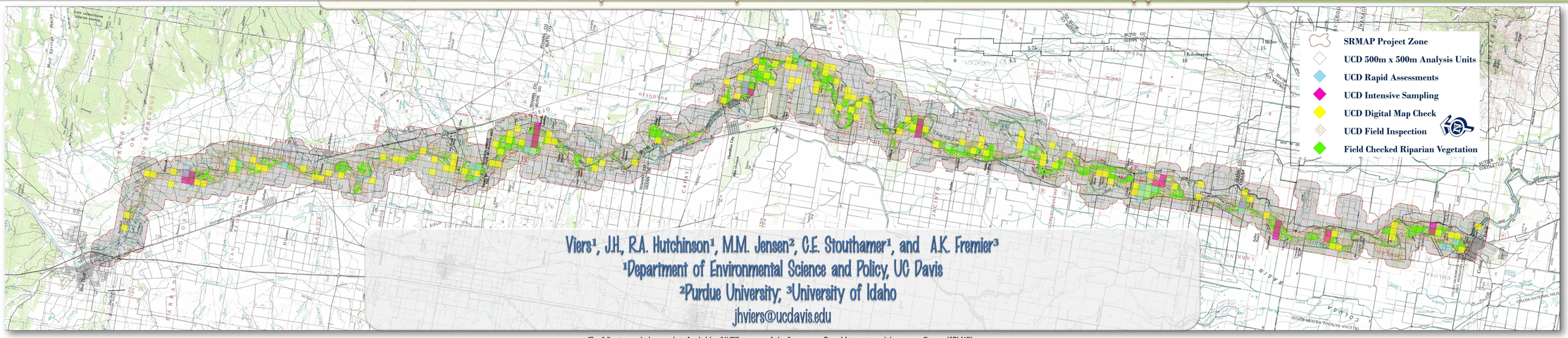
Sacramento River Riparian Map Validation: A Multi-Tiered Approach



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The following applied research is funded by CALFED as part of the Sacramento River Monitoring and Assessment Project (SRMAP).
We would like to thank Laura Galbert, Thuy Le, Sarah Lewis, and Jacob Loyko for their help in the field and lab. Thanks also to the Center for Watershed Sciences for use of the their watercraft; Mehrey Vaghti and Amy Williams for their data; and Eric Larsen for his collaboration.

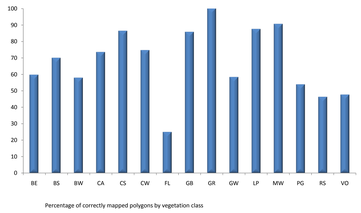
Visual Inspection

Purpose

Visual validation was conducted in order to quickly assess the accuracy of the 2007 Sacramento River Vegetation Map.

Methods

Field validation of CSUC polygons was conducted along a 100 mile stretch of the Sacramento River between Red Bluff (south of the diversion dam) and Colusa on over 30 properties owned by the Department of Fish and Game, The Nature Conservancy, Fish and Wildlife Service, and the Department of Water Resources. Polygon accuracy was checked visually in the field by species dominance and then editing polygon attributes in ArcPad 7.1 loaded into Trimble GeoXM units.



Results

We visited 15.2% of mapped polygons (n=1,228) and detected an 80.7% rate of accuracy based on contingency analysis in all visited vegetation types (Table 1).

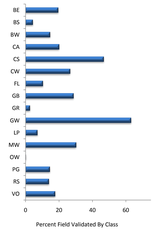
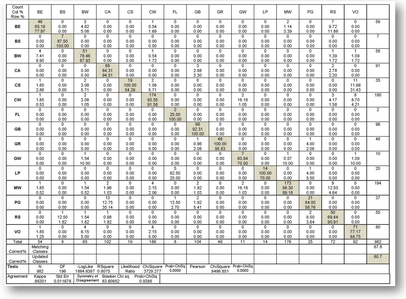


Table 1. Contingency analysis of the Sacramento River Vegetation Map as digitized by CSU Chico (horizontal axis) and as field validated by UC Davis (vertical axis). The accuracy rate of 80.7% is based on contingency analysis of all (1,228) polygons, this table only includes polygons that did not require edits to geometry or a new vegetation classification.



