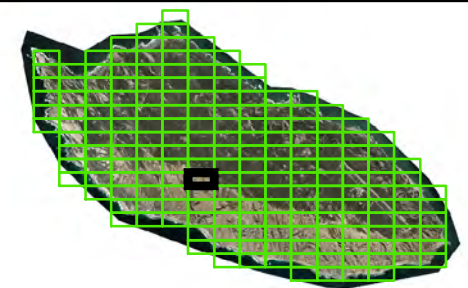
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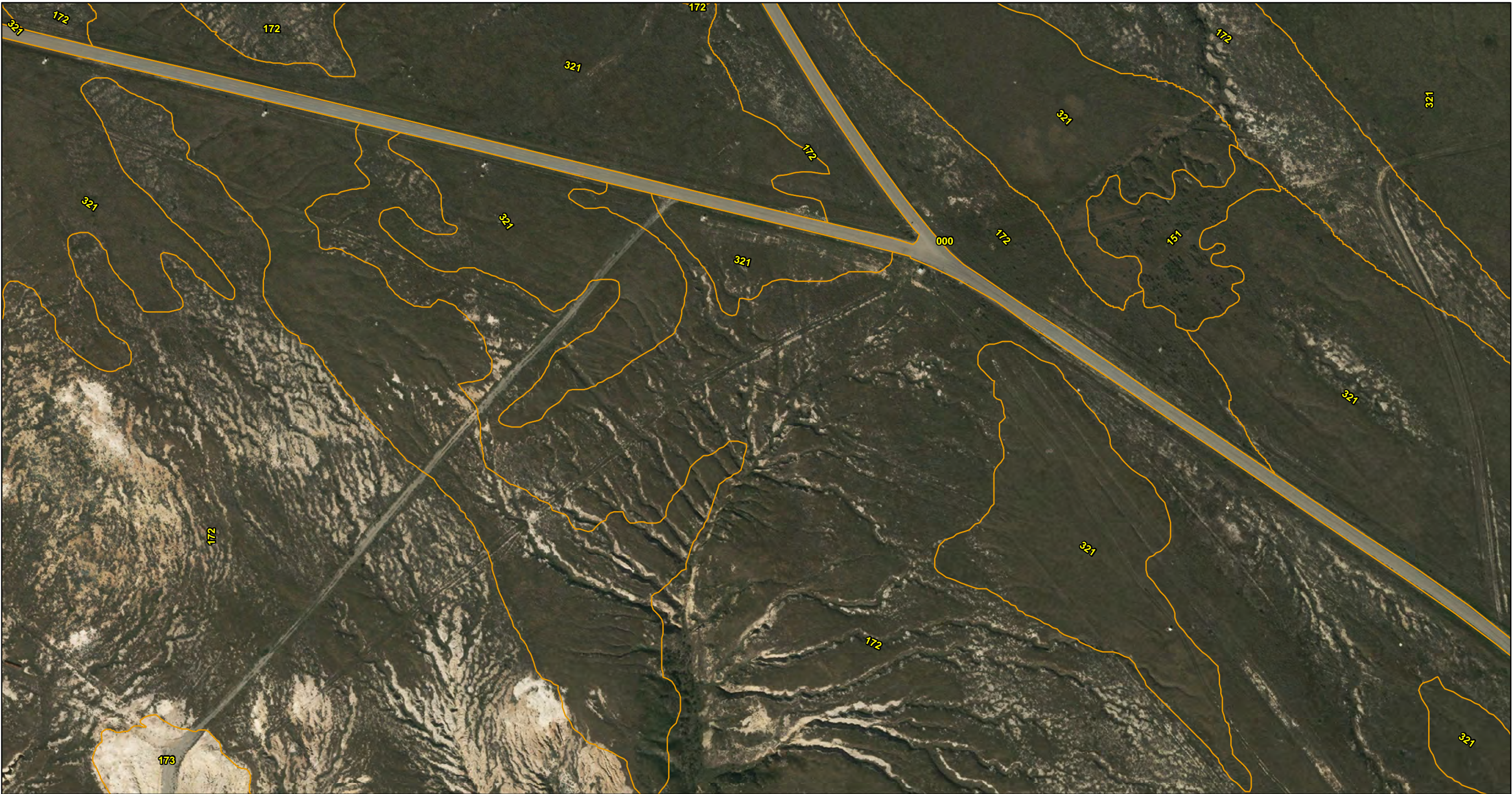
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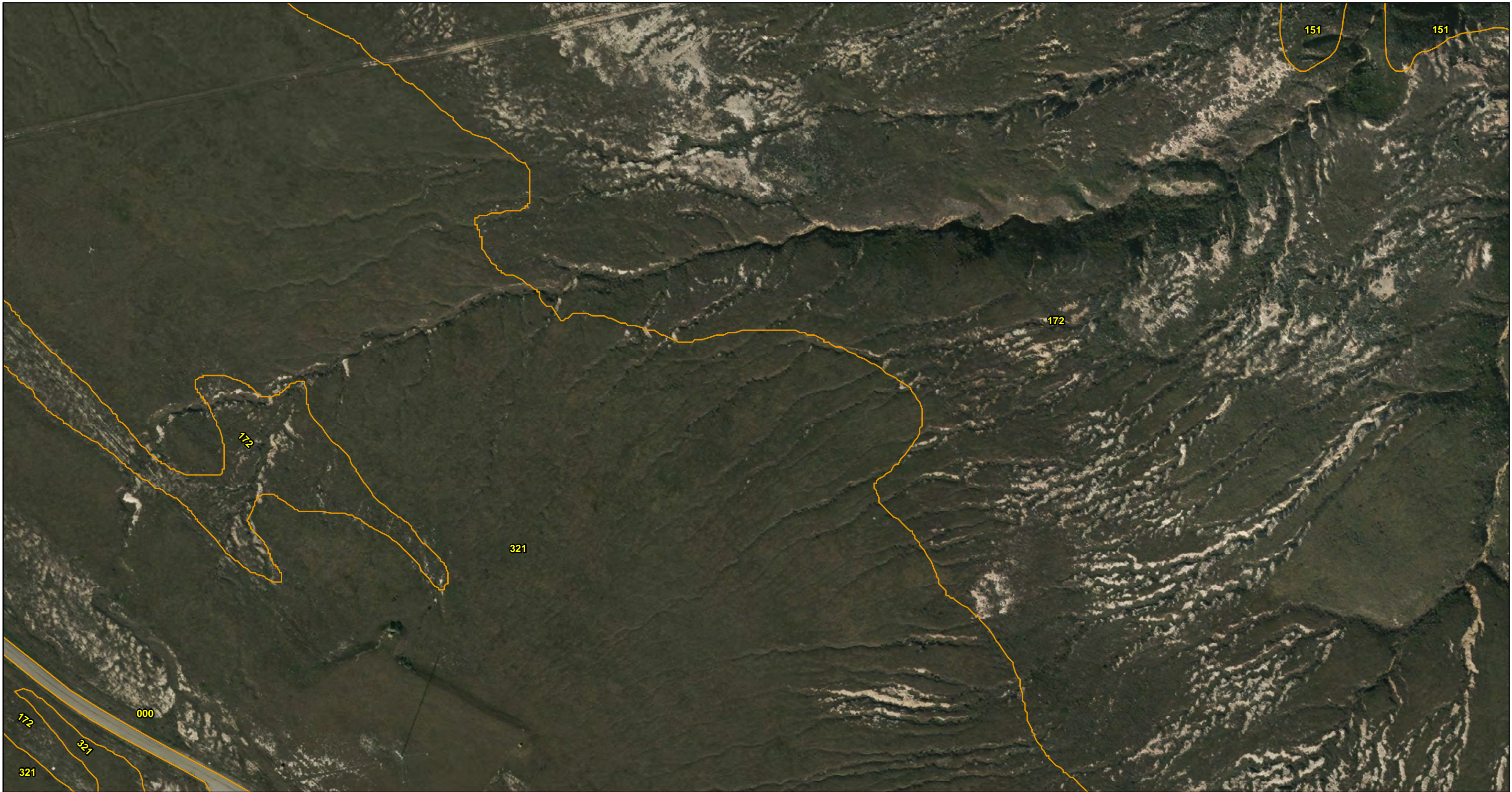
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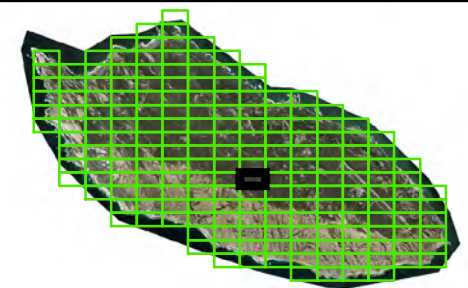
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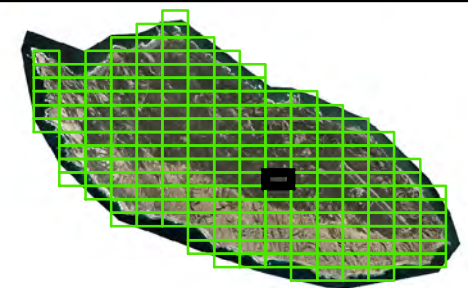
 Vegetation Classification Types



Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
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Projection: Lambert Conformal Conic  
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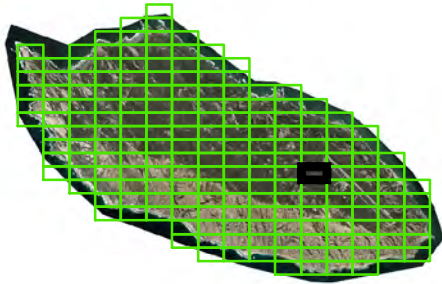
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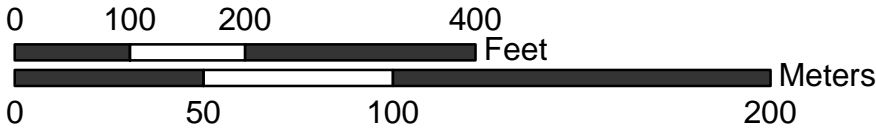
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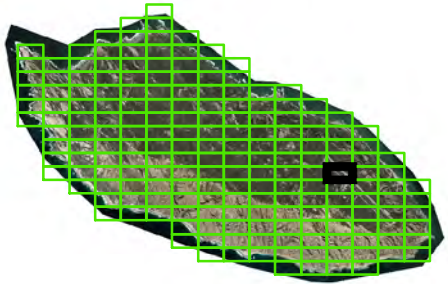
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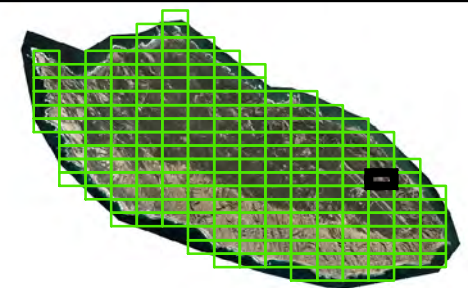
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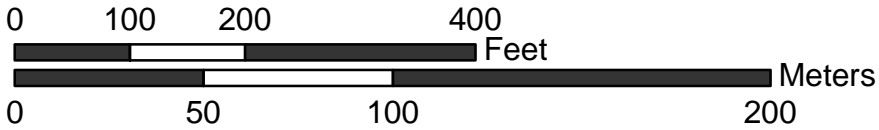
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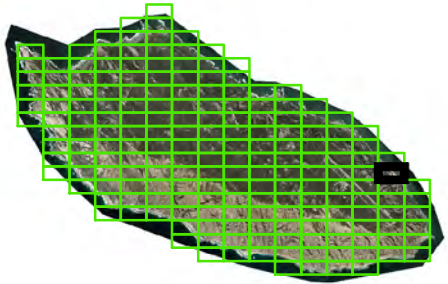
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Vegetation Classification

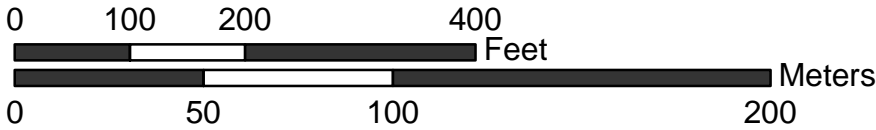
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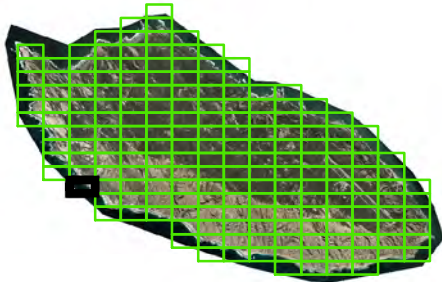
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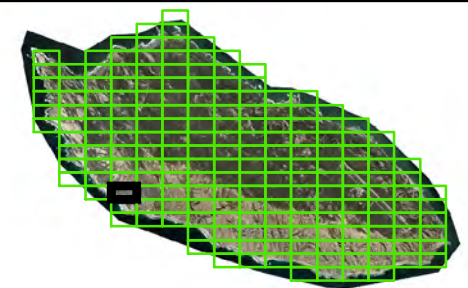
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Vegetation Classification

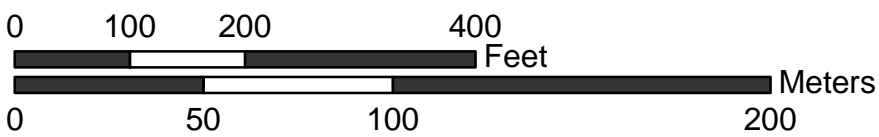
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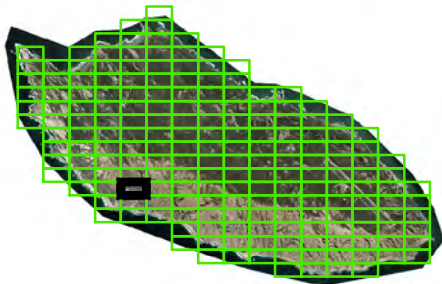
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North American Datum of 1983

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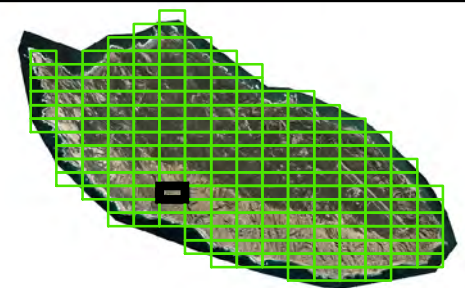
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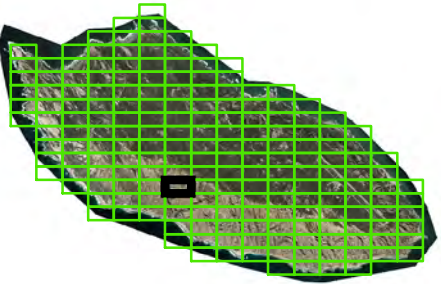
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Vegetation Classification

