



Salinas River Vegetation Mapping Report

Photo Interpretive Guidelines for Mapping Vegetation

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Prepared for:

The Nature Conservancy

By:

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1. INTRODUCTION

The Nature Conservancy (TNC) contracted AIS to develop a terrestrial vegetation map for the Salinas River in Monterey County with the main goal of the project being to create a baseline map of existing vegetation within the river floodplain. The mapping area is buffered approximately $\frac{1}{4}$ mile from the river channel, and includes vegetation along the tributaries of the Arroyo Seco, San Antonio and Nacimiento Rivers, in addition to several smaller tributaries mentioned in the description below. See Figure 1.

The vegetation map will be used by TNC to determine the extent of native riparian vegetation along the Salinas River and its major tributaries, to identify significant areas of invasive species such as Giant Cane, and to inform an assessment of potential wildlife corridors along the riparian corridor to the adjacent upland habitats in the coastal ranges.

The Salinas Mapping Area

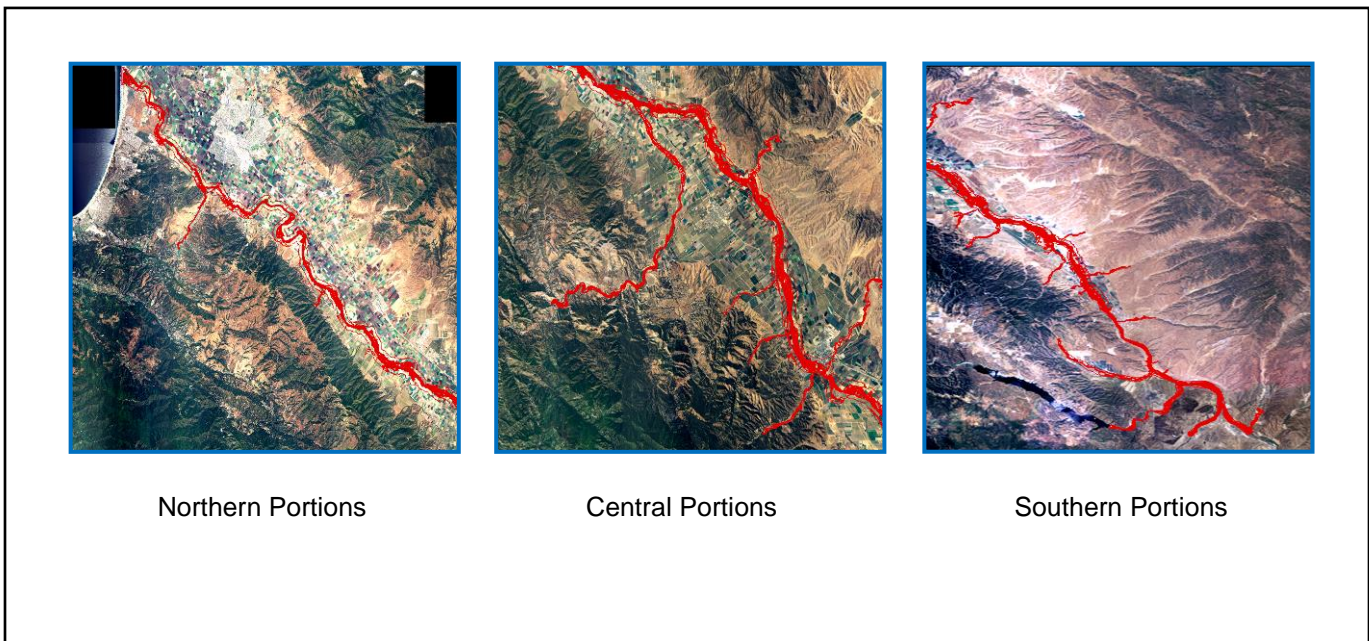


Figure 1: Shows the Salinas Mapping Area divided into three regions from north to south

2. DESCRIPTION

The Salinas River mapping area encompasses the portions of the watershed north of the San Luis Obispo county line to the Salinas estuary where it enters the Monterey Bay north of the town of Marina. It includes portions of the following tributaries which drain watersheds from the adjacent hills within the outer coastal ranges. The following is a list of those tributaries addressed in this mapping effort:

- El Toro Creek
- Chalone Creek
- Monroe Creek
- Thompson Creek
- San Lorenzo Creek
- Branstetter Canyon
- Limekiln Creek
- Feliz Canyon
- Espinoza Canyon
- Pine Creek
- Garrissere Canyon
- Pancho Rico Creek
- Sargent Canyon
- Sarah Canyon
- Hames Creek
- Big Sandy Creek
- Quinado Canyon

The mapping area encompasses primarily riparian and wetland habitats and adjacent agricultural lands and urban development. In several locations, the active floodplain is in close proximity to upland habitats where they too are mapped.

The property covers approximately 60,000 acres (~94 square miles) which represents about 2% of the entire watershed. The valley lies entirely within the outer coastal ranges; its western edges bounded by the Sierra de Salinas and Santa Lucia Range with the eastern portions defined by the western slopes of the Gabilan and Diablo Ranges. See Figure 2.

The Salinas valley is approximately ten miles wide and about 155 miles long. Land uses in the watershed include row crops, vineyards, pasture and grazing lands as well as urban areas, military bases and public open space.¹ The project includes approximately 110 miles of the total length noted above.



Figure 2 – Mapping area

Elevations within the mapping area range from near sea level in the extreme northwestern portions to slightly over 1000' along Jolon Road in the western portion of the study area.

Precipitation ranges from about 12" in the central portions of the valley around King City to about 25" along the

leeward foothills of the Santa Lucia Range.² Maritime influence extends far

inland, especially in late afternoons where substantial summer cooling occurs even in such inland locations like King City where the average maximum July temperature of 85 is only 10 degrees higher than that of Salinas, over 40 miles closer to the coast. Possible correlations in vegetation to climatic patterns within the mapping area were noted during the effort and are listed below:

1. Location of dominant stands *Salix lasiolepis* within about 5 miles of the Salinas estuary (Maritime portions of the mapping area)
2. *Quercus wizlizenii* replacing *Q. agrifolia* in foothill regions south of King City and presence of *Q. douglasii* in the southern half of the mapping area
3. Stands of *Lepidospartum squamatum* occurring along sparse floodplains south of King City (Inland portions of the mapping area)

¹ The Salinas River Permit Coordination Program; Sustainable Conservation, 2003

² Taken from a portion of Mean Annual Precipitation – State of California; R.F. Cushing; 1971

3. SUMMARY OF THE MAPPING EFFORT

- November 2007 – Proposal of work delivered to TNC
- December 2007 – First field reconnaissance
 - TNC Project Director
 - AIS Photo Interpreter
- December & January 2007 & 2008 – Signature correlations developed along with preliminary mapping classifications & keys.
- January – April 2008 – Preliminary Photo Interpretation
 - Northern portions - Delineated & Labeled
 - Southern portions – Preliminary linework
- April 2008 – Second field reconnaissance
 - TNC Project Director
 - AIS Photo Interpreter
- April 2008 – Final Delineations, corrections
 - Refinement of linework for entire region
 - Editing of labels (floristic assignments)
- May 2008 – Final Report & Delivery

4. VEGETATION MAPPING CRITERIA & METHODOLOGIES

Vegetation mapping procedures include first conducting an initial field reconnaissance that establishes relationships between plant communities and their physiognomic requirements. The first reconnaissance visit consisted of a one-day effort and involved the AIS photo interpreter along with the TNC Project Director. Approximately 50 GPS points were taken along watershed from State Route 68 south to the Arroyo Seco, capturing the major floristic variability within the northern third of the mapping area. A second visit was conducted from Soledad south to the San Luis Obispo county boundary and included lands on the Camp Roberts Military Reservation which allowed access to the Nacimiento River. An additional 114 GPS waypoints were gathered along routes during this effort.