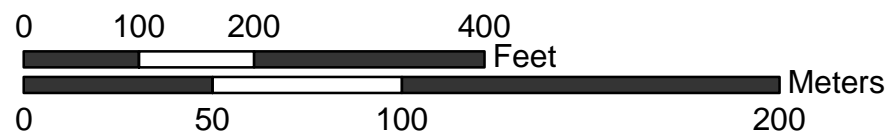
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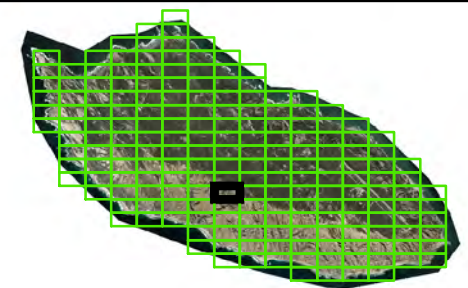
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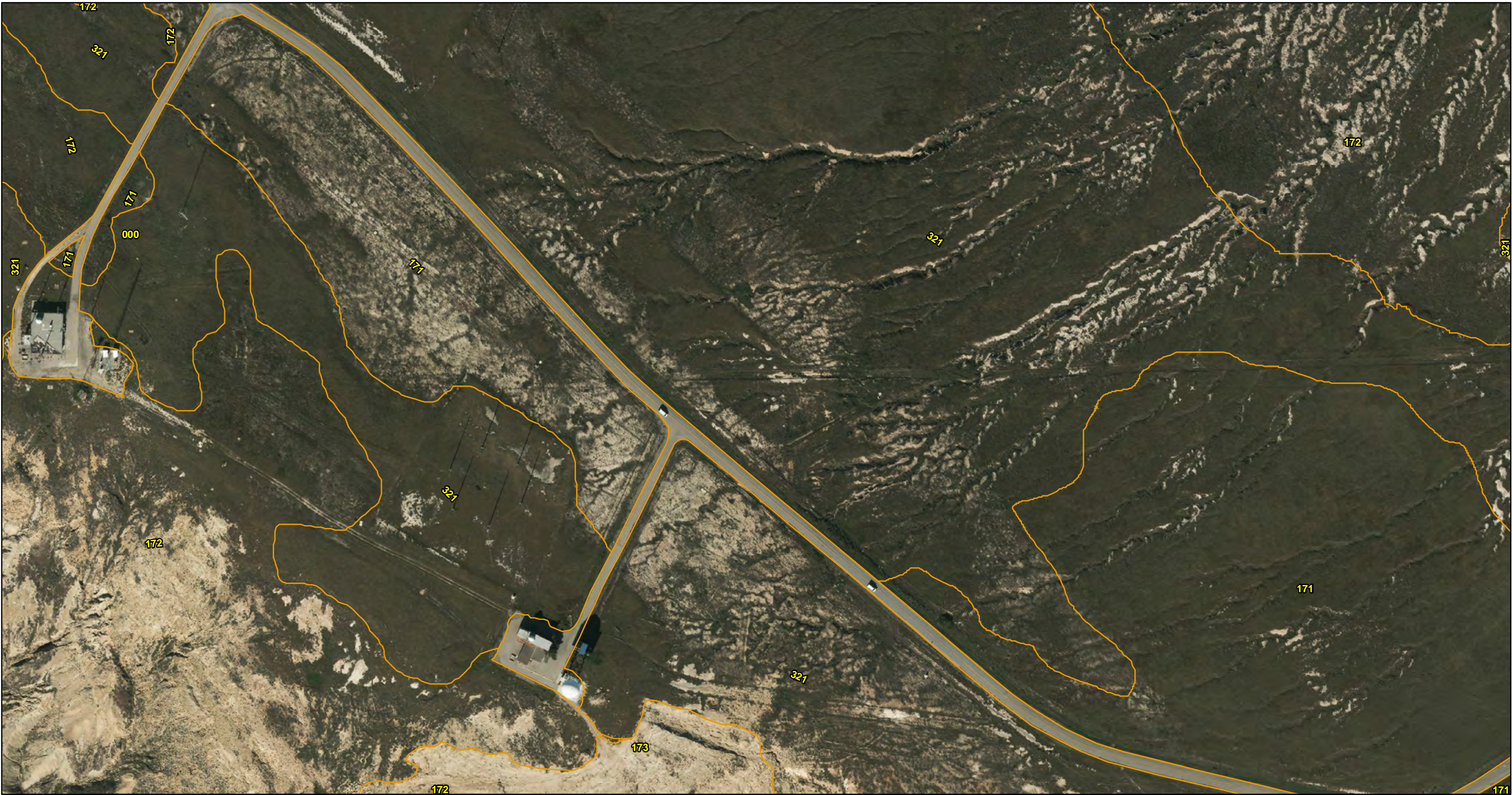
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Vegetation Classification

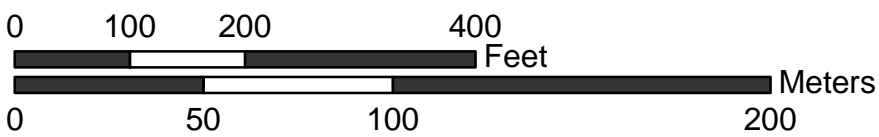
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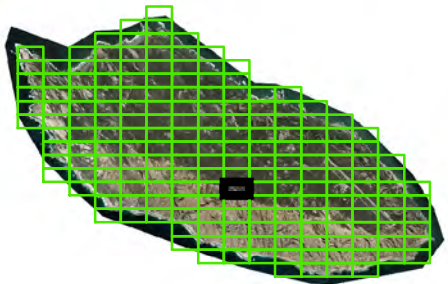
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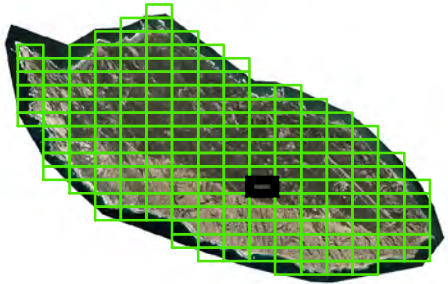
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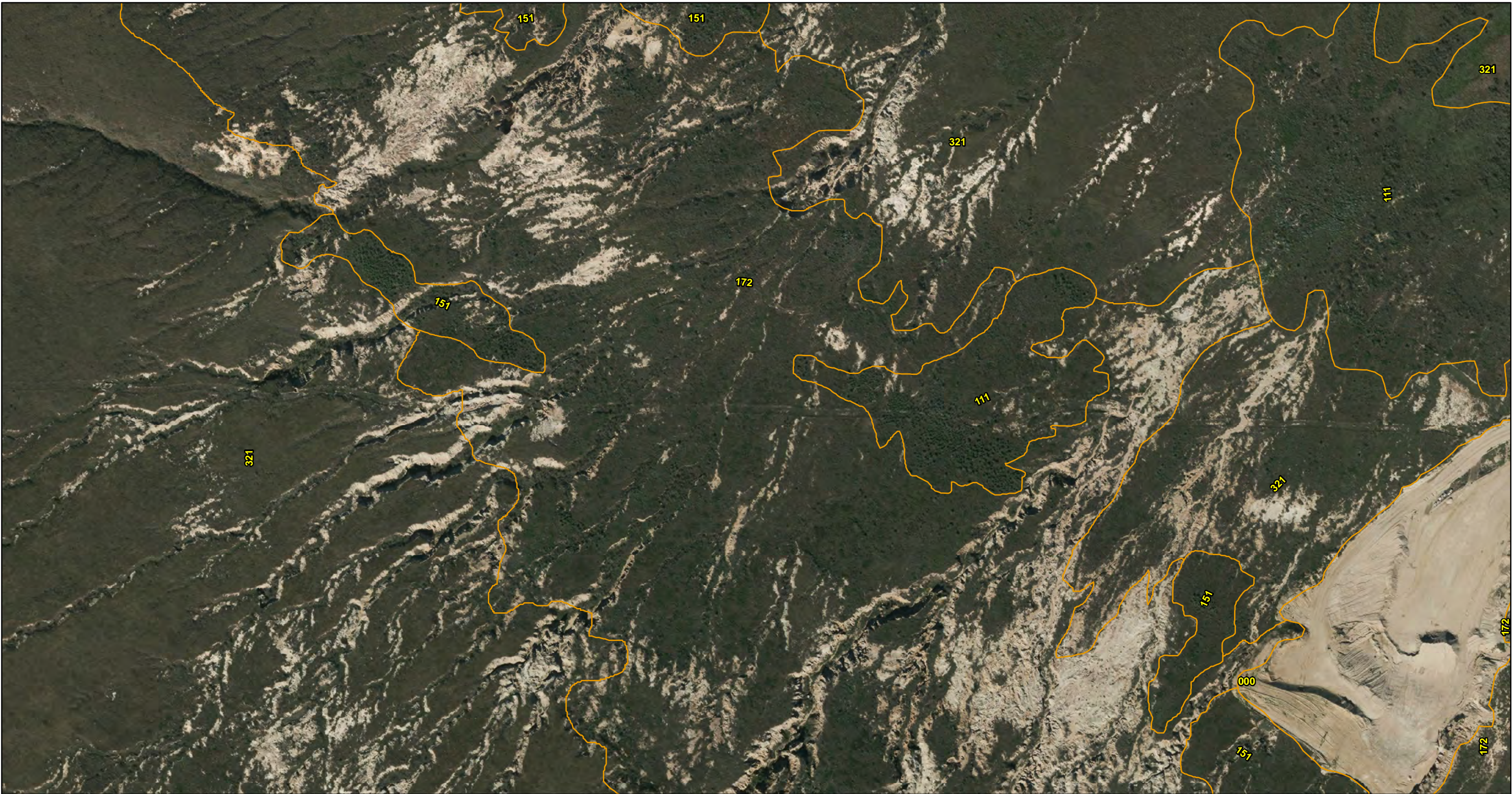
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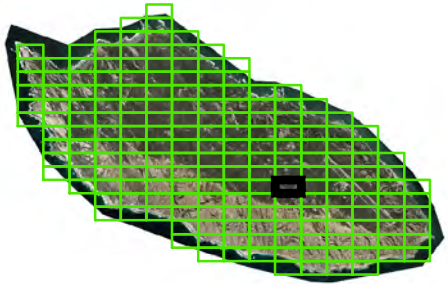
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North American Datum of 1983

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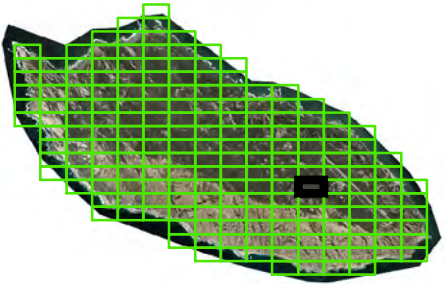
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North American Datum of 1983

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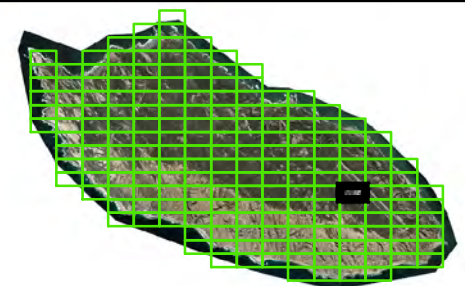
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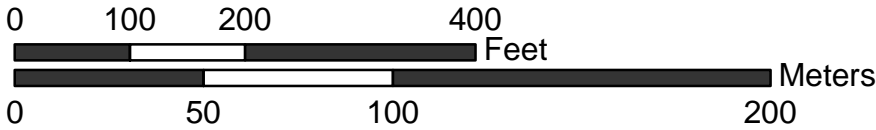
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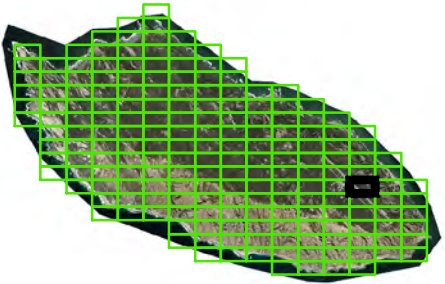
 Vegetation Classification Types



Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
North American Datum of 1983

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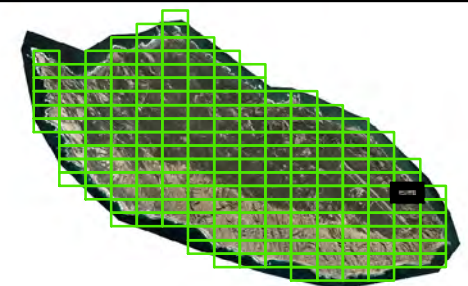
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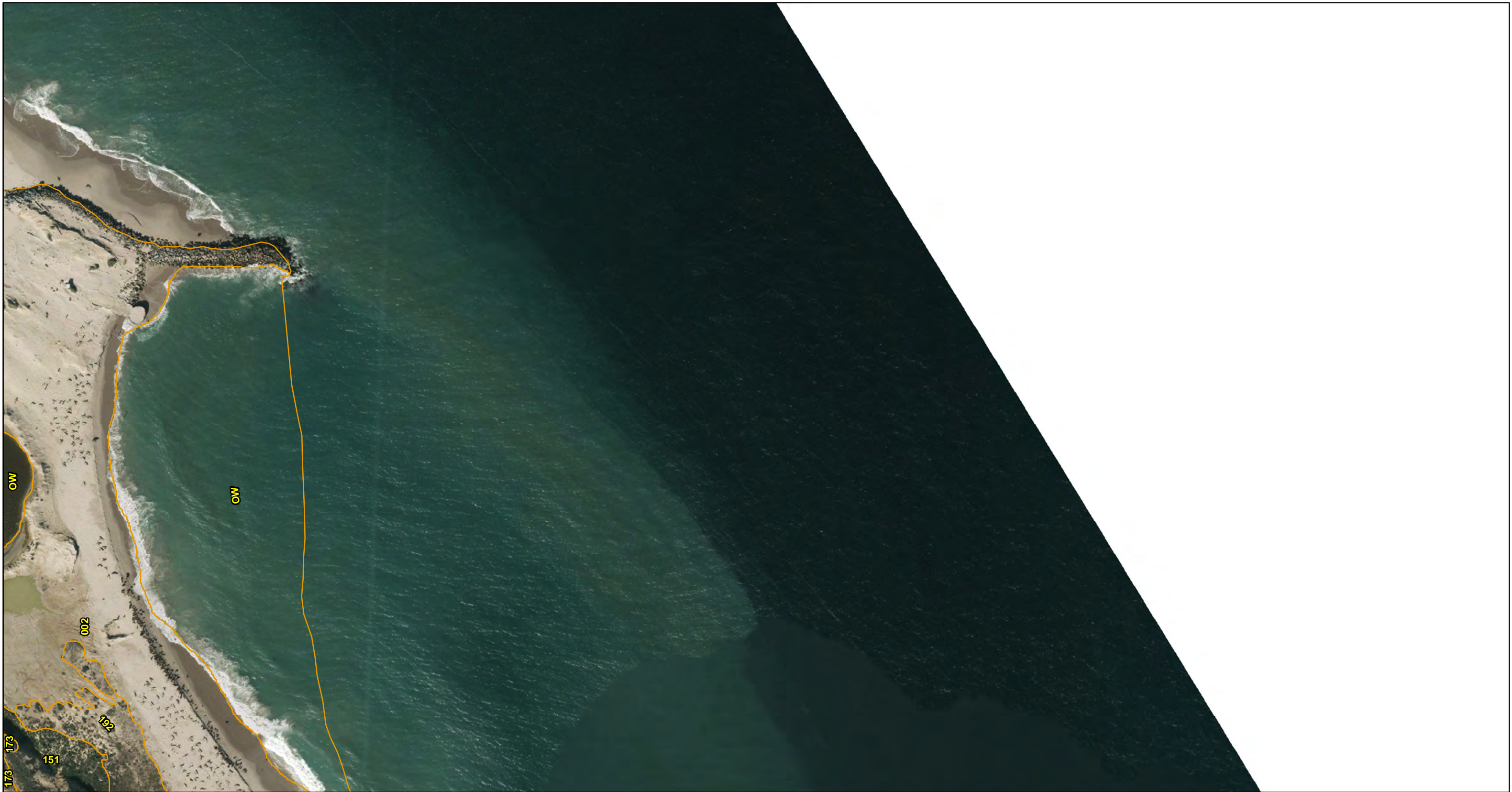
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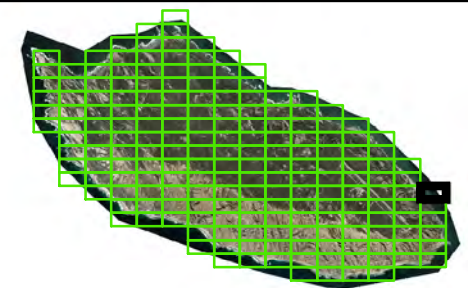
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Vegetation Classification

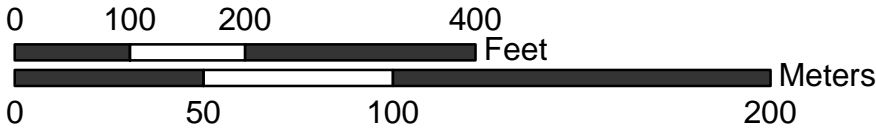
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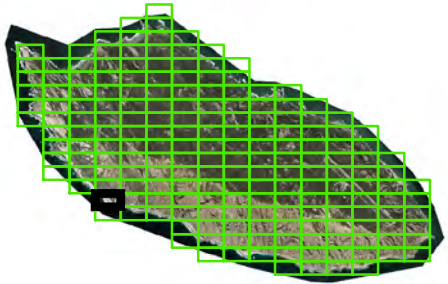
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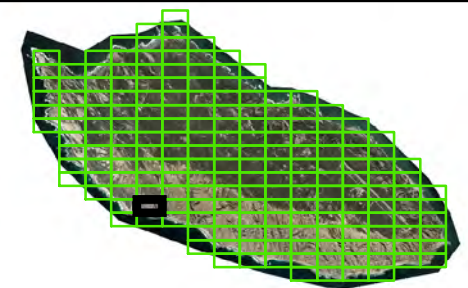
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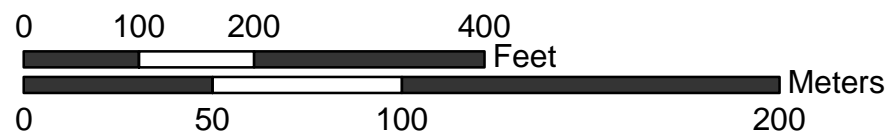
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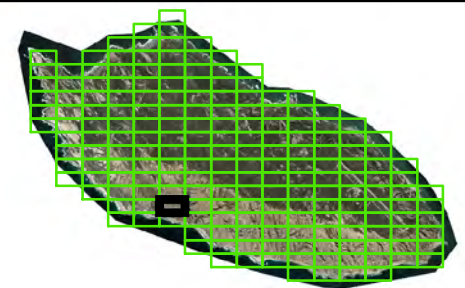
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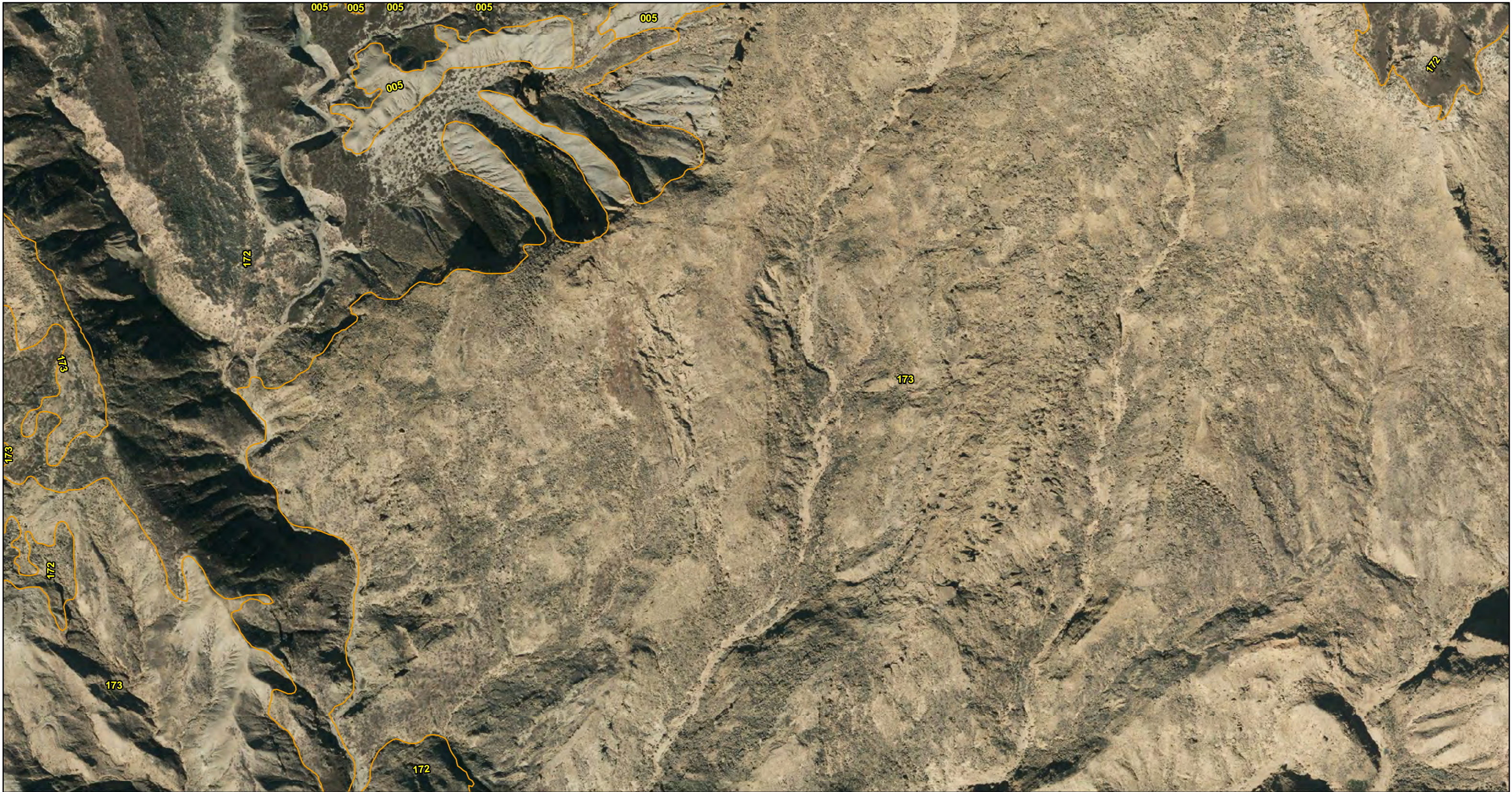
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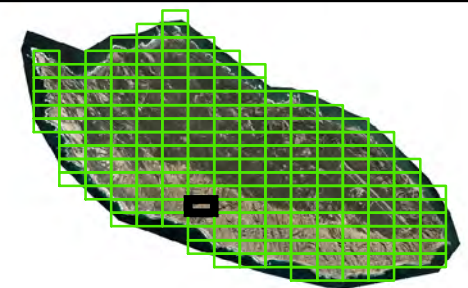
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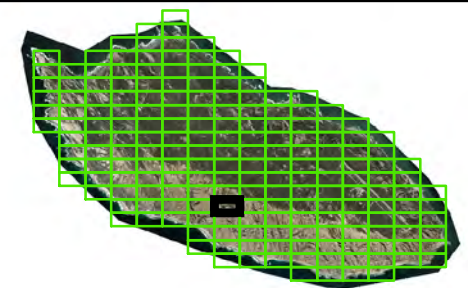
 Vegetation Classification Types



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State Plane California VI FIPS 0406 feet  
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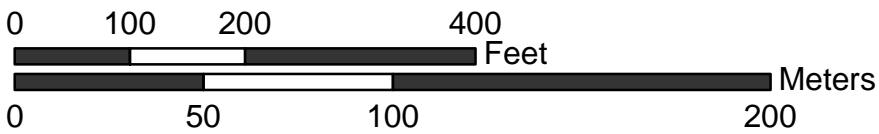
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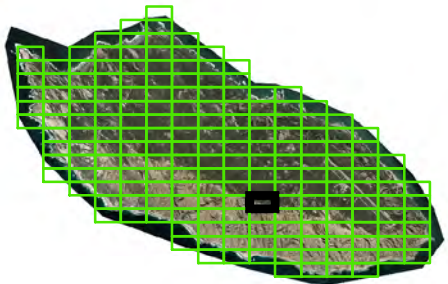
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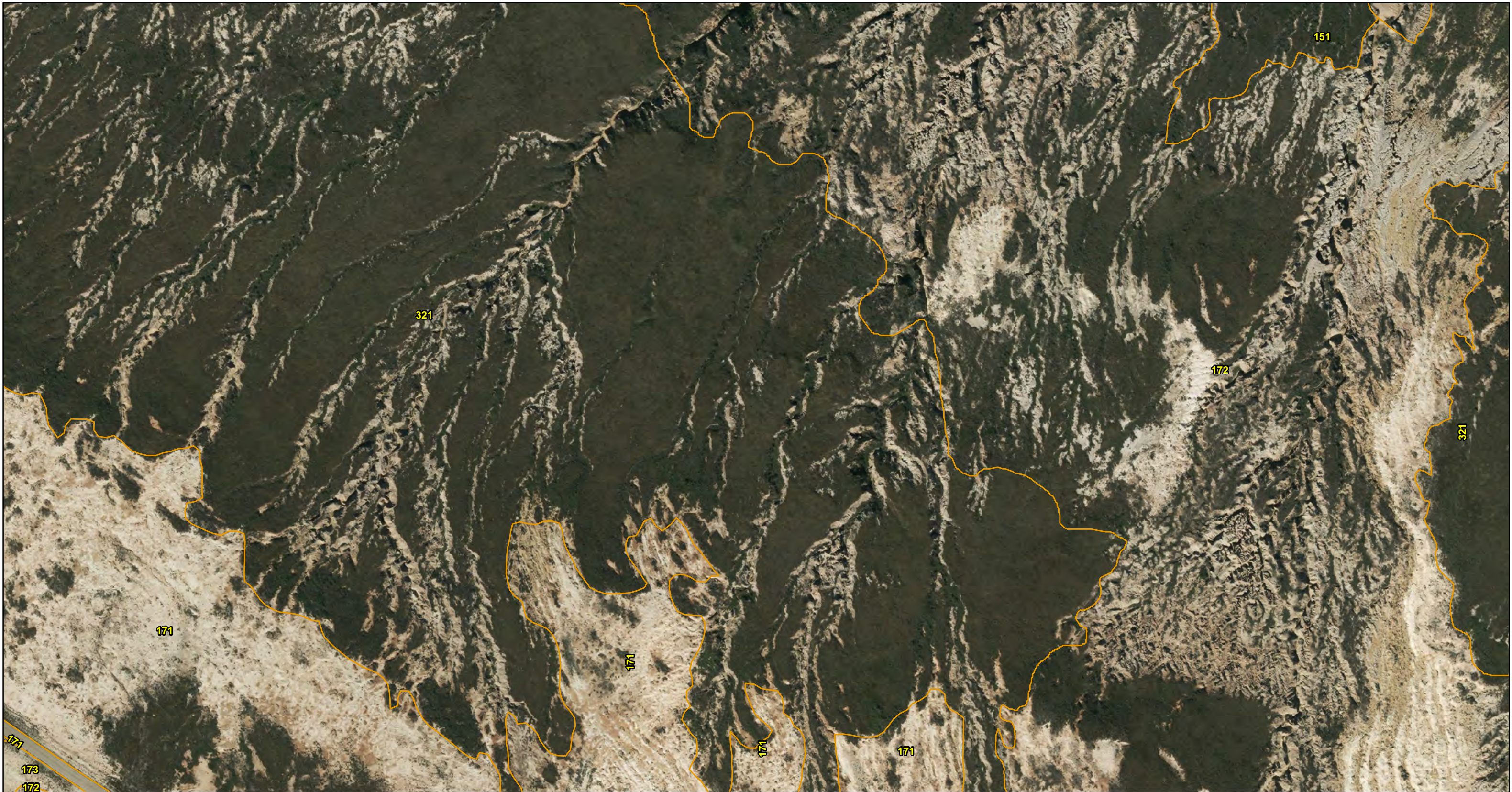
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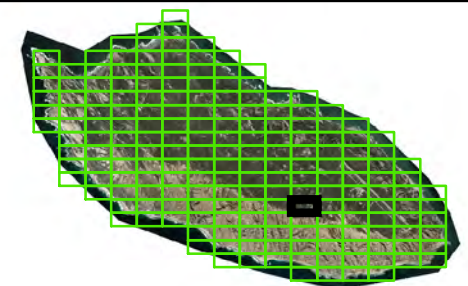
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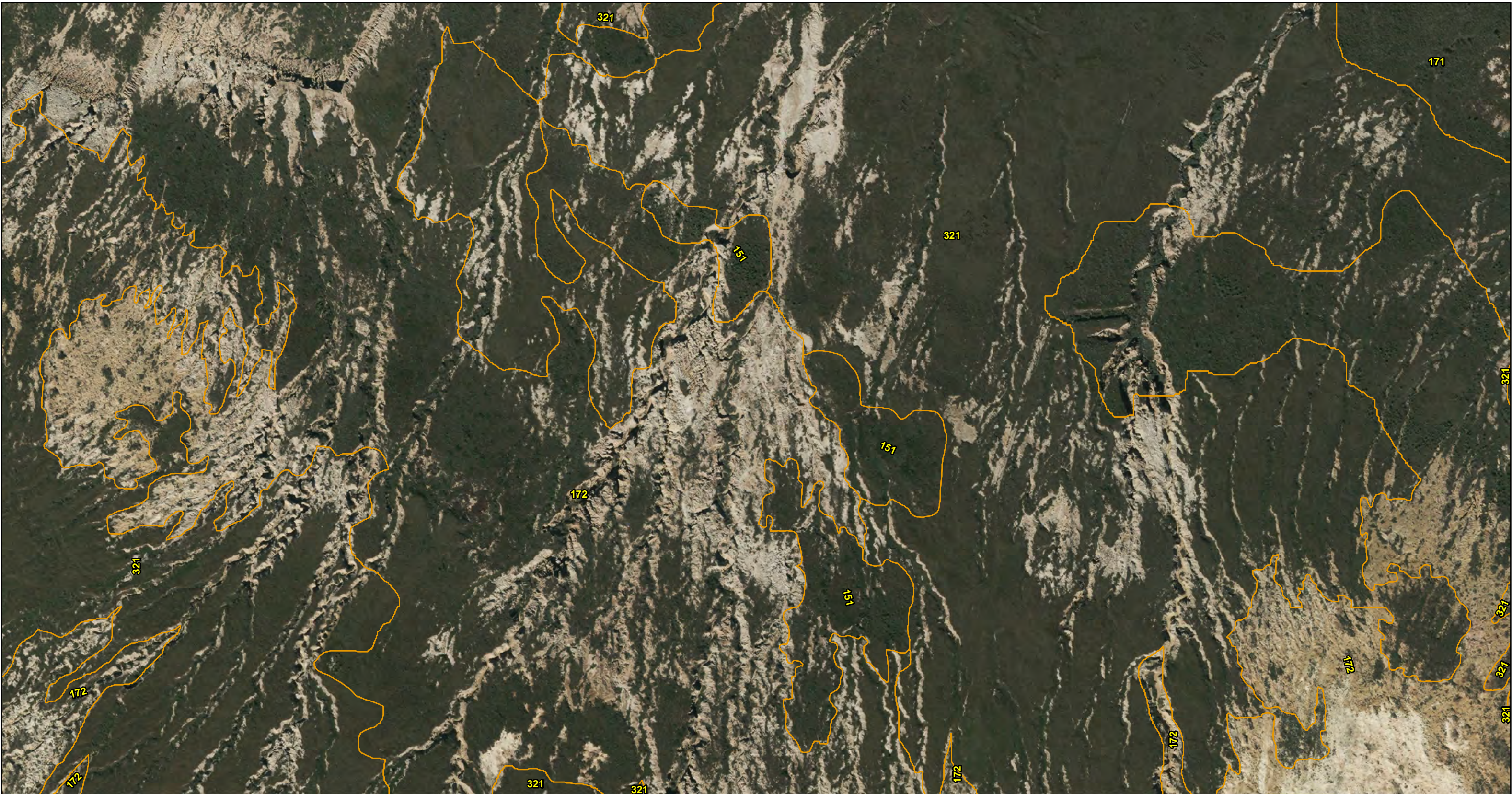
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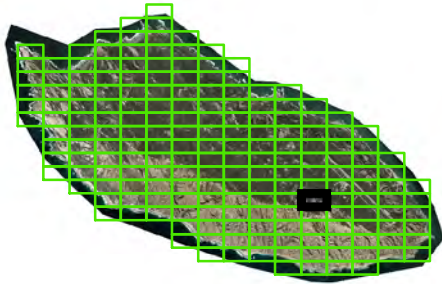
Vegetation Classification Types



Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

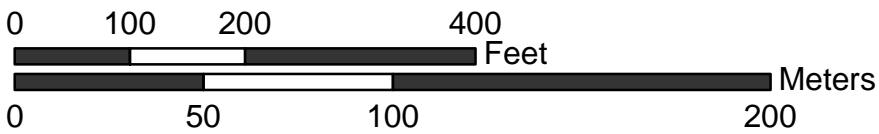
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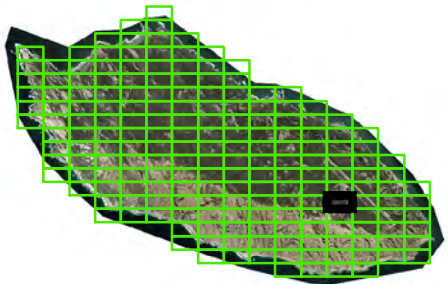
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

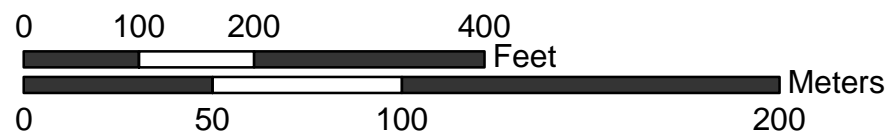
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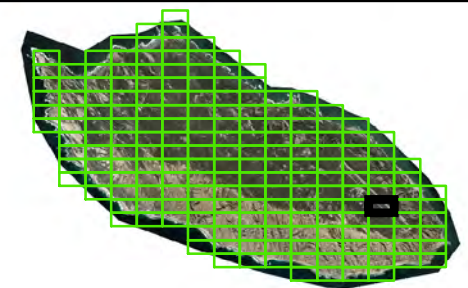
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

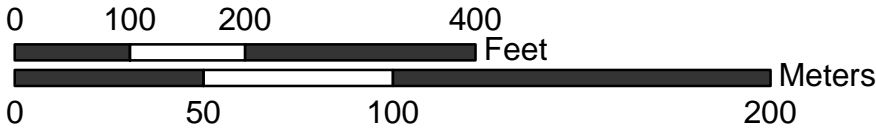
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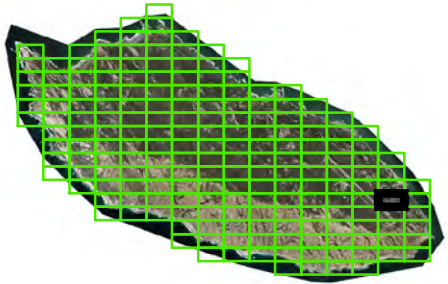
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North American Datum of 1983

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Vegetation Classification

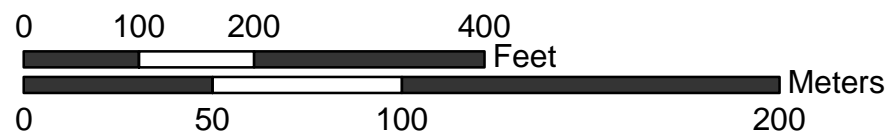
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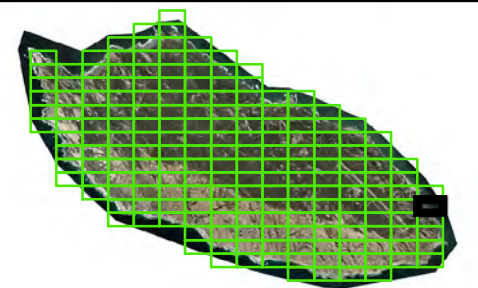
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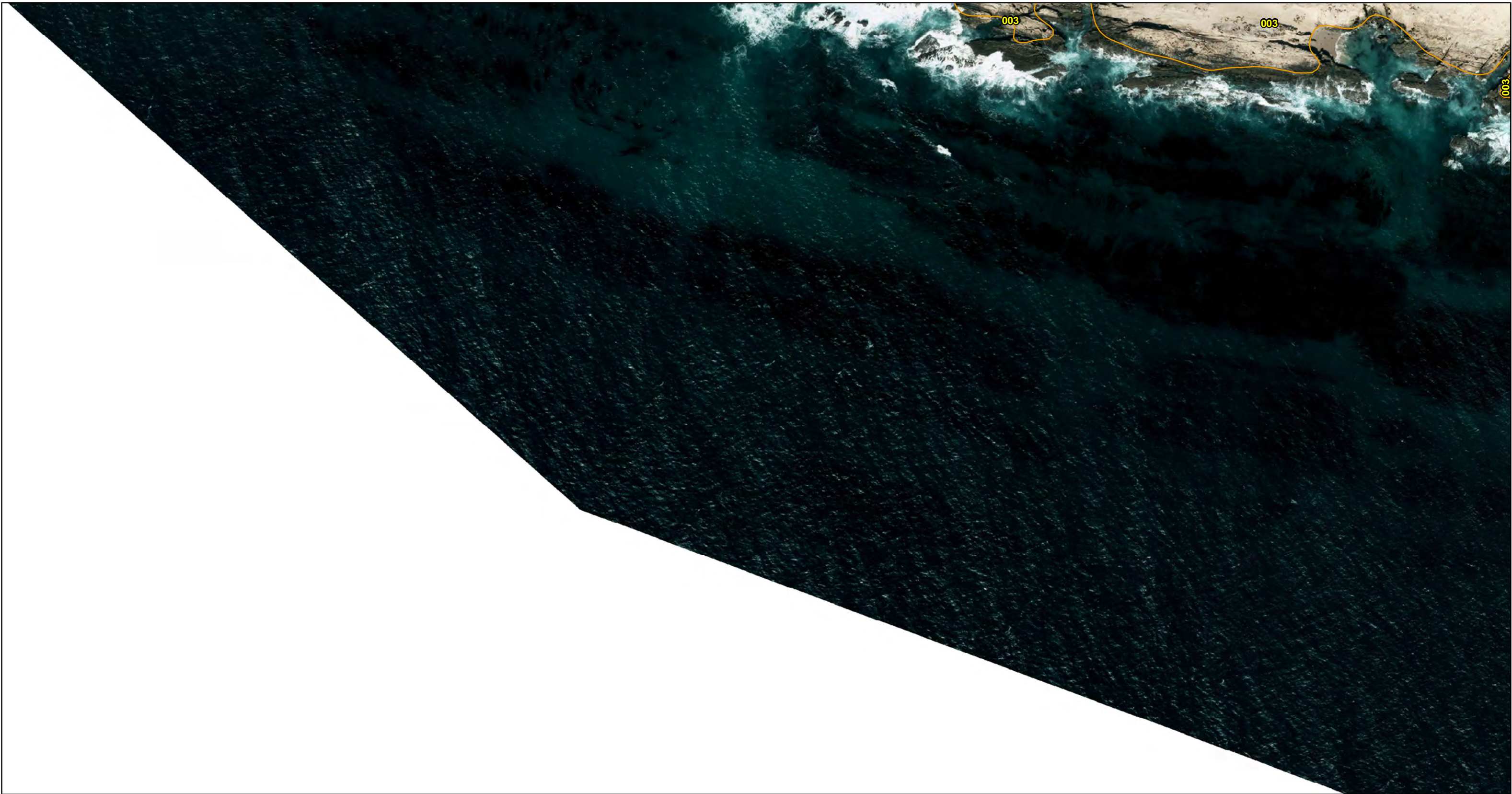
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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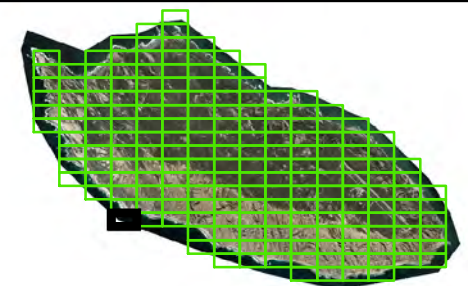
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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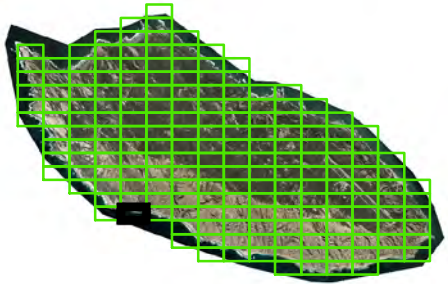
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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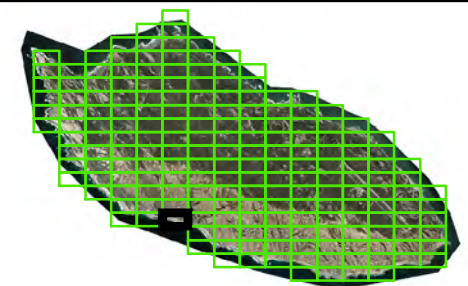
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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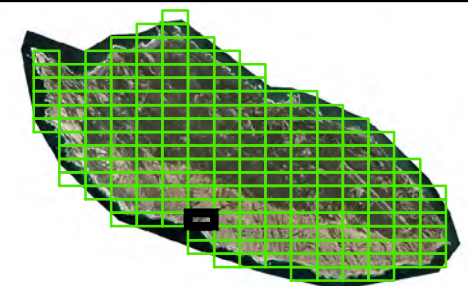
Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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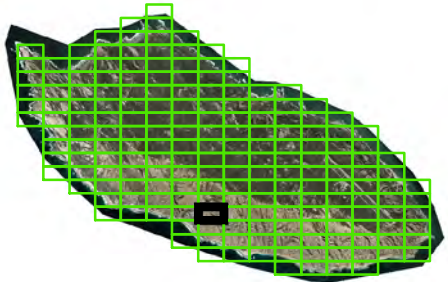
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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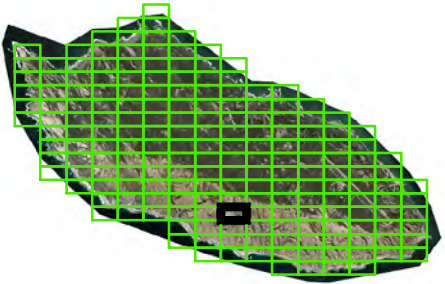
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Vegetation Classification

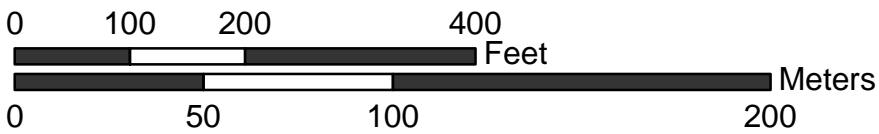
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 Vegetation Classification Types



Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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Vegetation Classification Types



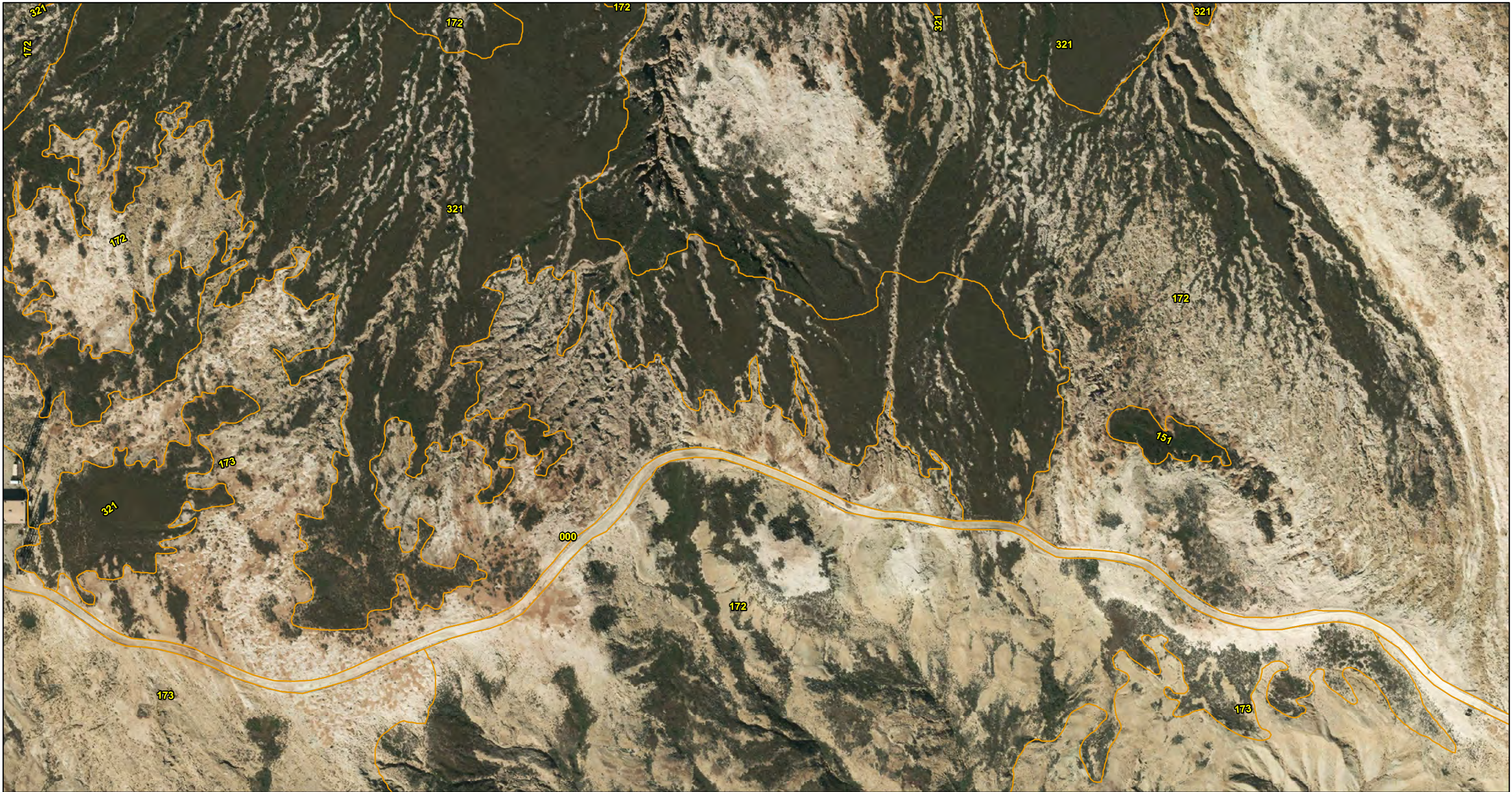
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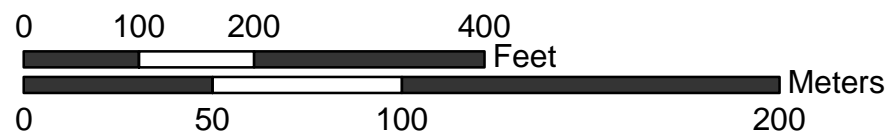
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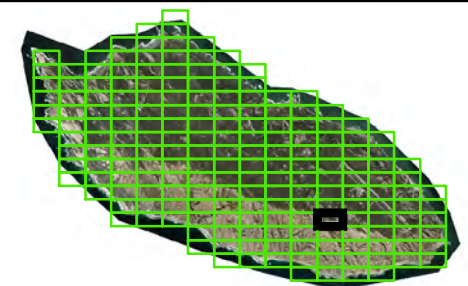
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Vegetation Classification

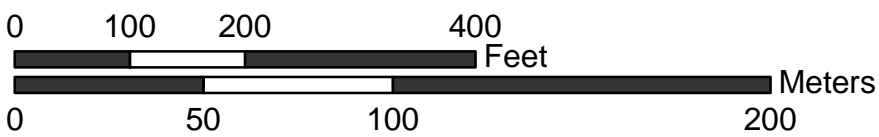
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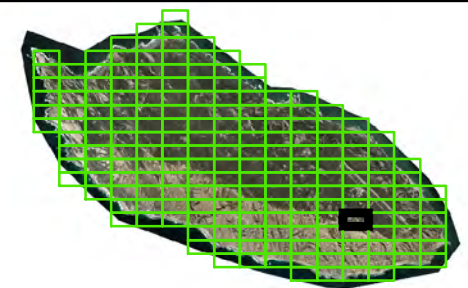
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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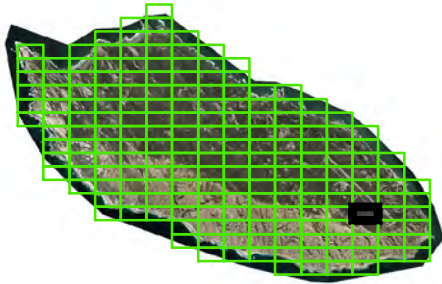
Vegetation Classification Types