Identify

Identify from: <Top-most layer>

waypts
061

Location: 661,139.610 4,022,961.229 Meters

Field	Value
FID	
Shape	
AREA	
PERIMETER	
WAYPTS2_	
WAYPTS2_I	
WAYPOINT_N	
UTM_E	
UTM_N	
DISTANCE	
BEARING	
SIZE	
PHOTOS	
DESCRIPTIO	Arrundo, mixed willow; clered disturbed to east (annuals & pepperweed); River & Arrund

Identified 1 feature

A close-up aerial photograph of a specific location marked by a blue circle. The image shows a river and surrounding vegetation. A legend in the bottom left corner shows a green triangle for 'December Waypoints' and a blue circle for 'April Waypoints'.

Using these points, air photo signatures (color-tone-texture combinations that the photo interpreter views on the hard copy or digital photo) were then correlated to their corresponding plant communities or plant species viewed in the field. AIS photo interpreters evaluated these correlations between the vegetation units and photo signatures and refined them to insure that the map would be useful at a resolution needed to meet TNC's goals.

A preliminary mapping classification and PI signature key was then developed using information derived from the field reconnaissance and any existing field plot data and vegetation classifications used in previous mapping efforts.

The vegetation units were then interpreted across the entire study area using heads-up digitizing techniques through custom tools developed in the Arc GIS 9.2 Software that were enhanced by AIS. As a general rule, common and widespread vegetation units were delineated down to a minimum mapping unit (MMU) of approximately ¼ acre. Small wetlands and forest openings were delineated in several incidences below the MMU.

One-meter National Agricultural Inventory Program (NAIP) imagery flown in July of 2005 was used as a base for the delineated polygons and photo interpretation signature. Additional online digital imagery was used as supplementary information from both Google & MSN Maps. It is important to note that the interpretation is based on the 2005 imagery and much of the vegetation more closely associated with the most dynamic portions of the floodplain (willow thickets, flats and the stream channel itself) will probably have changed significantly since then. Other trend-related occurrences (control of Giant Cane, urban and agricultural expansion, etc.) may also have changed since the time the digital imagery was created.

Several herbaceous types (Pepperweed) cannot be distinguished using the NAIP imagery and are therefore only mapped where noted in the field.

The following ancillary datasets were supplied by the contractor to further aid in mapping the vegetation types:

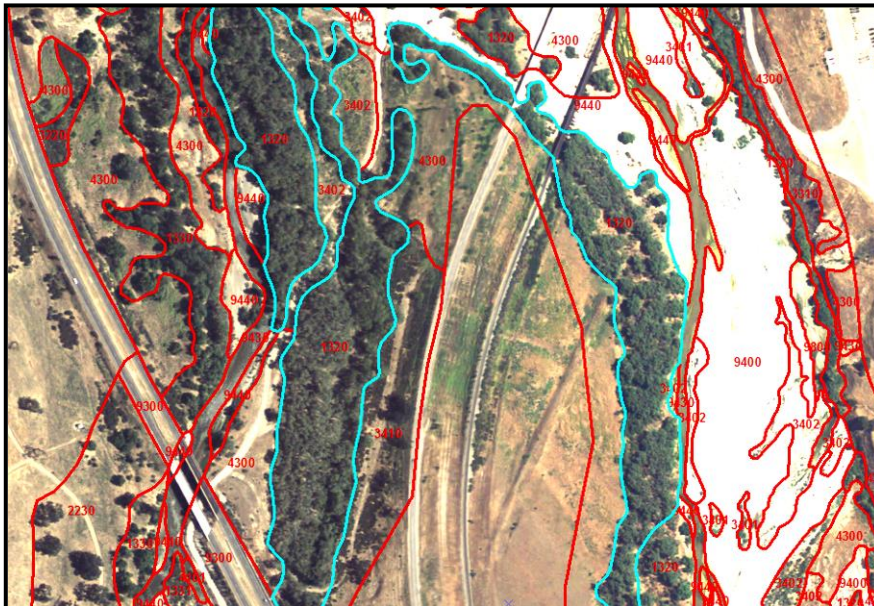
- USGS DRG topographic data
- Hydrology Data Layer
- National Wetlands Inventory Map Data – Salinas River (In part)
- Giant Cane (*Arrundo donax*) Map
- Salinas Estuary Vegetation Map (U.S. Fish & Wildlife Service)

Vegetation Density - (Cover Class Values)

Densities are mapped for each vegetation layer that exists in the stand except for herbaceous types. Vegetation densities can be assigned for up to two layers of vegetation (tree and shrub layers). Density values are generalized into the following five category ranges:

- 1 = >60% - (Forests & woodlands)
- 2 = 40-60% - (Woodlands)
- 3 = 25-40% - (Savanna-like open woodlands)
- 4 = 10-25% - (Sparse woodlands)
- 5 = 2-10% - (Sparse emergent – sparse vegetation)

Densities are mapped for the overstory life form defined by the floristic type. All density values are measured in absolute cover, not relative cover. Density values are an important component of the riparian habitats in that many of the larger stands of undisturbed vegetation contain greater than 60% cover of trees or shrubs. Generally, more highly disturbed riparian vegetation stands tend to correlate with a sparser density cover.



Note the example above, (outlined in blue) represents some good examples of fairly intact cottonwood forests near the Bradley-Lockwood Road north of the town of San Miguel. Tree cover in these polygons average greater than 50%.



Note in this example above, (outlined in blue) cover values are significantly lower, understory vegetation consists of annual weedy grasses and the stand is in close proximity to road related disturbances to the east

Floristic Assignments of Vegetation Polygons

As is true in many of the California and Sonoran riparian systems, individual dominance of one particular species often does not continue over extended areas and is therefore extremely difficult for photo interpreters to assign alliance-level floristic values to those particular polygons. Therefore, the mapping classification often includes groups of several species (multiple or super alliance level mapping units) such as type 1330 (Fremont Cottonwood – Mixed Willow Forests). In other instances, where photo signature allows for individual species to be identified, and stand characteristics often depict individual plant dominance over a significant area, alliance level mapping units are defined; one example being type 3403 (Narrow Leaf Willow Alliance).