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State Plane California VI FIPS 0406 feet  
North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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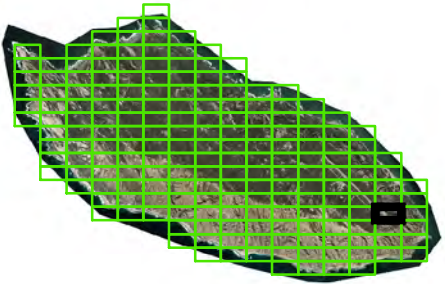
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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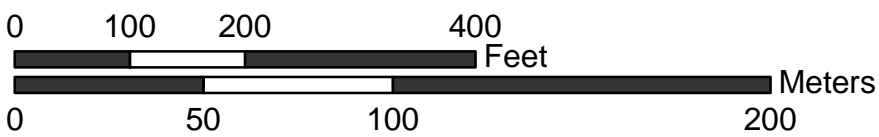








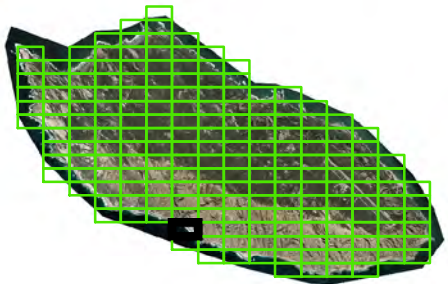
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Vegetation Classification

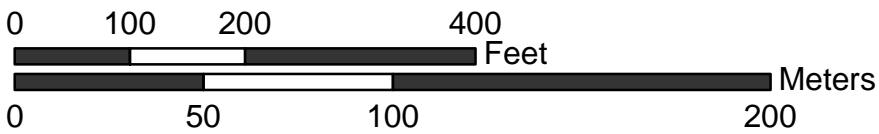
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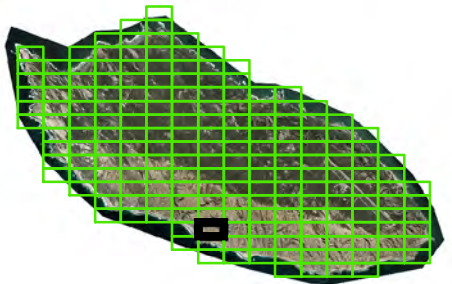
 Vegetation Classification Types



Projection: Lambert Conformal Conic  
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North American Datum of 1983

NBVC San Nicolas Island  
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Vegetation Classification Types



Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

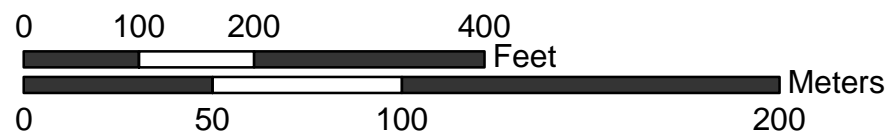
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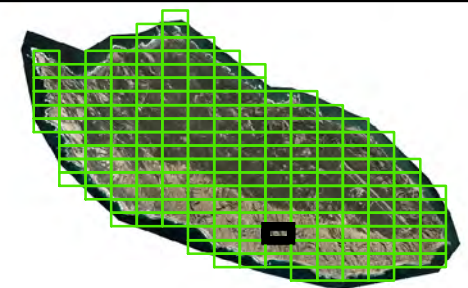
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Vegetation Classification

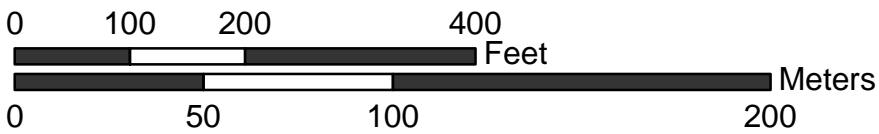
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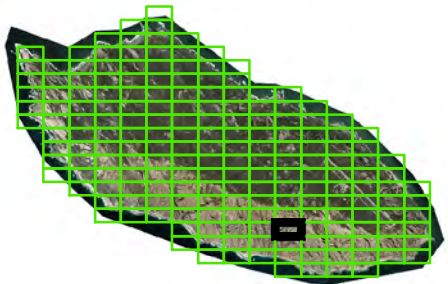
 Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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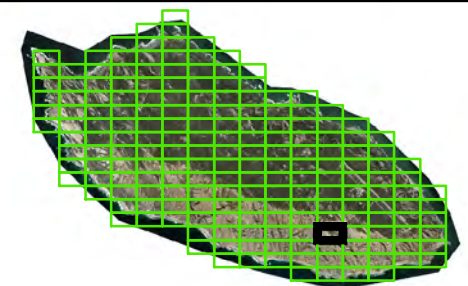
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Vegetation Classification

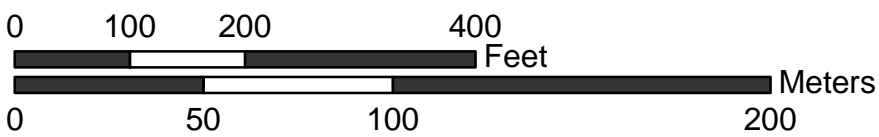
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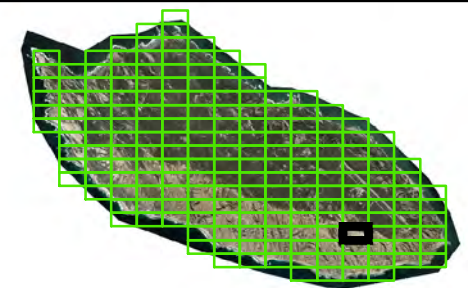
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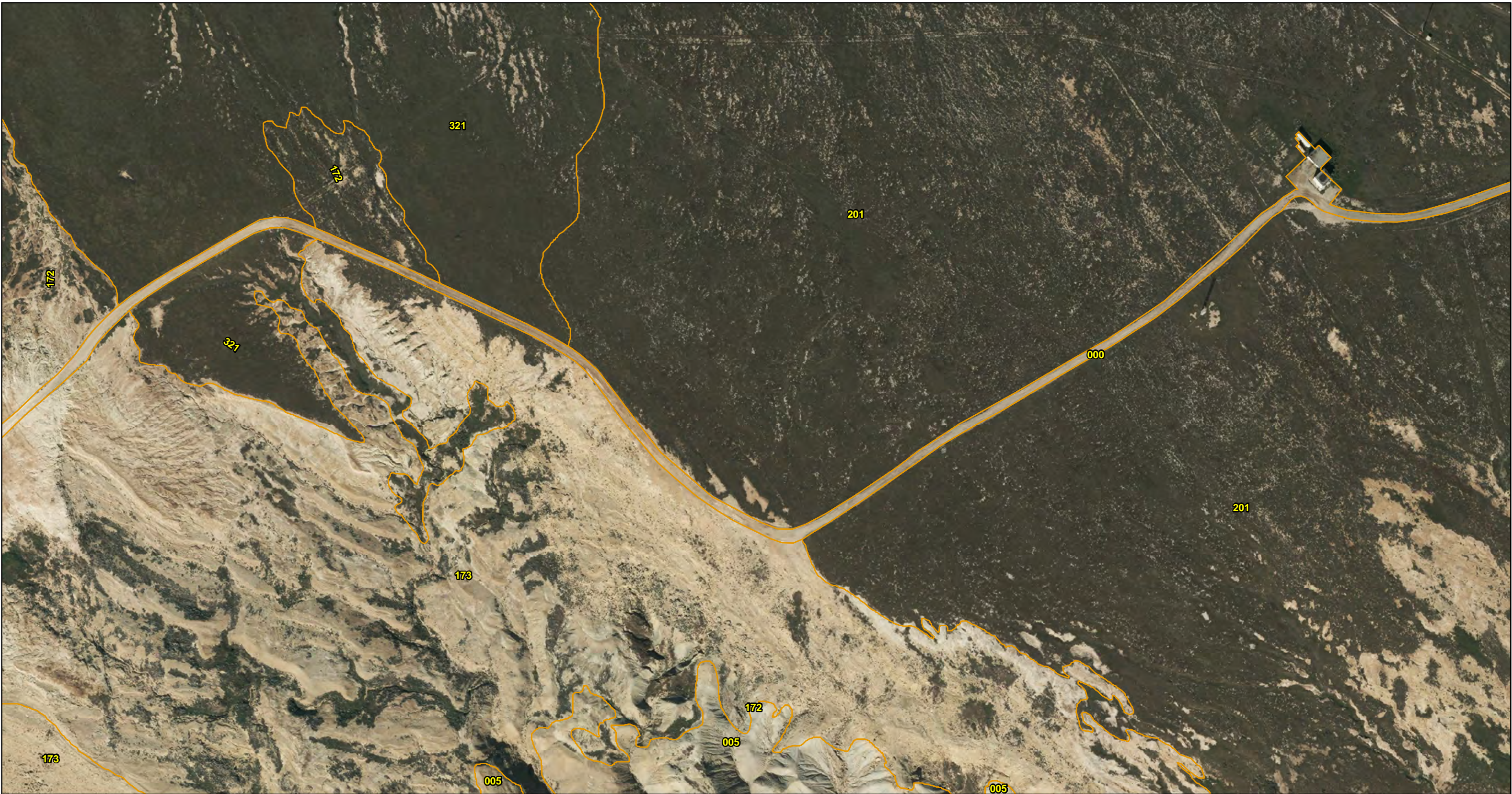
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NBVC San Nicolas Island  
Vegetation Classification

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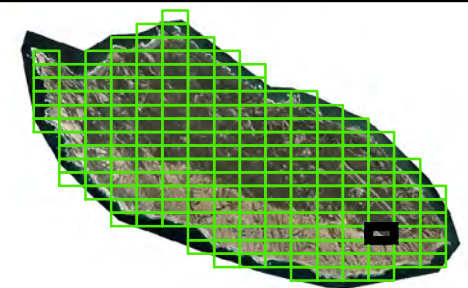
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Vegetation Classification

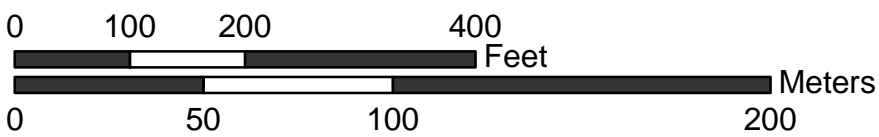
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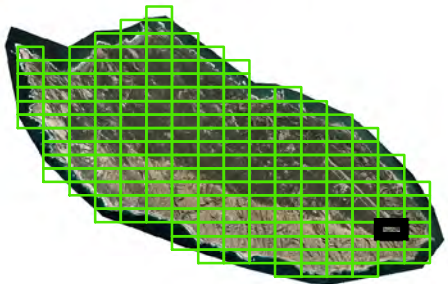
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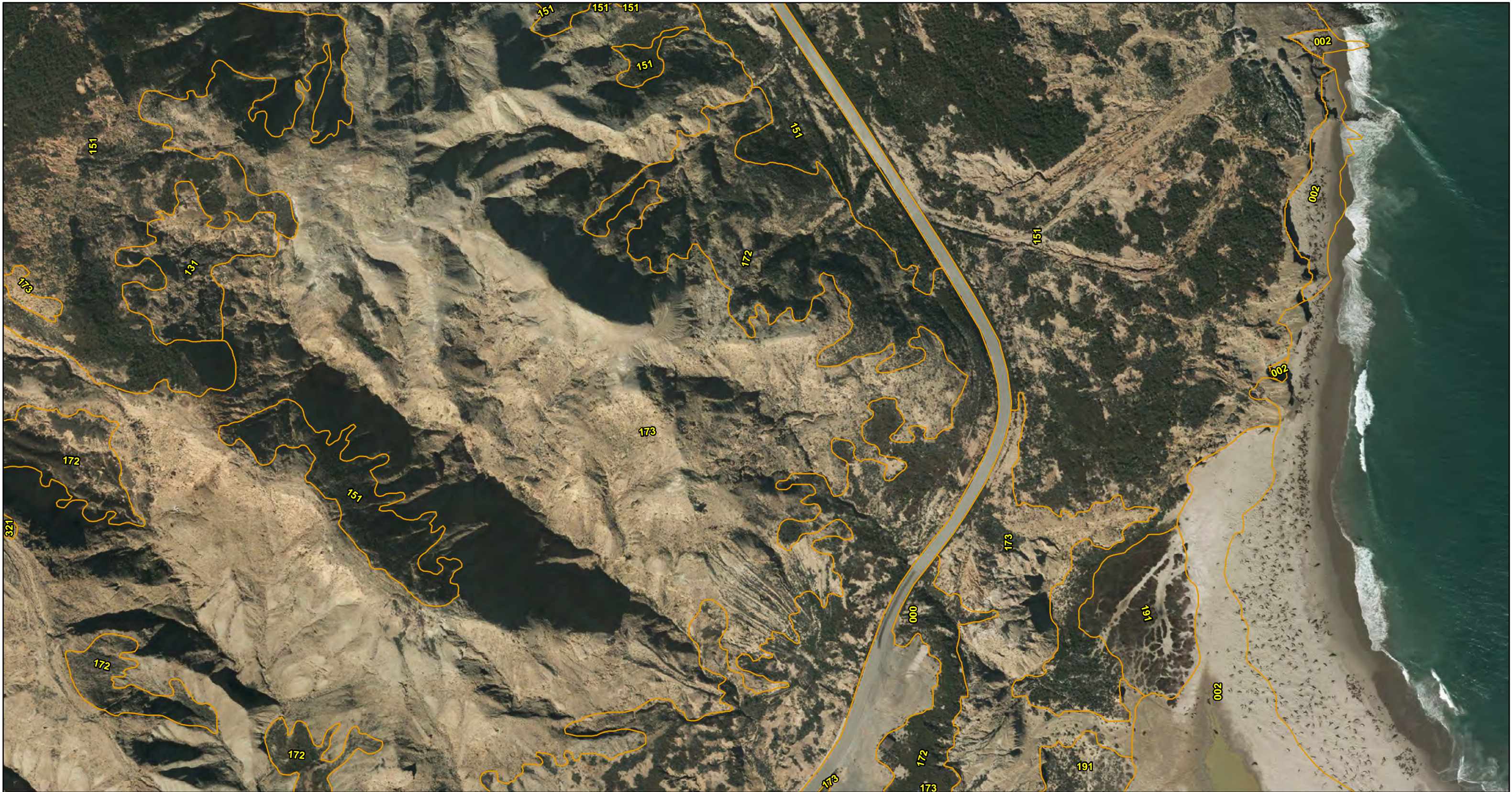
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NBVC San Nicolas Island  
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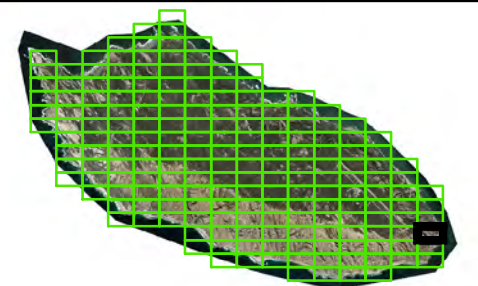
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Vegetation Classification