Following the protocols used in mapping the San Benito River watershed in 2007, TNC and AIS agreed that incorporating structure into the floristic

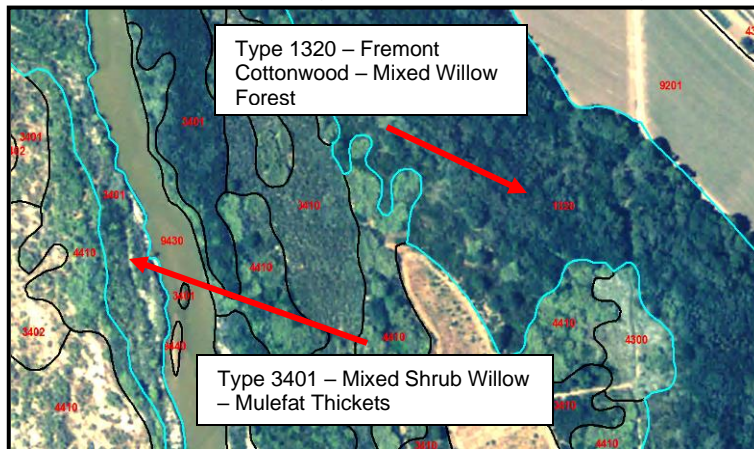


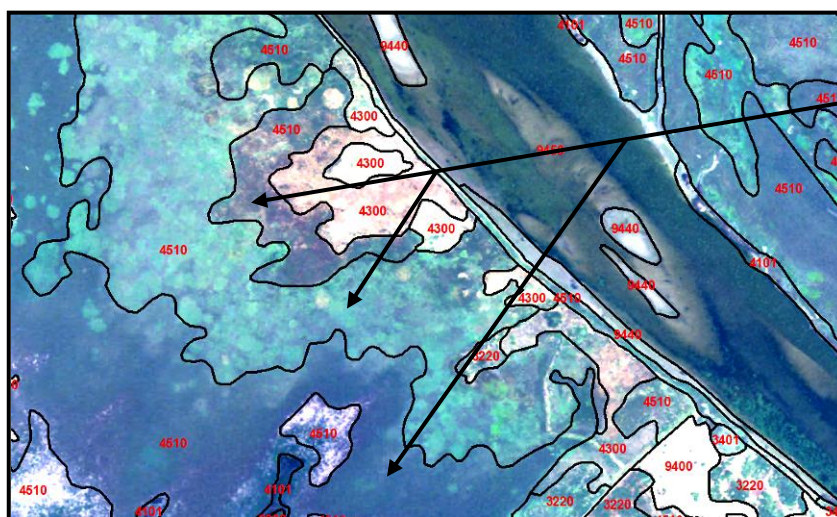
Figure 3

classification (in particular, stand size characteristics) would be a useful tool in distinguishing true riparian forests and woodlands from shrubby thickets of younger vegetation which are often more temporal in nature. Often, two polygons depicting a

similar makeup of species (Generally Fremont

Cottonwood and mixed species of willow) will be assigned different mapping units based on their stand size. See Figure 3.

Several polygons in the database contain identical codes but are separated by a line. Photo interpreters believe that relevant information exists between the two polygons not currently defined by the existing mapping classification but may be useful as additional information that may be extracted by TNC. One example includes a division between the subtle variations within a salt marsh community as noted below.



Polygons in this example may be separated based on growth or existing life cycle of the stand (typical in stands of *salicornia spp.*) or may reflect subtle variations in species composition (such as stands dominated by *Distichlis spicata* in contrast to stands dominated by *salicornia spp.*).

5. COMPARISONS - SAN BENITO & SALINAS RIPARIAN SYSTEMS



Figure 4: Salinas study (blue), San Benito study (green)

The following table represents the cartographic differences between the two projects:

	<u>Salinas River</u>	<u>San Benito River</u>
Acres mapped:	60,000	42,500
Total polygons:	10,400	4,300
Average Poly Size:	5.75 Acres	9.9 Acres



Figure 5

³ Note the area in green denoting significant connectivity between the riparian system and adjacent natural upland vegetation.

³ 2008 Google – Map data NAVTEQ

Adjacent Lands

As depicted above in figure 5, a much higher percent of natural interface exists along the San Benito Study (the northern delineation) with approximately 80% (64 miles) of riparian vegetation directly connecting to annual grasses or oak savanna. Only the southern 20% of the Salinas Riparian corridor is adjacent to oak woodland or annual grasses. Non natural interface along the Salinas corridor include mainly intensive row cropping and vineyards, while areas along the San Benito are experiencing urban growth extend southeast of the city of Hollister.

Invasive Species

Both projects have severe infestations of one or more invasive species which were mapped during each effort. The San Benito River study area contains extensive stands of *Tamarisk spp.*, especially in the southern portions of the region. Only small patches or individual plants were noted in the Salinas mapping region. Stands of *Arrundo donax*, while widespread and extensive in the northern half of the Salinas mapping area were not as of yet noted along the San Benito River. Small patches of *Lepidium spp.* (Pepperweed) were viewed in several locations, two mappable patches near King City in the Salinas project. It is possible that stands of pepperweed are also present on the San Benito but were not noted in the mapping effort.

Salinas River - Remnant Stands of California Sycamore

Several large stands of California Sycamore (*Platanus racemosa*) occur along the central southern portions of the Salinas corridor just south of King City to around San Ardo. Most of the trees are on level floodplains, emergent over a dense cover of naturalized annual grasses. They follow what would be possibly the older network of channels and floodplains that may have been characteristic of the valley in years past. The trees appear quite old, suggesting that possibly sycamore / alluvial scrub woodland was once a common feature in the southern portions of the valley.



Polygon Size

Delineated mapped units (polygons) within the Salinas study area average slightly over $\frac{1}{2}$ the size of polygons mapped in the San Benito mapping area. Riparian types and associated sparsely vegetated riverine flats and channels tend to be broken into extremely fine units due to the dynamic nature of these habitats occurring in areas that often change on a seasonal basis. Stands of upland vegetation however, often are continuous over the landscape especially when mapped to simple overstory dominance or co-dominance (alliance-level) mapping. The Salinas mapping area contains overall a much higher percentage of riparian polygons within the study when compared to the San Benito study area. See figure 6.

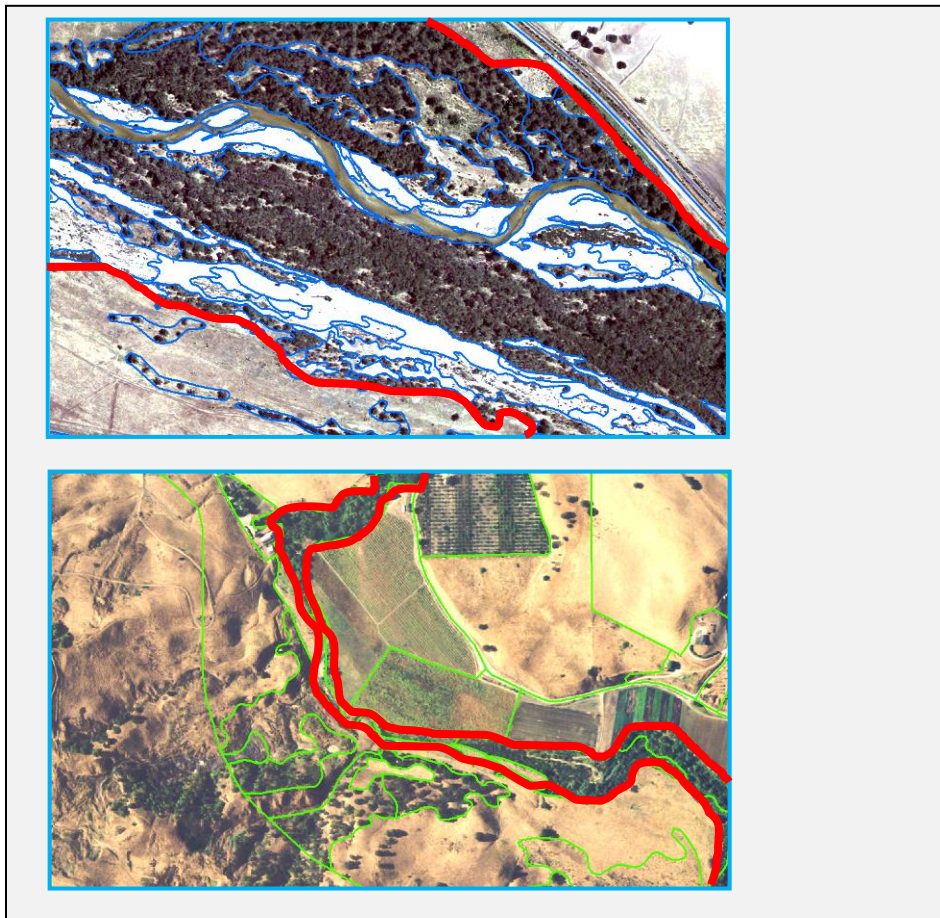


Figure 6: Outline of a portion of the Salinas (above) and San Benito (below) riparian zone (delineated in red). Approximate map scale is 1:5000.

SPECIAL NOTATIONS REGARDING THE MAPPING PRODUCT

Study area boundary: In several areas, the mapping study area boundary has been extended beyond the buffer in order to capture sensitive tributaries entering the Salinas or existing natural upland vegetation into the analysis that is in close proximity to the riparian corridor.

SALINAS RIVER – MAPPING TYPE STATISTICS

Rowid	FREQUENCY	PI	SHAPE_AREA
1	20	1150	45.572201
2	1	1300	0.391526
3	57	1310	434.267074
4	789	1320	3561.449917
5	92	1330	414.470398
6	85	1331	289.824027
7	31	1332	66.214255
8	19	1340	24.062589
9	1	2000	0.566904
10	200	2110	525.249977
11	148	2210	394.853448
12	16	2220	48.393296
13	39	2230	103.156446
14	9	3000	11.734931
15	3	3100	2.562471
16	10	3101	26.739724
17	12	3102	35.070167
18	1	3200	0.202226
19	529	3220	1787.497556
20	4	3300	3.682454
21	27	3301	43.424378
22	131	3310	300.489799
23	1	3400	2.864197
24	1678	3401	2849.687019
25	797	3402	2149.274974

Rowid	FREQUENCY	PI	SHAPE_AREA
25	797	3402	2149.274974
26	668	3403	1676.336199
27	447	3410	1287.983484
28	7	3420	54.995639
29	1	4000	7.024532
30	321	4101	236.736754
31	1	4110	0.056571
32	52	4210	56.534957
33	1250	4300	8443.563135
34	3	4301	3.501246
35	253	4310	2452.230693
36	443	4410	919.393509
37	29	4510	178.306112
38	16	4600	17.420463
39	1	9000	1.176251
40	57	9200	645.457525
41	134	9201	21139.360066
42	84	9202	2568.13764
43	250	9300	1857.572435
44	1	9302	1.943123
45	128	9400	458.246738
46	29	9420	41.234725
47	69	9430	2152.727526
48	1422	9440	1769.069211
49	1	9450	178.899303
50	2	9460	81.699987
51	55	9800	424.017705
52	2	9810	1.170903
53	4	9820	1.630357
54	6	9999	13.25044

Table shows number of polygons (frequency) and their total acreage by PI value. See mapping descriptions (Section 6) for PI values

6. MAPPING DESCRIPTIONS – Floristic Descriptions

Note: Distribution boxes (on left) depict mapped polygons highlighted in red. Image signature boxes show a typical signature for that type; signatures for all mapping type vary considerably.

1150 - Eucalyptus & other Exotic Trees



Type 1150: 46 Acres



Linear row of eucalyptus within riparian community

Mapping Descriptions: Mapped where Blue gum (*Eucalyptus spp.*) dominates the canopy. Stands are generally dense; usually over 80% cover and may occur adjacent to riparian settings or in rows between agriculture. Narrow rows of exotic trees, especially along urban fringe boundaries are not mapped in this effort. Other exotic stands mapped include Peruvian Pepper on several of the small tributaries. Tamarisk was noted in extremely small stands, or as individual plants in several locations, too small to map. The largest patch (~5 individuals) was noted in San Lorenzo Regional Park just south of the foot bridge where it crosses the Salinas.

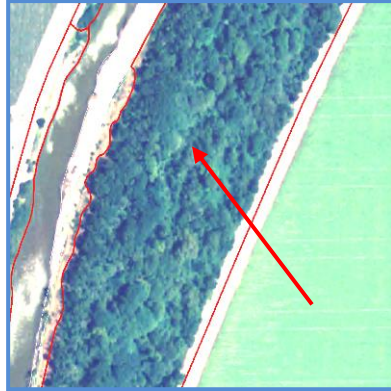
Environmental Parameters: Mapped sparingly; mainly in the northern section of the study area. No topographical or environmental correlates noted.

Riparian Forest Communities

1310 – Mixed Willow Forests



Type 1310: 434 Acres



Willow species dominate here

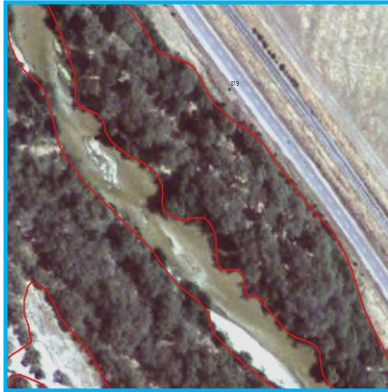
Mapping Descriptions: Mapped where one or more of the following (*Salix laevigata*, *S. lasiolepis*, *S. exigua* or *S. gooddingii*) mix in generally dense cover of over 60%. Willow strongly dominates the canopy layer. Other riparian species (*Populus fremontii*, *Acer negundo*) can occur as a minor component (generally under 10% relative cover).

Environmental Parameters: No distinctive correlations between stands which are strongly dominant willow and mixed cottonwood & willow stands were noted. More common in northern portions of the study. Mapped in temporarily to seasonally flooded regimes on well drained soil.