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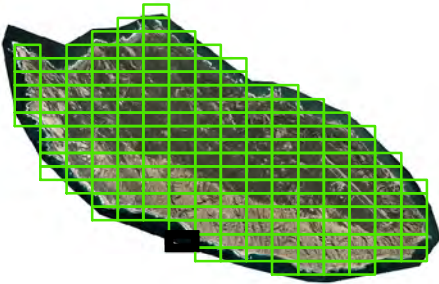
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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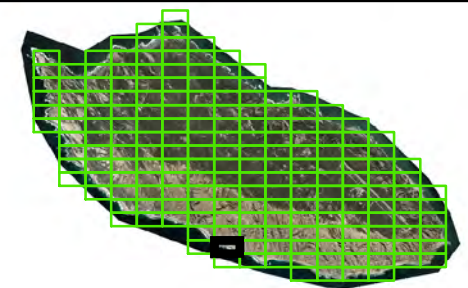
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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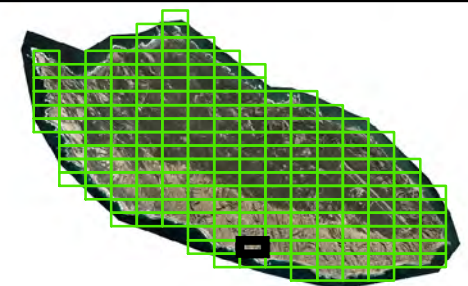
Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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Vegetation Classification Types



Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
North American Datum of 1983

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 Vegetation Classification Types



Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
North American Datum of 1983

NBVC San Nicolas Island  
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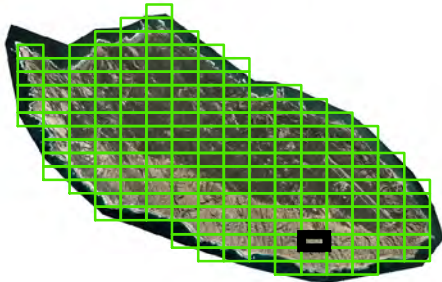
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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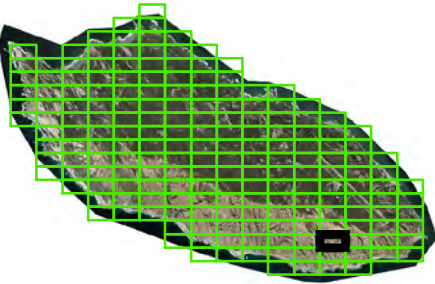
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Vegetation Classification

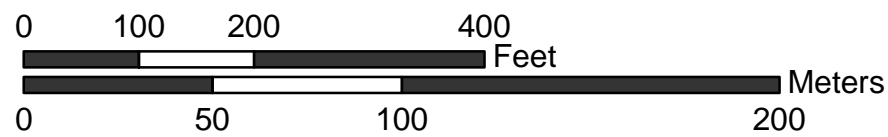
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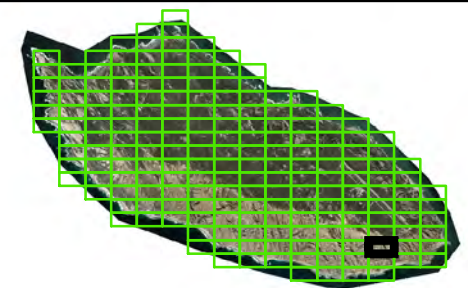
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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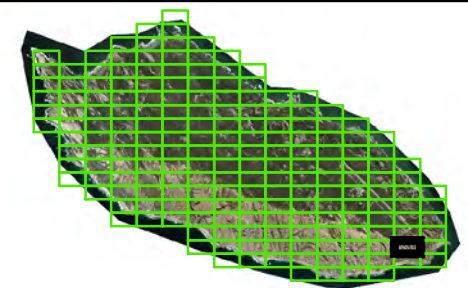
Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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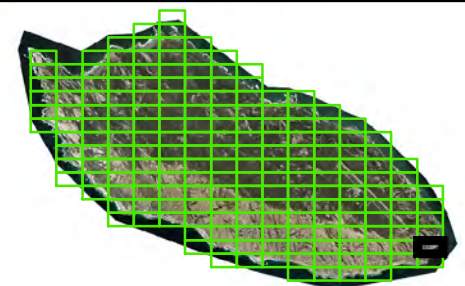
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Vegetation Classification

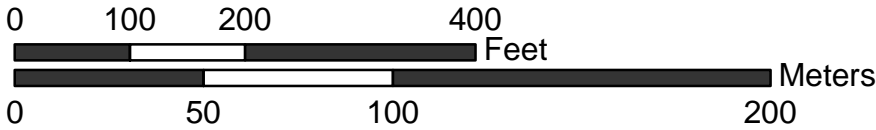
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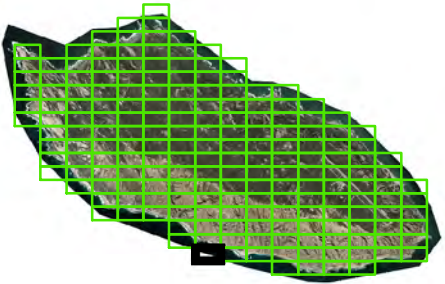
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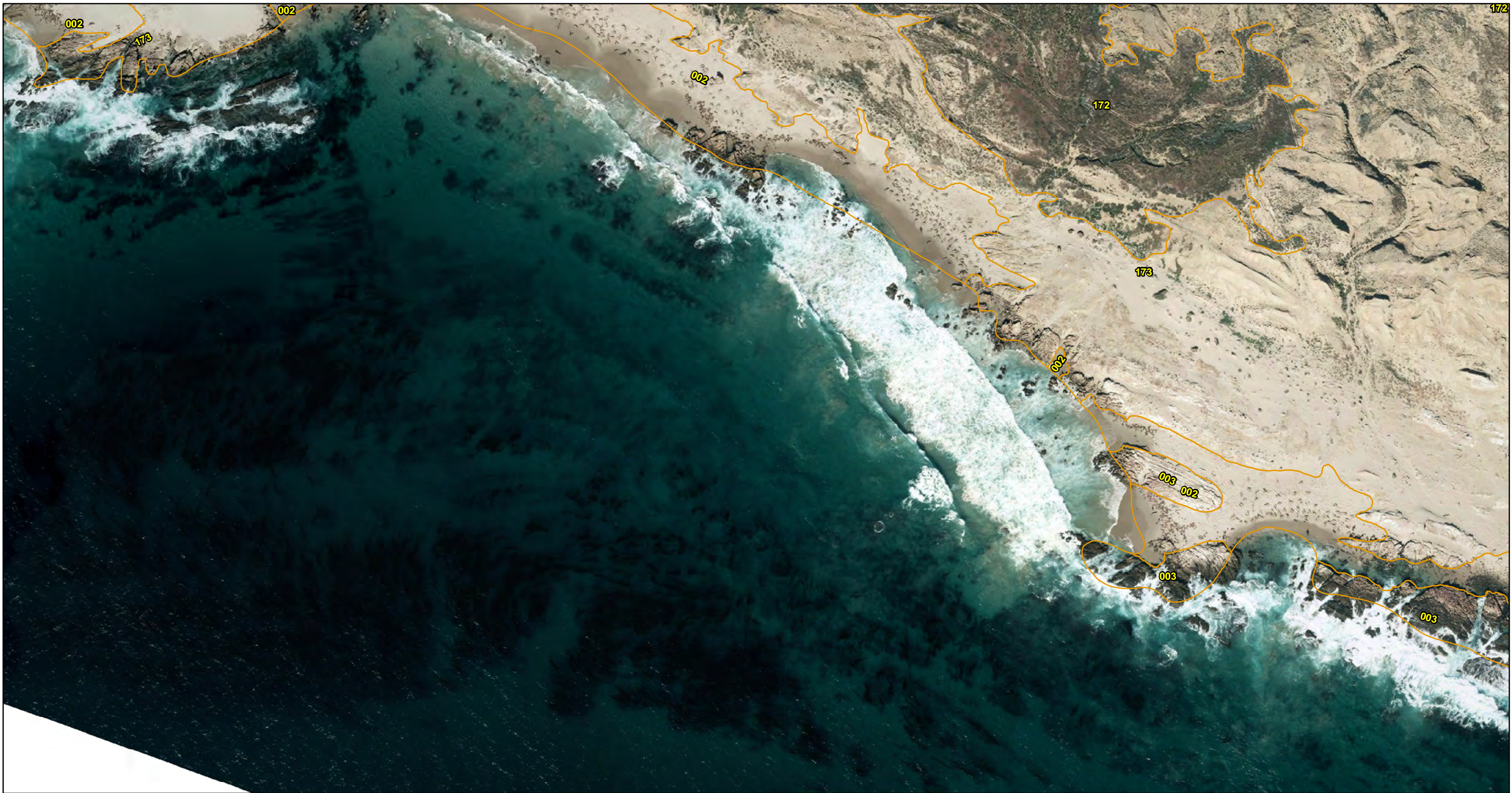
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NBVC San Nicolas Island  
Vegetation Classification

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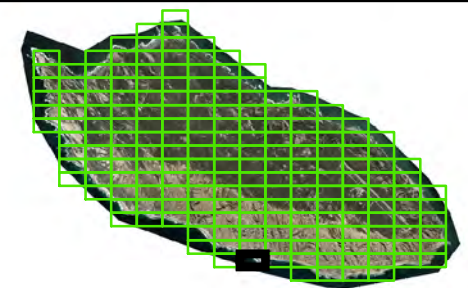
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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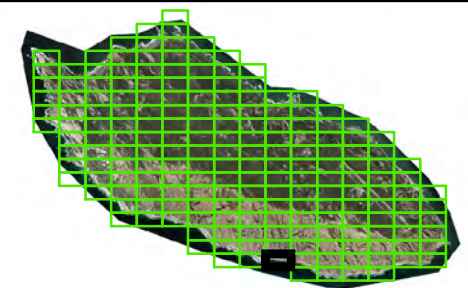
 Vegetation Classification Types



Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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Vegetation Classification Types



Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
North American Datum of 1983

NBVC San Nicolas Island  
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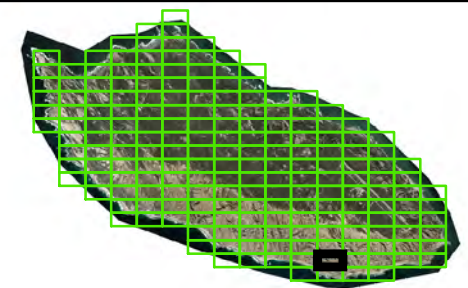
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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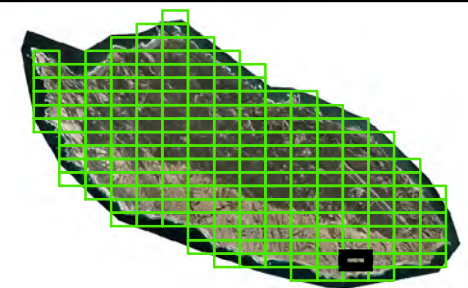
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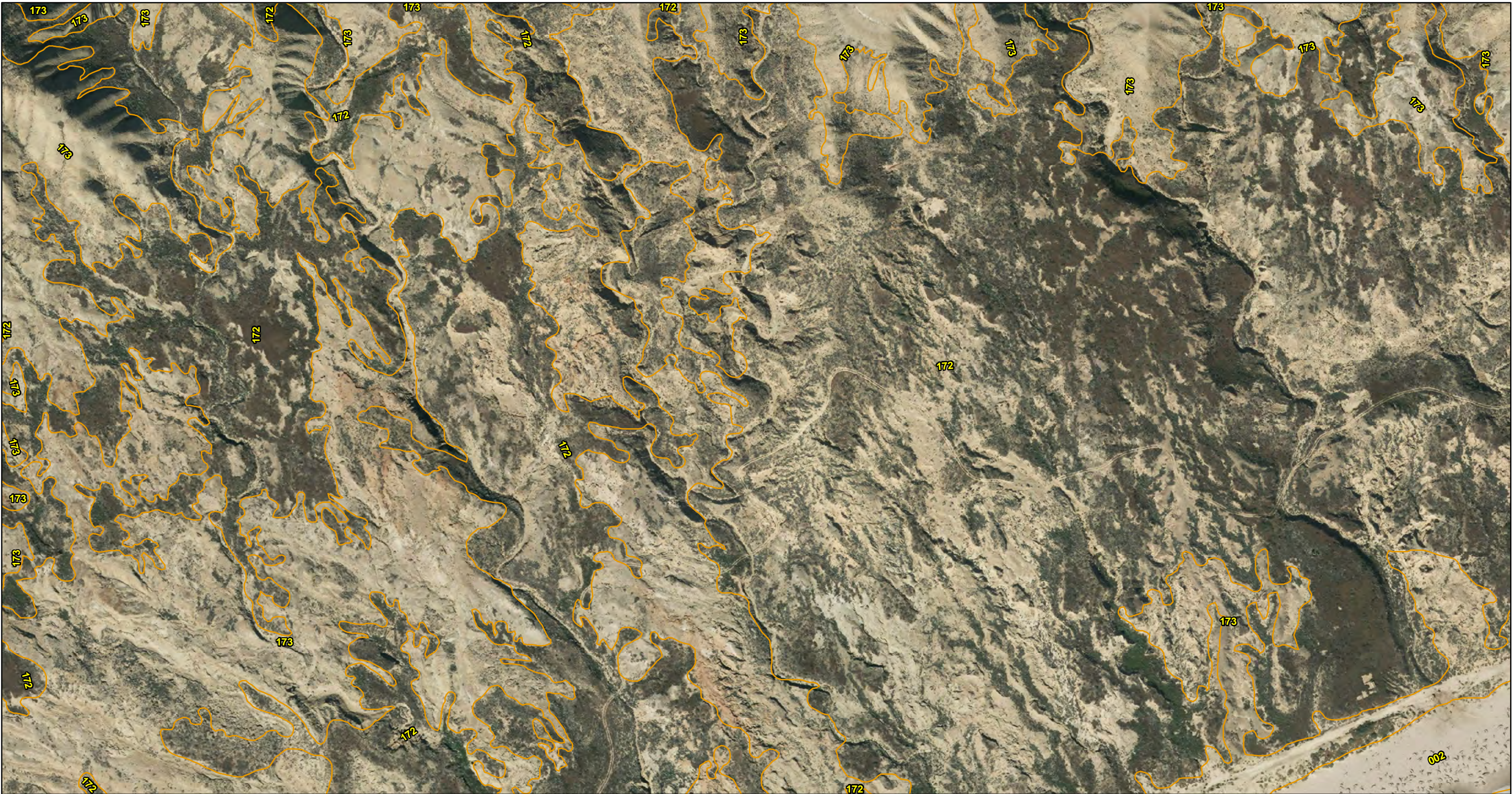
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NBVC San Nicolas Island  
Vegetation Classification