1320 – Fremont Cottonwood – Mixed Willow Forest



Type 1320: 3560 Acres



A rather dry example (Waypoint 19) where cottonwood occurs as overstory to Box Elder

Mapping Descriptions: Mapped where *Populus fremontii* is dominant to or shares dominance or is subordinate to any number of mixed willow species mentioned in type 1310 above. *Acer negundo* may be a minor component to the canopy or the understory tree layer.

Environmental Parameters: Mapped in locations often somewhat drier than type 1310; occasionally in areas that do not regularly flood. Generally occurs on outer margins of willow thicket types.



Example noted from waypoint 19 depicting Cottonwood & Box Elder

1330 – California Sycamore – (Coast Live Oak – Fremont Cottonwood)



Type 1330: 414 Acres



Note slightly greener signature than cottonwood along east side of the river: Waypoint 23

Mapping Descriptions: Mapped where *Platanus racemosa* dominates or shares dominance with either *Quercus agrifolia* or *Populus fremontii*. Older stands along the Salinas River often contain an understory of dense annual grasses whereas more dynamic stands along many of the tributaries are still in an alluvial setting. Mapped to this more general category when not noted with White Alder or in an alluvial scrub setting (see finer level sycamore types on following pages) Stands in narrower canyons or small tributaries often contain a component of Coast Live Oak

Environmental Parameters: Generally occurs in drier settings than type 1320 except older groves along the Salinas River. Most stands are along tributaries west of the Salinas River on gravely well drained soils.



Example from Waypoint 23 along the west bank of the Salinas River. Eastern portion of this stand has some Fremont Cottonwood.

1331 – California Sycamore / Alluvial Fan Savannah



Type 1331: 290 Acres



Stand along Arroyo Seco

Mapping Descriptions: Mapped where *Platanus racemosa* dominates the tree canopy in generally sparse cover over a sparse scrubby layer often composed of *lepidospartum squamatum*. In ideal settings, understory herbs are sparse, often with exposed gravelly soils. Numerous stands in the mapping area contain denser annual grasses in the understory however.

Environmental Descriptions: Noted in areas that were intermittently to temporarily flooded, generally on gravelly flats adjacent to seasonally flowing streams. Best examples occur on Arroyo Seco.

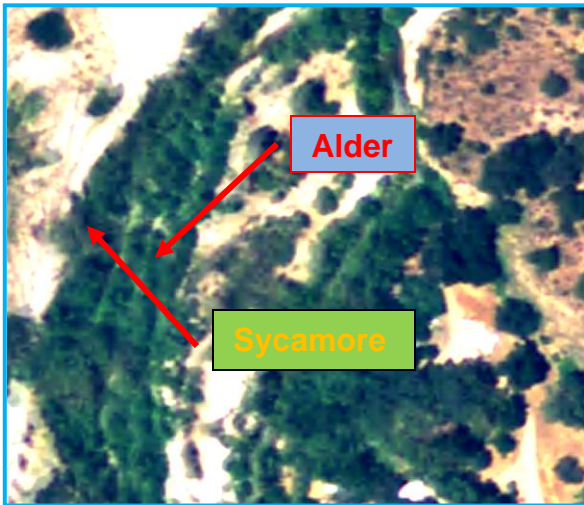
1332 – California Sycamore – White Alder – (Mixed Willow)



Type 1332: 66 Acres



Upper portions of Arroyo Seco



Mapping Descriptions: Mapped where either *Platanus racemosa* or *Alnus rhombifolia* either dominate or co-dominate the tree layer. Both species are present in at least minor cover. Willows can be a component to the understory shrub layer.

Environmental Parameters: Mapped adjacent to and in close proximity to perennial upper stream courses along the waters edge. Mapped exclusively along the upper portions of the Arroyo Seco in narrow bands, especially by the Arroyo Seco Road Bridge.

1340 –White Alder – (Mixed Willow)



Type 1340: 24 Acres



Narrow bands along the Arroyo Seco; note liner pattern to the alder

Mapping Descriptions: Mapped where *Alnus rhombifolia* dominates the tree layer in generally dense settings; often sharing the canopy with tall shrubby willows.

Environmental Settings: Noted along upper perennial streams exclusively in the western most portions of the Arroyo Seco. Mapped adjacent to the stream channel.

Upland Woodland & Shrub Communities

2110 – Coast Live Oak

Mapping Descriptions: Mapped where *Quercus agrifolia* dominates the stand; generally in woodland settings over an understory of annual grasses and forbs.

Environmental Parameters: Mapped in upland settings, often on steep embankments along the western margins of the Salinas River Floodplain or above the active floodplain on areas of deep soil. Scattered in small stands throughout the study; more common on tributaries west of the Salinas River.

2210 – Blue Oak (Interior Live Oak)

Mapping Descriptions: Mapped where *Quercus douglasii* dominates or shares dominance with *Quercus wizlizenii* generally in dense woodland or savanna settings over a dense herbaceous layer of annual grasses and forbs.

Environmental Parameters: Mapped in upland settings, in gently rolling to steep hillsides, especially west of the Salinas River and on slopes adjacent to tributaries. Nearly all stands occur from Arroyo Seco south to the county line.

2230 – Valley Oak

Mapping Descriptions: Mapped where *Quercus lobata* dominates the canopy in sparse to moderate cover over a dense herbaceous layer of annual grasses and forbs. *Quercus agrifolia* may be a component to the tree layer.

Environmental Parameters: Mapped exclusively along the Arroyo Seco, San Antonio and Nacimiento Rivers on deep well developed soils often upslope from the more active floodplain.



Valley Oak gallery – Sherwood Forest



Sherwood Forest – Camp Roberts

Upland Shrub Types

3101 – Chamise – Mixed Xeric Chaparral

Mapping Descriptions: Mapped where *Adenostoma fasciculatum* dominates the xeric shrub layer in open to dense stands.

Environmental Parameters: Several small stands were observed on steep convex south trending slopes along the margins of the mapping area.

3103 – Mixed Scrub Oak Chaparral

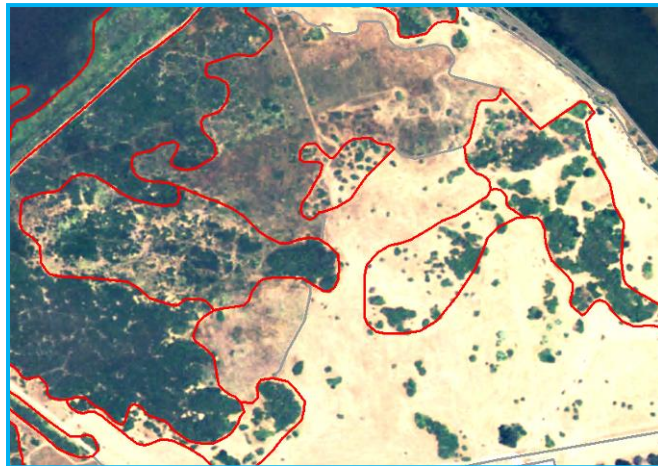
Mapping Descriptions: Mapped where either *Quercus berberidifolia* or *Q. wizlizeni* dominate the shrub layer often with a component of *Rhamnus* and *Heteromeles arbutifolia*.