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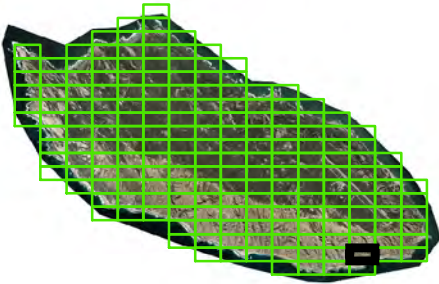
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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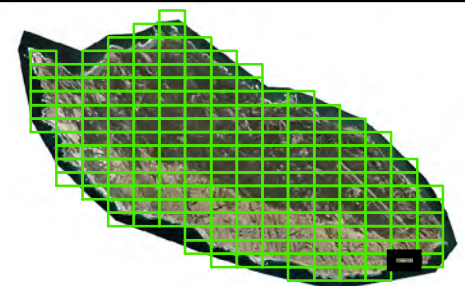
Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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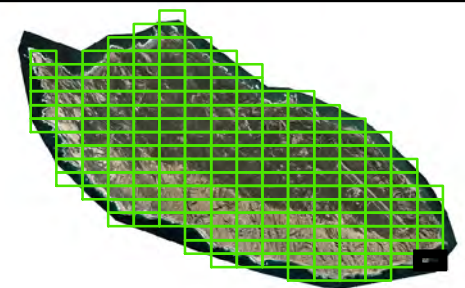
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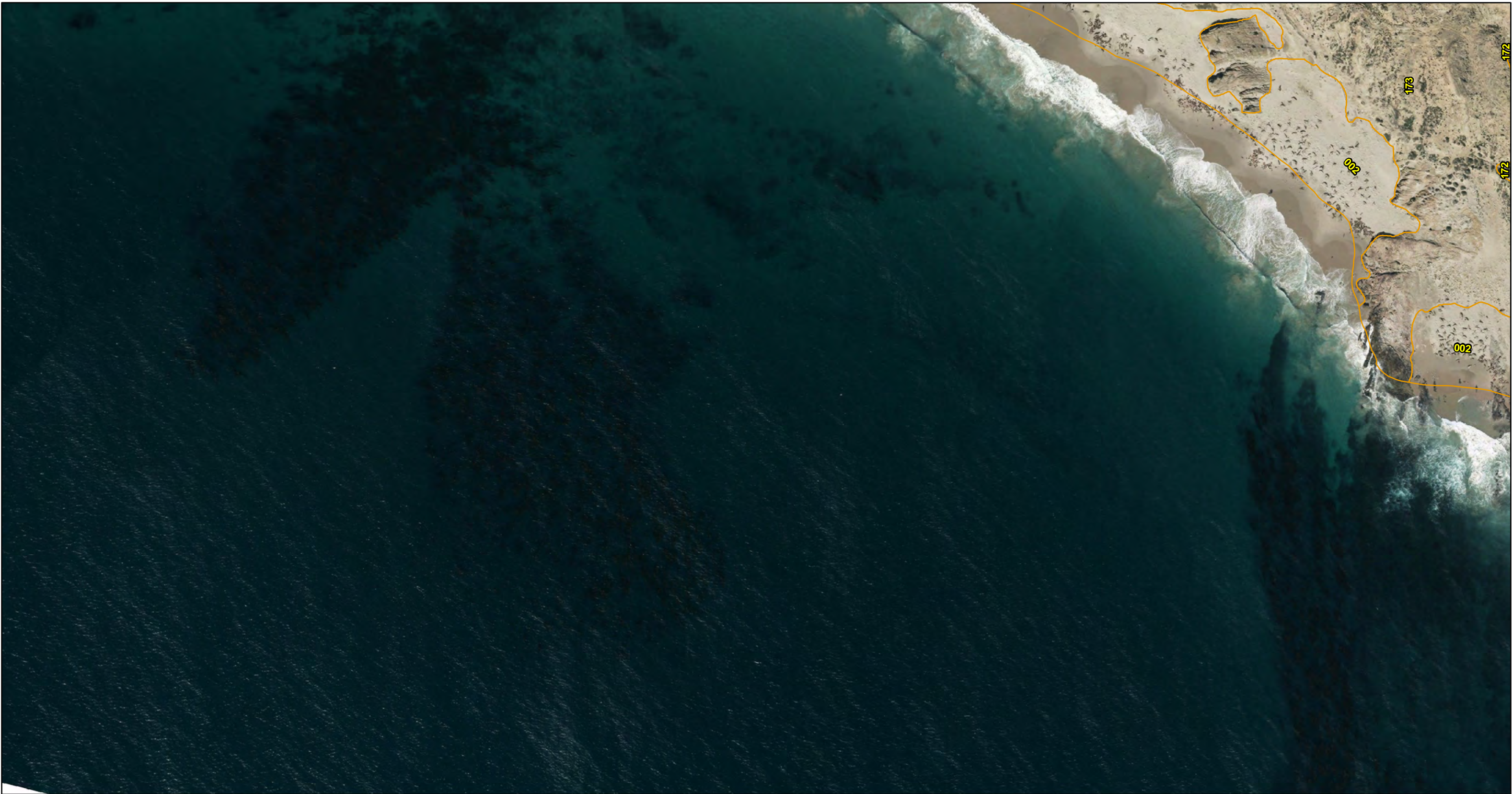
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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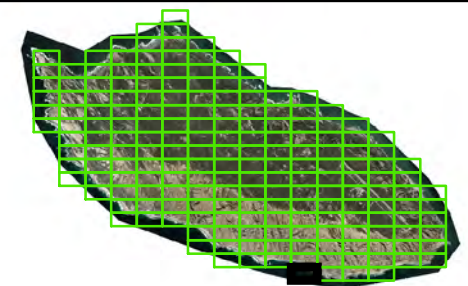
Vegetation Classification Types



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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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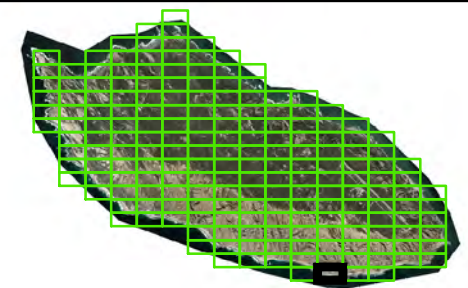
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Vegetation Classification

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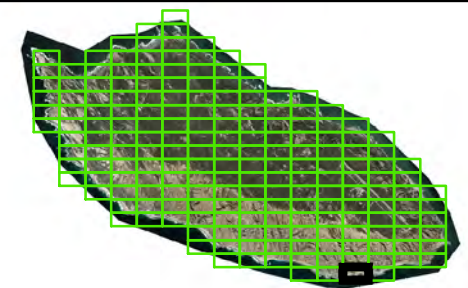
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North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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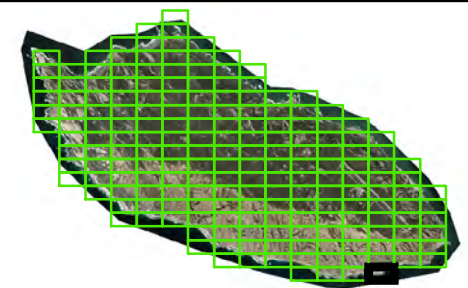
 Vegetation Classification Types



Projection: Lambert Conformal Conic  
State Plane California VI FIPS 0406 feet  
North American Datum of 1983

NBVC San Nicolas Island  
Vegetation Classification

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## **APPENDIX B**

**FIELD KEY TO VEGETATION ASSOCIATIONS ON NAVAL BASE VENTURA COUNTY,  
SAN NICOLAS ISLAND, CALIFORNIA**







# Field Key to Vegetation Associations on NBVC San Nicolas Island

**Class A** – Trees evenly distributed and conspicuous throughout stand. In areas where vegetation cover is greater than about 20 percent, tree canopy may be as low as 10 percent over denser layers of shrub and herbaceous species. In areas where vegetation is less than 20 percent total cover, trees may cover somewhat less than 10 percent (as low as about 8 percent) but are evenly distributed across the stand. **See Forests and Woodlands.**

**Class B** - Woody shrubs or subshrubs conspicuous throughout stand. When total vegetation cover is ca. 20 percent, the tree layer, if present, generally less than 5 percent cover in stand; herbaceous species may total higher cover than shrubs. Shrubs are always at least 5 percent cover. In areas where vegetation is less than 10 percent total cover, shrubs may cover less than 5 percent, but are evenly distributed across the stand. **See Shrublands.**

**Class C** - Non-woody herbaceous vegetation, including graminoid and forb species, dominant throughout stand. When total vegetation cover is greater than about 20 percent, the layers for shrubs, subshrubs, and trees, if present, are of lower cover than herbs and less than 10 percent. If total vegetation cover is less than about 20 percent, shrubs, subshrubs, and/or trees may be present but are less than 2-5 percent cover and are not evenly distributed across stand. **See Herbaceous Vegetation.**

## Class A. Forests and Woodlands

1. *Salix lasiolepis* is dominant over all other species.

*Salix lasiolepis* Association  
*Salix lasiolepis* Alliance

## Class B. Shrublands

1. Shrublands are dominated by drought-deciduous or coastal succulent shrubs that are primarily in upland or mesic habitats.

- a. *Leptosyne gigantea* dominant, or accounts for more shrub cover than any other single shrub species.

*Leptosyne gigantea* Association  
*Leptosyne gigantea* Alliance

- b. *Opuntia* and/or *Cylindropuntia* spp. co-occur with *Artemisia nesiotica* or other coastal scrub species.

*Opuntia littoralis* Shrubland Alliance

- c. *Artemisia nesiotica* is the sole dominant.

*Artemisia californica* Association  
*Artemisia californica* Alliance

- d. *Opuntia* and/or *Cylindropuntia* spp. are sole dominant; *A. nesiotica* trace or absent.

*Opuntia littoralis* Alliance

2. Vegetation dominated by microphyllous evergreen shrubs including *Baccharis pilularis* and *Isocoma menziesii*.

- a. *Baccharis pilularis* is the sole dominant

*Baccharis pilularis* Association  
*Baccharis pilularis* Alliance

- b. *Baccharis pilularis* dominates over a mixed of grasses and herbs



***Baccharis pilularis* / Annual Grass-Herb Association**

***Baccharis pilularis* Alliance**

- c. *Isocoma menziesii* is the dominant low shrub usually with a mixture of herbs and grasses plus a low cover of *Distichlis spicata* and other shrubs.

- i. *Isocoma menziesii* is the sole dominant.

***Isocoma menziesii* Association**

***Isocoma menziesii* Alliance**

- ii. *Isocoma menziesii* dominates over other shrubs, grasses and herbs.

1. *Isocoma menziesii* co-occurs with *Lupinus albifrons* and/or *Astragalus traskiae*

***Isocoma menziesii* – *Lupinus albifrons*/*Astragalus traskiae***

**Provisional Association**

***Isocoma menziesii* Alliance**

2. *Isocoma menziesii* co-occurs with *Distichlis spicata*.

***Isocoma menziesii* – *Distichlis spicata* Association**

***Isocoma menziesii* Alliance**

**Class C. Herbaceous Vegetation**

1. Vegetation is dominated mainly by upland and mesic herbaceous species including native and exotic grasses, forbs, and cryptogrammic species. If woody species are present, they cover less than 5 percent of the ground surface.

- a. Grasslands or forb lands are strongly dominated by nonnative annual grasses and forbs. There are native species, but these are relatively low cover.

- i. *Avena barbata* and *Bromus* species are present with no clear dominant species.

**Mediterranean California Naturalized Annual and Perennial Grassland**

2. Vegetation is dominated mainly by relatively low perennial forbs and graminoids of coastal more or less saline environments including brackish and salt marshes, sea cliffs, and dunes.

- a. Salt marsh vegetation dominated by the perennial forb *Frankenia salina*, usually mixed with other saline forbs and grasses.

- i. *F. salina* is sole dominant; *Distichlis spicata* not present.

***Frankenia salina* Association**

***Frankenia salina* Alliance**

- ii. *F. salina* is dominant with > trace *Distichlis spicata* present.

***Frankenia salina* / *Distichlis spicata* Association**

***Frankenia salina* Alliance**

- iii. *Ammophila arenaria* is present along with a mixed herbaceous layer.

***Ammophila arenaria* Stand Type**

***Ammophila arenaria* Semi-Natural Stand**

- b. Salt marsh vegetation dominated by the perennial grass *Distichlis spicata*, usually mixed with other saline forbs and grasses.

- i. *Distichlis spicata* is sole dominant.

***Distichlis spicata* Association**

***Distichlis spicata* Alliance**

3. Coastal low-spreading herbaceous stands dominated by the perennial herb *Ambrosia chamissonis* and *Abronia maritima* or *A. umbellata*, usually mixed with other forbs and grasses.

- a. *A. chamissonis* associated with *Abronia maritima* and/or *umbellata* and *Cakile maritima*.

***Ambrosia chamissonis* – *Abronia maritima* – *Cakile maritima* Association**



- 1 *Abronia maritima* -*Ambrosia chamissonis* Alliance  
2 b. *A. chamissonis* co- or sub-dominant to *Cakile maritima* and *Carpobrotus edulis*.  
3 *Cakile maritima* — *Ambrosia chamissonis* — *Carpobrotus edulis* Association  
4 *Abronia maritima* — *Ambrosia chamissonis* Alliance  
5 4. *Deinandra clementina* is dominant over a mixed herbaceous layer.  
6 *Deinandra clementina* – *Eriogonum giganteum* Provisional Association  
7 *Deinandra clementina* – *Eriogonum giganteum* Provisional Alliance  
8 5. The perennial grass *Ammophila arenaria* is dominant over other grasses and herbs and associated  
9 with dunes of coastal bars, foredunes, and along the immediate coastline.  
10 *Ammophila arenaria* Stand Type  
11 *Ammophila arenaria* Semi-Natural Stand  
12 6. *Carpobrotus edulis* and/or other ice plants are strongly dominant, usually on bluffs or dunes  
13 adjacent to the ocean.  
14 *Carpobrotus edulis* or other Ice Plants Type  
15 *Carpobrotus edulis* or other Ice Plants Semi-Natural Stands



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## **APPENDIX C**

### **PLOTS VERSION 3.2 DATABASE SCREENSHOTS**







Classification Plot Data

**EDITING MODE:** **ADD NEW**

Project Name: SNI

Plot Code: SNI001

Last Updated By: On:

**New Plot**

**Back to Main Menu**

Plot Location and Description | Environmental Information | Vegetation Sampling | Photos

**Plot Location Information:**

UTM Zone:  ☐ Default State:  Land Owner: NPS ☐ Default

Coordinates  
X:  Y:   
GPS Error:  Elevation:   
# Satellites:  Elev Units:  ☐ Default

Plot Directions:

Survey Date:  Surveyors:

Plot Shape:  ☐ Default

Plot radius (m):  0 Make these values the default

X dimension (m):  0 ☐

Y dimension (m):  0

Provisional Community Name:

Relative Stand Size:

Representativeness:

**Reset Default Values**

☐ Observation Point

☐ Sensitive Data

Plot Event ID: SNI00101

**Create New Event**

**Figure C-1. PLOTS v. 3.2 Database screenshot, showing classification plot location and description entry page**

Classification Plot Data

**EDITING MODE:** **ADD NEW**

Project Name: SNI

Plot Code: SNI001

Last Updated By: On:

**New Plot**

**Back to Main Menu**

Plot Location and Description | Environmental Information | Vegetation Sampling | Photos

**Slope: (Choose one or the other)**

Categorical:

Degrees:  °

**Aspect: (Choose one or the other)**

Categorical:

Degrees:  °

Landform:

Topographic Position:

**Soil Texture:**

**Soil Drainage:**

**Surficial Geology:**

**Cowardin System:**

**Hydro Regime:**

**% Bedrock:**  0

**% Large Rocks:**  0

**% Small Rocks:**  0

**% Sand:**  0

**% Litter, Duff:**  0

**% Wood:**  0

**% Water:**  0

**% Bare Soil:**  0

**% Other:**  0

**Non-vegetated Surface**

**Total:**  0

(total not to exceed 100%)

**% Other description:**

**Environmental and Disturbance Comments:**

**Landscape Comments:**

**Hydrology Evidence:**

**General Comments:**

**Figure C-2. Environmental information data entry page**



**Classification Plot Data**

**EDITING MODE:** **ADD NEW**

**Project Name:** SNI

**Plot Code:** SNI001

**Last Updated By:** On:

**New Plot**

**Plot Location and Description** | **Environmental Information** | **Vegetation Sampling** | **Photos**

**Leaf Phenology:** Leaf Type: Physiognomic Class:

**Strata % Cov / Max Hgt** Plant species:

T1:	T2:	T3:	S1:	S2:	S3:	H:	N:	V:	A1:	A2:	E:	All:	Stratum	Local Taxon Name	Taxon Code	Range Cover Per Stratum	Continuous Cover Per Stratum	Within Plot	Last Updated By

**Calculate Total Cover**

**Simple Addition**

Record: 1 of 1 No Filter Search

[illegible]



Accuracy Assessment Data

EDITING MODE:

ADD NEW

Project Name: SNI

AA Code: SNI\_AA\_0001

Last Updated By: On:

Back to Main Menu

New Point

AA Point Location and Description

Photos

Location Information:

UTM Zone: ☐ Default

Elevation:

Coordinates

X:  Y:

Elev Units: ☐ Default

GPS Error:  # Satellites:

Plot Size:  Plot shape: ☐ Default

Choose to what level you will identify the AA point:

☐ Associations or Communities
☐ Map Units

Choose how you want to select communities:

☐ by Code
☒ by Name

← What you pick here should remain the same throughout the project.