Environmental Parameters: Several large stands entering the mapping area from north trending slopes south of the San Antonio River were observed on the second reconnaissance. Mapped on somewhat less xeric slopes than type 3101.

3220 – Coyote Brush



Type 3220: 1787 Acres



Typical stands vary in stand size considerably

Mapping Descriptions: Mapped in a variety of settings where *Baccharis pilularis* dominates the shrub layer in sparse to dense settings over an understory of annual grasses and shrubs.

Environmental Parameters: Often noted just upslope from Mulefat in settings very close to the riparian fringe. Also noted in drier settings in sparse cover on grassy gently sloping hillsides along the margins of the mapping area.

3301 – Mixed California Buckwheat – California Sagebrush

Mapping Descriptions: Mapped as a component to the Holland type Diablan Sage Scrub. *Artemisia californica* or *Eriogonum fasciculatum* dominate the drought deciduous shrub layer in sparse to dense settings.

Environmental Parameters: Noted on many of the tributaries to the Salinas River on steep slopes on a variety of soils. Most examples are noted in Black Canyon along the Bitterwater Road east of King City.

3310 – California Sagebrush Alliance

Mapping Descriptions: Mapped where *Artemisia californica* dominates the drought deciduous shrub layer in sparse to dense settings.

Environmental Parameters: Noted in slightly less severe settings than type 3301 where slopes are not quite as steep and soils are somewhat better developed. More common than type 3301, this type is scattered throughout the mapping area.

Riparian Shrub Communities

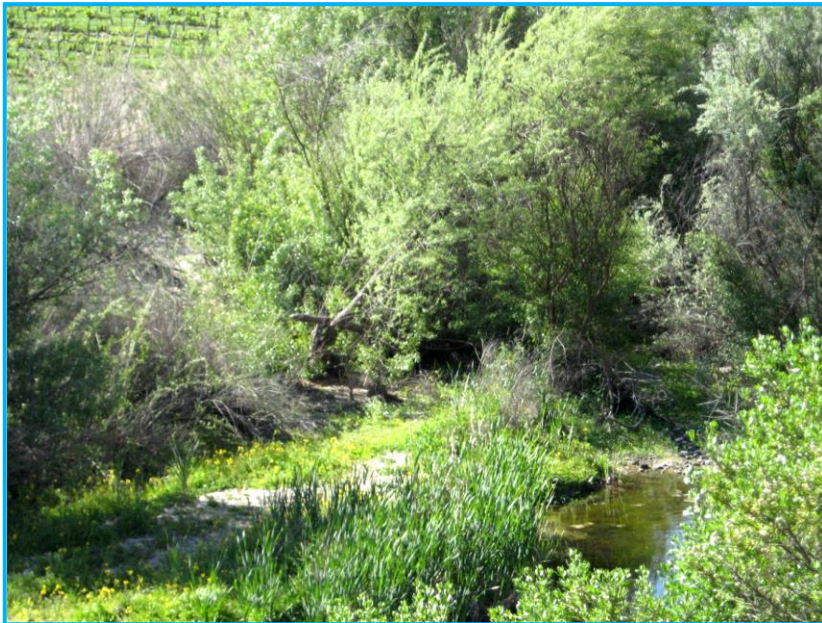
3401 – Mixed Shrub Willow – Mulefat Thickets



Type 3401: 2850 Acres



Noted here in a variety of settings from sparse cover to dense thicket.



Typical thicket along the San Antonio River – Waypoint 35

Mapping Descriptions:
Mapped where any one or more *Salix* spp. (*Salix lucida*, *S. lasiolepis*, *S. laevigata*, or *S. exigua*) dominates the shrub riparian layer often with a component of *Baccharis salicifolia*. Stands vary widely in species composition and stand cover, often depending on how often it floods

and how severe the flooding dynamics are on a year to year basis. Species composition can be quite similar to type 3220 but will differ in stand size. This type is generally considered a shrub thicket whereas type 3220 is mapped in forest or dense woodland settings.

Environmental Parameters: Mapped in temporarily to seasonally wet conditions; often adjacent to the main channel. By far the most commonly mapped type; over 1600 polygons of this type alone have been mapped.

3402 – Sparsely Vegetated Alluvial Scrub



Type 3402: 2149 Acres



Example located along the Salinas River east of the town of Bradley



Small stand of scalebroom dominated scrub noted at Waypoint 20 along the Salinas River

Mapping Descriptions:
Mapped where any number of shrubs (*Baccharis salicifolia*, *Lepidospartum* *sq*, *lupinus* *spp.* can each dominate or share dominance in the shrub and forb layer in sparse settings over gravelly floodplains.

Environmental Parameters:
Noted on intermittently flooded gravelly flats often upslope from drier stream channels along the Salinas

River and most of its tributaries. At times may be adjacent to stands of

sycamore alluvial scrub. Stand characteristics vary considerably from north to south with scalebroom being much more common south of King City. Stands north of Soledad often contain just a sparse component of Mulefat.

3403 – Narrow-leaf Willow (Mulefat – Coyotebrush)



Type 3403: 1676 Acres



Signature diagnostic, trending blue.



Stand is along the Nacimienta River – Waypoint 10

Mapping
Descriptions:
Mapped where *Salix exigua* dominates the shrub layer often with a significant component of *Baccharis salicifolia* or in drier settings with a component of *Baccharis pilularis*. Driest stands have an understory of mixed annual grasses and forbs.

Environmental
Parameters: Noted

in a variety of flooding regimes, but overall this species of willows tends to occupy only intermittently flooded sites. Some stands observed in upland settings. Often adjacent to wetter stands of mixed willow or adjacent to sparse alluvial fan scrub habitat. Common throughout mapping area except northern most sections.

3410 – Mulefat



Type 3410: 1288 Acres



Example contains dense stand with Coyotebrush and sparser setting with Narrow-leaf Willow.



Stand noted here is surrounded by a sparsely vegetated flat

Mapping Descriptions: Mapped in a variety of settings where *Baccharis salicifolia* dominates the stand; often with a small component of *Salix spp.* in wetter settings and with *Baccharis pilularis* in drier flooding regimes. Stands vary from sparse to dense. *Populus fremontii* can be an emergent tree to the shrub understory layer.

Environmental Parameters: Usually found in drier settings than mixed willow thickets. Noted throughout the study, especially along the Salinas River; less common in the northern most portions of the study.

3420 – Arroyo Willow

Mapping Descriptions: Mapped where *Salix lasiolepis* dominates the tall shrub layer. In several stands, arroyo willow is only a component to the riparian vegetation and is mapped as a mixed willow type.

Environmental Parameters: Noted only in small stands in the northern most portions of the study near the Salinas estuary.

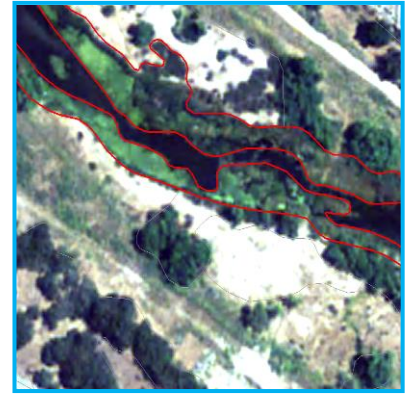
4101 – Undifferentiated Marsh – (Cattail – Bullrush)



Type 4101: 237 Acres
Mapping Descriptions:



Example of bullrush; a narrow band along the Salinas River



Narrow bands of varying age cattail along the San Antonio River



Example depicts narrow band of cattails adjacent to the San Antonio River

Mapped where either *Scirpus spp.* (*californicus* or *acutus*) or *Typha latifolia* dominate the marsh. *Typha* was generally more dominant over a majority of the study except in areas near the Salinas estuary where *Scirpus* was noted in pure stands. Separating out freshwater marsh stands into dominant species of either cattail or bullrush

is beyond the resolution of the one-meter digital imagery.

Environmental parameters: Noted in semi permanently to permanently flooded areas adjacent to the major rivers in the study. Mapped in extremely narrow settings often well below one acre.

4210 – Sedge – Rush – Wet Grasses – Meadow Mapping Unit

Mapping Descriptions: Noted in very small patches generally south of Arroyo Seco. Mapped where *Carex*, *Juncus* or *eleocharis* dominate or share dominance in the herbaceous layer occasionally with wet grasses.

Environmental Parameters: Mapped in temporarily to seasonally flooded conditions often in swales or adjacent to small ponds.

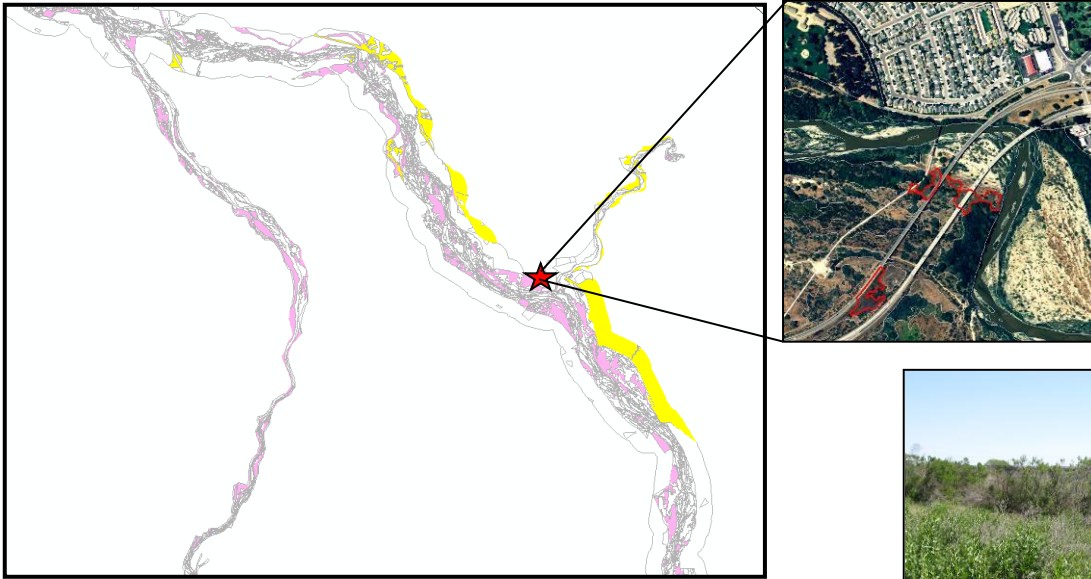


Example noted along Indian Valley Road north of San Miguel

4300 – Ruderal Grasslands & Forblands

4301 – *Lepidium latifolium*

4310 – Mediterranean California Annual Grasslands & Forbs



Typical distribution pattern of 4310 (yellow) and type 4300 (pink). Several patches of pepperweed were noted near King City (starred location) Example above represents the central portion of the mapping area.



Example patch of pepperweed noted above adjacent to Hwy. 101.

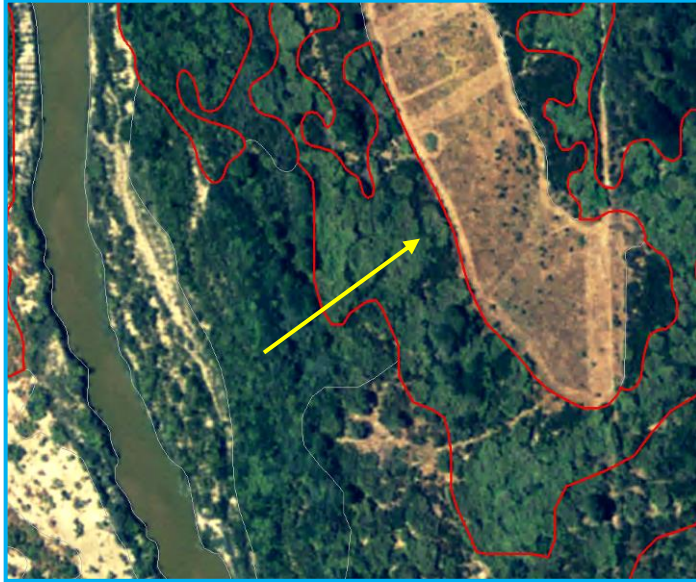
Mapping Descriptions: Mapped in two settings throughout the study area: Type 4300 is mapped in conditions where disturbance is high, and where invasive exotic species such as *Lepidium latifolium*, *Conium maculatum* and other aggressive types can be found. In this type, weedy forbs often dominate the Mediterranean naturalized grasses. Type 4310 is generally mapped along the fringes of the study area on hilly terrain where naturalized Mediterranean annual grasses including species of *Bromus*, *Avena*, and *Hordium* share dominance in the herbaceous layer. Emergent shrubs may occur in the stand; generally under 10% cover. Stands of *Lepidium Latifolium* (Type 4301) have no reliable photo interpretive signature and were mapped based on reconnaissance location only.

Environmental Parameters: Type 4300 is generally more mesic, occurring on deeper soils along the floodplain and in highly disturbed settings, often adjacent to agriculture. Type 4310 occurs on steeper slopes in xeric conditions, often adjacent to oak woodlands and chaparral.

4410 – Giant Cane



Core area located from King City north to Chualar



Note individual clones along the margins of the stand



Mapping Descriptions:
Mapped where *Arrundo donax* dominates the tall herbaceous or shrub layer; often in pure monotypic stands but also as a component to willow (especially *Salix exigua*) and mulefat. Individual clones of only a few plants either as a component to other vegetation types or in isolated patches are not mapped in this study.

In this example, Giant Cane occurs adjacent to river flats and along the stream channel itself.

Environmental parameters: Mapped in a variety of settings from upland where it is adjacent to annual grasses to seasonally flooded conditions along the stream channel edge. When it is a component to mixed riparian stands, *Arrundo* is mapped when it dominates the stand.