Survey Date:

Surveyors:

Slope: (Choose one or the other)

Categorical:

Degrees:  °

Aspect: (Choose one or the other)

Categorical:

Degrees:  °

AA Event ID: SNI\_AA\_000101

Create New Event

General Comments:

Primary Veg:

Secondary Veg:

Classified Veg:

Reset Default Values

**Figure C-5. Accuracy Assessment data entry page**

[illegible]

**Figure C-6. Accuracy Assessment photo reference page**



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## **APPENDIX D**

### **SAN NICOLAS ISLAND VEGETATION COMMUNITIES HIERARCHY**







# San Nicolas Island Vegetation Communities Hierarchy

## Formation Class

### Formation Subclass

#### Formation

##### Division

##### Macrogroup

##### Group

##### *Alliance*

##### *Association*

## Mesomorphic Tree Vegetation (Forest and Woodland)

### Temperate Forest

#### Temperate Flooded and Swamp Forest

Western North America Warm Temperate Flooded and Swamp Forest

Southwestern North American Riparian, Flooded and Swamp  
Forest/Scrubland

Southwestern North American Riparian/Wash Scrub

*Salix lasiolepis*

*Salix lasiolepis*

## Mesomorphic Shrub and Herb Vegetation (Shrubland and Grassland)

### Mediterranean Scrub and Grassland

#### Mediterranean Scrub

California Scrub

California Coastal Scrub

Central and South Coastal Californian coastal sage scrub

*Artemisia californica*

*Artemisia californica*

*Deinandra clementina* – *Eriogonum giganteum* Provisional

*Deinandra clementina* – *Eriogonum giganteum*

Provisional

Central and south coastal California seral scrub

*Isocoma menziesii*

*Isocoma menziesii*

*Isocoma menziesii* – *Lupinus albifrons*/Astragalus

*traskiae* Provisional

*Lupinus albifrons*

*Lupinus albifrons*

#### Mediterranean Grassland and Forb Meadow

California Grassland and Meadow

California Annual and Perennial Grassland

Mediterranean California naturalized annual and perennial grassland

## Temperate and Boreal Shrubland and Grassland

### Temperate and Boreal Scrub and Herb Coastal Vegetation

Pacific Coast Scrub and Herb Littoral Vegetation

Vancouverian Coastal Dune and Bluff

Vancouverian/Pacific dune mat

*Abronia maritima*–*Ambrosia chamissonis*

*Ambrosia chamissonis*–*Abronia maritima*–*Cakile*  
*maritima*

*Cakile maritima*–*Ambrosia chamissonis*–

*Carpobrotus edulis*

California Coastal evergreen bluff and dune scrub

*Baccharis pilularis*

*Baccharis pilularis*/Annual Grass–Herb Shrubland



California-Vancouverian semi-natural littoral scrub and herb vegetation

*Carpobrotus edulis* or other Ice Plants Semi-natural Stands

*Carpobrotus edulis* or other Ice Plants

***Ammophila arenaria* Semi-natural Stands**

*Ammophila arenaria*

**Temperate and Boreal Salt Marsh**

Western North American Interior Alkali-Saline Wetland

Warm Semi-Desert/Mediterranean Alkali-Saline Wetland

Southwestern North American salt basin and high marsh

*Frankenia salina*

*Frankenia salina*

*Frankenia salina*/*Distichlis spicata*

*Distichlis spicata*

*Distichlis spicata*

**Xeromorphic Scrub and Herb Vegetation (Semi-Desert)**

**Warm Semi-Desert Scrub and Grassland**

**Warm Semi-Desert Scrub and Grassland**

Sonoran and Chihuahuan Semi-Desert Scrub and Grassland

Viscaino-Baja California Desert Scrub

Coastal Baja California Norte maritime succulent scrub

*Opuntia littoralis*

*Opuntia littoralis*

*Leptosyne gigantea*

*Leptosyne gigantea*

*Lycium californicum*

*Lycium californicum*



## **APPENDIX E**

### **SAN NICOLAS ISLAND SPECIES LIST**







**Species observed during classification plots and rare plant surveys in 2012-2013**

Scientific Name	Common Name	Family	PLANTS Code	Annual, Biannual, Perennial*	Native, non-native, endemic**
<i>Abronia maritima</i>	red sand verbena	Nyctaginaceae	ABMA2	P	native
<i>Abronia umbellata</i>	pink sand verbena	Nyctaginaceae	ABUM	P	native
<i>Achillea millefolium</i>	common yarrow	Asteraceae	ACMI2	P	native
<i>Acmispon argophyllus</i> var. <i>argenteus</i>	Silver bird's-foot trefoil	Fabaceae	LOARA2	P	endemic
<i>Amblyopappus pusillus</i>	dwarf coastweed	Asteraceae	AMPU3	A	native
<i>Ambrosia chamissonis</i>	silver bur ragweed	Asteraceae	AMCH4	P	native
<i>Ammophila arenaria</i>	European beach grass	Poaceae	AMAR4	P	non-native
<i>Amsinckia menziesii</i>	Menzies' fiddleneck	Boraginaceae	AMMEI2	A	non-native
<i>Amsinckia spectabilis</i>	woolly breeches	Boraginaceae	AMSP3	A	native
<i>Artemisia californica</i>	coastal sagebrush	Asteraceae	ARCA11	P	native
<i>Artemisia nesiotica</i>	island sagebrush	Asteraceae	ARNE6	P	endemic
<i>Arundo donax</i>	giant reed	Poaceae	ARDO4	P	non-native
<i>Astragalus traskiae</i>	Trask's milkvetch	Fabaceae	ASTR4	P	endemic
<i>Atriplex californica</i>	California saltbush	Chenopodiaceae	ATCA	P	native
<i>Atriplex semibaccata</i>	Australian saltbush	Chenopodiaceae	ATSE	P	non-native
<i>Atriplex watsonii</i>	matscale	Chenopodiaceae	ATWA	A/P	native
<i>Avena barbata</i>	slender oat	Poaceae	AVBA	A	non-native
<i>Avena fatua</i>	wild oat	Poaceae	AVFA	A	non-native
<i>Baccharis pilularis</i>	coyote brush	Asteraceae	BAPI	P	native
<i>Brassica nigra</i>	black mustard	Brassicaceae	BRNI	A	non-native
<i>Brassica tournefortii</i>	Sahara mustard	Brassicaceae	BRTO	A	non-native
<i>Bromus diandrus</i>	ripgut brome	Poaceae	BRDI3	A/P	non-native
<i>Bromus hordeaceus</i>	soft brome	Poaceae	BRHO2	A/P	non-native
<i>Bromus madritensis</i> subsp. <i>madritensis</i>	compact brome	Poaceae	BRMA3	A/P	non-native
<i>Bromus madritensis</i> subsp. <i>rubens</i>	red brome	Poaceae	BRRU2	A/P	non-native
<i>Cakile maritima</i>	European sea rocket	Brassicaceae	CAMA	A	non-native
<i>Calystegia macrostegia</i> subsp. <i>amplissima</i>	southern island morning glory	Convolvulaceae	CAMAA	P	endemic
<i>Calystegia malacophylla</i> subsp. <i>pedicellata</i>	Sierra false bindweed	Convolvulaceae	CAMA38	P	non-native
<i>Camissoniopsis cheiranthifolia</i>	beach suncup	Onagraceae	CACH13	P	native
<i>Carpobrotus chilensis</i>	sea fig	Aizoaceae	CACH38	P	non-native
<i>Carpobrotus edulis</i>	freeway iceplant	Aizoaceae	CAED3	P	non-native



Scientific Name	Common Name	Family	PLANTS Code	Annual, Biannual, Perennial*	Native, non-native, endemic**
<i>Castilleja densiflora</i>	denseflower Indian paintbrush	Orobanchaceae	CADE29	A	native
<i>Crassula connata</i>	sand pygmyweed	Crassulaceae	CRCO34	A	native
<i>Cryptantha maritima</i>	Guadalupe Island cryptantha	Boraginaceae	CRMAM	A	native
<i>Cryptantha traskiae</i>	Trask's cryptantha	Boraginaceae	CRTR7	A	native
<i>Cylindropuntia prolifera</i>	coastal cholla	Cactaceae	CYPR19	P	native
<i>Cynodon dactylon</i>	Bermuda grass	Poaceae	CYDA	P	non-native
<i>Deinandra clementina</i>	Catalina tarweed	Asteraceae	DECL	P	endemic
<i>Dichelostemma capitatum</i>	blue dicks	Themidaceae	DICA14	P	native
<i>Distichlis spicata</i>	salt grass	Poaceae	DISP	P	native
<i>Dithyrea maritima</i>	beach spectacle-pod	Brassicaceae	DIMA6	P	native
<i>Dudleya vires</i> subsp. <i>insularis</i>	bright green dudleya	Crassulaceae	DUVII	P	native
<i>Eriogonum grande</i> var. <i>timorum</i>	San Nicolas Island buckwheat	Polygonaceae	ERGRT	P	endemic
<i>Erodium cicutarium</i>	redstem stork's bill	Geraniaceae	ERCI6	A	non-native
<i>Erodium moschatum</i>	musky stork's bill	Geraniaceae	ERMO7	A	non-native
<i>Festuca myuros</i>	annual fescue	Poaceae	VUMY	A	non-native
<i>Festuca perennis</i>	perennial ryegrass	Poaceae	LOPE	P	non-native
<i>Frankenia salina</i>	alkali heath	Frankeniaceae	FRSA	P	native
<i>Hirschfeldia incana</i>	short-podded mustard	Brassicaceae	HIIN3	P	non-native
<i>Hordeum brachyantherum</i> subsp. <i>californicum</i>	meadow barley	Poaceae	HOBRC2	P	native
<i>Hordeum intercedens</i>	vernal barley	Poaceae	HOIN2	A	native
<i>Hornungia procumbens</i>	prostrate hutchinsia	Brassicaceae	HOPR4	A	native
<i>Isocoma menziesii</i>	Menzies' goldenbush	Asteraceae	ISMEM	P	native
<i>Jepsonia malvifolia</i>	island jepsonia	Saxifragaceae	JEMA	P	endemic
<i>Lactuca serriola</i>	prickly lettuce	Asteraceae	LASE	A	non-native
<i>Lamarckia aurea</i>	goldentop grass	Poaceae	LAAU	A	non-native
<i>Lasthenia californica</i> subsp. <i>californica</i>	California goldfields	Asteraceae	LACA7	A	native
<i>Lepidium nitidum</i>	shining pepperweed	Brassicaceae	LENIN	A	native
<i>Lepidium oblongum</i>	veiny pepperweed	Brassicaceae	LEOBI	A	native
<i>Leptosyne gigantea</i>	giant tickseed	Asteraceae	COGI	P	native
<i>Lomatium insulare</i>	San Nicolas Island biscuitroot	Apiaceae	LOIN2	P	native
<i>Lupinus albifrons</i> var. <i>douglasii</i>	California silver bush lupine	Fabaceae	LUALD	P	native
<i>Lycium brevipes</i>	desert boxthorn	Solanaceae	LYBR	P	native



Scientific Name	Common Name	Family	PLANTS Code	Annual, Biannual, Perennial*	Native, non-native, endemic**
<i>Lycium californicum</i>	California desert-thorn	Solanaceae	LYCA	P	native
<i>Malacothrix foliosa</i> subsp. <i>polycephala</i>	leafy desertdandelion	Asteraceae	MAFOP2	A	endemic
<i>Malacothrix incana</i>	dunedelion	Asteraceae	MAIN	P	native
<i>Malacothrix saxatilis</i> var. <i>implicata</i>	island cliff-aster	Asteraceae	MASAI	P	endemic
<i>Malva assurgentiflora</i>	island mallow	Malvaceae	LAASA	P	native
<i>Malva parviflora</i>	cheeseweed	Malvaceae	MAPA5	A	non-native
<i>Medicago polymorpha</i>	bur-clover	Fabaceae	MEPO3	A	non-native
<i>Melilotus indicus</i>	yellow sweetclover	Fabaceae	MEIN2	A/B	non-native
<i>Mesembryanthemum crystallinum</i>	common iceplant	Aizoaceae	MECR3	A/P	non-native
<i>Mesembryanthemum nodiflorum</i>	slenderleaf iceplant	Aizoaceae	MENO2	A/P	non-native
<i>Myoporum laetum</i>	myoporum	Scrophulariaceae	MYLA5	P	non-native
<i>Opuntia littoralis</i>	coast prickly pear	Cactaceae	OPLI3	P	native
<i>Opuntia oricola</i>	tall prickly pear	Cactaceae	OPOR	P	native
<i>Orobanche parishii</i> subsp. <i>brachyloba</i>	short-lobed broomrape	Orobanchaceae	ORPAB	P	native
<i>Polygonum argyrocoleon</i>	Persian knotweed	Polygonaceae	POAR5	A	non-native
<i>Polypogon monspeliensis</i>	annual beard grass	Poaceae	POMO5	A	non-native
<i>Pseudognaphalium biolettii</i>	bicolored everlasting	Asteraceae	PSBI3	P	native
<i>Pseudognaphalium californicum</i>	green everlasting	Asteraceae	PSCA13	A/B	native
<i>Pseudognaphalium stramineum</i>	cotton-batting	Asteraceae	PSST7	B	native
<i>Salicornia depressa</i>	pickleweed	Chenopodiaceae	SADE10	P	native
<i>Salix lasiolepis</i>	arroyo willow	Salicaceae	SALA6	P	native
<i>Salsola australis</i>	Russian-thistle	Chenopodiaceae	SAKAP	A	non-native
<i>Salsola tragus</i>	Russian-thistle, tumbleweed	Chenopodiaceae	SATR12	A	non-native
<i>Sanicula arguta</i>	sharptooth black snakeroot	Apiaceae	SAAR10	P	native
<i>Schoenoplectus americanus</i>	three-square	Cyperaceae	SCAM6	P	native
<i>Senecio vulgaris</i>	old-man-in-the-spring	Asteraceae	SEVU	A	non-native
<i>Sonchus asper</i>	spiny sowthistle	Asteraceae	SOAS	A/B	non-native
<i>Sonchus oleraceus</i>	common sowthistle	Asteraceae	SOOL	A/B	non-native
<i>Spergularia macrotheca</i> var. <i>macrotheca</i>	sticky sandspurrey	Caryophyllaceae	SPMAM	P	native
<i>Stipa cernua</i>	nodding needlegrass	Poaceae	NACE	P	native



Scientific Name	Common Name	Family	PLANTS Code	Annual, Biannual, Perennial*	Native, non-native, endemic**
<i>Stipa diegoense</i>	San Diego needlegrass	Poaceae	ACDI10	P	native
<i>Stipa lepida</i>	foothill needlegrass	Poaceae	NALE2	P	native
<i>Stipa miliacea</i> var. <i>miliacea</i>	smilgrass	Poaceae	PIMI3	P	non-native
<i>Suaeda taxifolia</i>	wooly seablite	Chenopodiaceae	SUTA2	P	native
<i>Trifolium albopurpureum</i>	rancheria clover	Fabaceae	TRAL5	A	native
<i>Trifolium microcephalum</i>	smallhead clover	Fabaceae	TRMI4	A	native
<i>Trifolium microdon</i>	Valparaiso clover	Fabaceae	TRMI5	A	native
<i>Trifolium palmeri</i>	southern island clover	Fabaceae	TRGRP	A	native
<i>Trifolium willdenovii</i>	tomcat clover	Fabaceae	TRWI3	A	native
<i>Typha domingensis</i>	southern cattail	Typhaceae	TYDO	P	native
<i>Typha latifolia</i>	broadleaf cattail	Typhaceae	TYLA	P	native

\*A (Annual): a plant that completes a lifecycle in one year or growing season, B (Biennial): a plant that completes a lifecycle in two years or growing seasons, P (Perennial): a plant that lives more than two years or growing seasons and continues to flower and reproduce throughout the duration of the plants lifetime.

\*\* Native: a plant that occurs naturally on San Nicolas Island, Non-native: a plant that has been intentionally or accidentally introduced and now has self-sustaining populations on San Nicolas Island, Endemic: a plant which grows only on San Nicolas Island or only within the Channel Islands.