4510 – Pickleweed – (Saltgrass – Jaumea – Alkali Heath) Salt Marsh

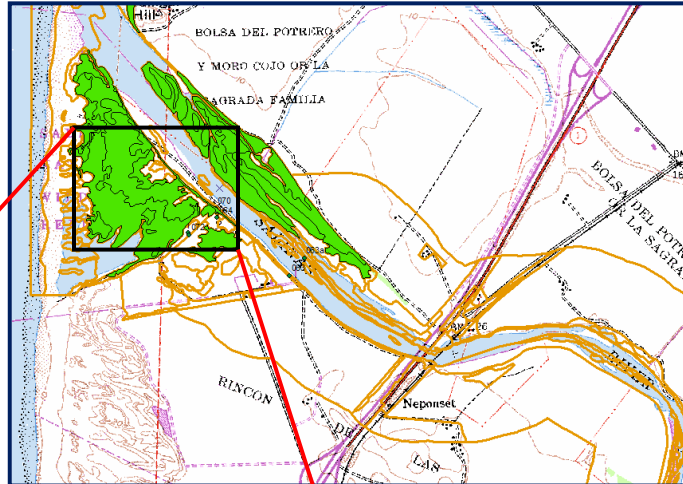
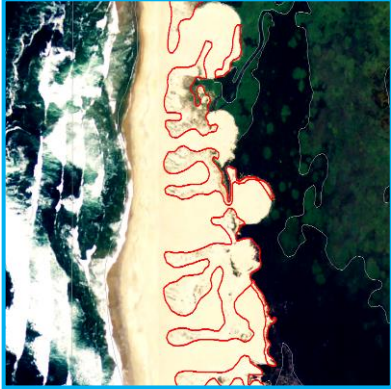


Image to the left depicts the signature variability in the saltmarsh community which in this example depicts differing growth stages of *Salicornia*. The lighter green area may also represent a somewhat higher elevation in the saltmarsh where *Distichilis spicata* may be a component to the *salicornia*.

Mapping Descriptions: Mapped where *Salicornia* spp. generally dominates the forb layer with other species locally dominating or a significant component to the stand; including *Distichilis spicata*, *Jaumea*, *Frankenia grandifolia*, *Grindelia* spp.

Environmental Parameters: Mapped primarily in tidally flooded regimes in the Salinas River estuary.

4600 – Coastal Dune Vegetation



Mapping Descriptions: Mapped in about 15 locations on coastal dunes west of the Salinas estuary. Species composition for this community was not determined and is mapped on photo (image) signature alone.

7. Data Dictionary

Salinas River Mapping Classification

Last Modified – January 2008

Classification of Vegetation Types (Alliance-Formation Level)

CLASS

Formation

Alliance & Mapping Units

1000 – FORESTS

1100 – Temperate Broadleaf Sclerophyll Evergreen Forests

1101 – Lower Elevation Mixed Broadleaf Hardwoods (California Bay – Madrone - Coast Live Oak) Mapping Unit

1150 – *Eucalyptus* Alliance or other exotic trees

1200 – Temperate Needleleaf Evergreen Forests

1230 – Foothill Pine Alliance

1300 – Temporarily Flooded Cold Season Deciduous Forests

1310 – *Mixed Willow* Forests

1320 – *Fremont Cottonwood* – *Mixed Willow* Forests

1330 – *California Sycamore* – (*Coast Live Oak* – *Fremont Cottonwood*)

1331 – *California Sycamore Alluvial Fan Savanna*

1332 – *California Sycamore* – *White Alder* (*Mixed Willow*)

1340 – *White Alder* (mixed willow)

2000 – WOODLANDS

2100 – Xeric Sclerophyll Evergreen Woodlands

2110 – *Coast Live Oak* Alliance

2120 – Interior Live Oak Alliance

2200 – Cold Season Deciduous Woodlands

*2201 – Mixed Blue Oak - Foothill Pine – (*Coast Live Oak* – *Interior Live Oak*)*

2210 – *Blue Oak* Alliance

2211 – *Blue Oak* (*Interior Live Oak*) / *California Annual Grasslands*

2220 – *California Buckeye* (*Interior Live Oak* - *Blue Oak*)

2230 – *Valley Oak* Alliance

2240 – *Tamarisk* (*Narrow-leaf willow*)

3000 – SHRUBLANDS

3100 – Temperate Broadleaf Sclerophyll Evergreen Shrublands

3101 – *Chamise* – *Mixed Xeric Chaparral* Mapping Unit

3102 – *Mixed Mesic Chaparral* (*Mixed scrub oak*, *Rhamnus* spp. & *Toyon*)

3200– Temperate Microphyllous Evergreen Shrubland

3220 – Coyote Brush Alliance

3300 – Temperate Xeric Mixed Drought-Deciduous Evergreen Shrubland

3301 – Mixed California Buckwheat – California Sagebrush

3310 – California Sagebrush Alliance

3400 – Temporarily Flooded Cold Season Deciduous Shrublands

3401 – Mixed Shrub Willow – Mulefat Thickets

3402 – Sparse Mulefat – Floodplain small shrubs (*Atriplex* spp. – Scalebroom Annual grasses & forbs)

3403 – Narrowleaf willow (*Mulefat*) thickets

3410 – Mulefat Alliance

3420 – Arroyo Willow

4000 – HERBACEOUS

4100 – Saturated Temperate Perennial Graminoids

4101 – Undifferentiated Marsh (*cattail*, *bulrush*)

4200 – Seasonally or Temporarily Flooded Graminoids

4210 – Sedge – Rush – Wet Grasses – (*Salt Grass*) Meadow Mapping Unit

4300 – Tall Temperate Annual Graminoids (Ruderal Dominant)

4301 – *Lepidium latifolium*

4310 – California Annual Grasslands Alliance

4400 – Tall Temperate Perennial Graminoids

4410 – Giant Cane

4500 – Tidally Flooded Graminoids

4510 – Pickleweed – Saltgrass – *Jaumea* – Alkali heath Mapping Unit

4600 – Coastal Dune Vegetation

9000 – LAND USE / UNVEGETATED

9800 – WATER

9200 – Agriculture

9201 – Row & field Crops (Irrigated and non irrigated)

9202 – Orchard – Vineyards

9300 – Built-up / Urban Disturbance

9302 – Quarry

9400 – Sparsely Vegetated or Unvegetated Areas

9410 – Landslides

9420 – Cliffs – Rock Outcrops

9430 – Active River Channel

9440 – River Flats

9450 – Tidally influenced portions of the Salinas River

9460 – Coastal Dune sparsely vegetated

9810 – Reservoirs

9820 – Small Ephemeral Ponds

9999 – Field questions – Six remaining

ADDITIONAL FIELDS CONTAINED IN THE DATABASE

COVER CLASS DENSITY VALUES (Separate fields – attributed to each polygon)

Note: Cover class categories for Trees & Shrubs – 1 field each

- 1 = >60%
- 2 = 40-60%
- 3 = 25-40%
- 4 = 10-25%
- 5 = 2-10%

QC (INTERNAL QUALITY CONTROL)

Used by AIS photo interpreters to check their work and AIS QC staff to check PI's work. This is an internal field and has been set back to zero.

FIELDCHECK

- 0 = No Field Check
- 1 = AIS PI Questions – Polygons denoted by photo interpreters where they have questions regarding the final label (call).
- 2 = Field Question Answered

GIS-RELATED

Shape Length & Shape Area