Rapid Assessments

Purpose

Rapid assessments were collected as a method of map validation and as a continuation of data collection begun by CSU Chico in an effort to develop vegetation types to the alliance and association level on the Sacramento River. Rapid assessments are used to "update the location, distribution, species composition, and disturbance information of vegetation types" by the California Native Plant Society (CNPS) and the Department of Fish and Game.

Methods

Rapid assessments were collected along 100 miles of the Sacramento River between Red Bluff and Colusa. We used the CNPS protocol as outlined in the Vegetation Rapid Assessment Protocol created by the CNPS Vegetation Committee (http://cnps.org/cnps/vegetation/). RA's were then used to validate the CSU Chico map and will be turned into the DFG vegetation program.

Preliminary Results

We conducted 56 rapid assessments in twelve of the fifteen vegetation types used in the 2007 Sacramento River vegetation map. Cottonwood (CW) forest types were especially variable in the understory make up and well defined associations, developed by Vaghti (2003).

Cottonwood forest associations (Vaghti 2003):
Populus fremontii / Acer negundo
Populus fremontii / Salix gooddingii
Populus fremontii / Rubus ursinus
Populus fremontii / Artemisia douglasiana
Populus fremontii / Acer negundo/Rubus discolor
Populus fremontii / Vitis californica
Populus fremontii / Galium aparine

Our results suggest that associations may also exist between *Populus fremontii / Carex barbarae* and *Populus fremontii / Toxicodendron diversilobum.*

Populus fremontii / Carex barbarae association

Populus fremontii / Vitis californica association

Rapid Assessments (RA) by polygon vegetation classification

Vegetation Class	# RA
BE	8
BS	1
BW	4
CA	4
CS	4
CW	10
GB	3
GW	3
MW	4
PG	3
Restoration	2
RS	7
VO	3

Intensive Sampling

Purpose

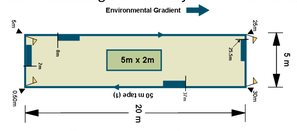
Intensive modified Whittaker plots were collected to validate the vegetation map and to gain detailed information about species cover, diversity, and tree height across environmental gradients and within different vegetation types.

Methods

Intensive modified Whittaker plots were set up throughout the project area, a 100 mile stretch of the Sacramento River from Red Bluff to Colusa. These plots were set up in areas that were floristically representative of a particular vegetation type at the association level. Data collection was conducted based on procedures developed by Barnett and Stohlgren (2003).

I-M Whittaker Plots at Merrill's Landing

California Annual Grassland (CA) plot



Preliminary Results

Our intensive sampling methods allowed us to update polygons with plot based vegetation sampling and field validated tree height information

Case Study: Cottonwood Forest Alliance

Cottonwood forests have a variety of understory herbaceous associations. We were able to identify many previously established associations from within our intensive modified Whittaker plot observations.

Populus fremontii/Artemisia douglasiana Association

Species (dominant)	*Cover*	*Stratum*
Populus fremontii	*15*	*Overstory*
Artemisia douglasiana	*30*	*Herbaceous*
Bromus diandrus	*2*	*Herbaceous*

Populus fremontii/ Salix gooddingii Association

Species(dominant)	*Cover*	*Stratum*
Populus fremontii	*15*	*Overstory*
Salix gooddingii	*25*	*Overstory*
Salix exigua	*15*	*Shrub*
Rubus ursinus	*3*	*Shrub*

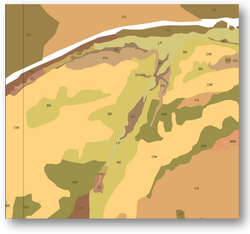
Digital Map Check

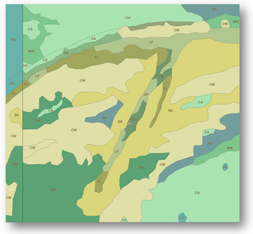
Purpose

Interpretative decisions of vegetation types are a central challenge in vector-based mapping efforts. This challenge is compounded by compositional choices (i.e., what is it?) and constitutional ones (i.e., how is it represented?); thus, digital map representation using a vector delineation process (i.e., head's up digitizing) is highly dependent upon human choice. We wanted to better understand representation of vegetation across the riverscape as dependent upon head's up GIS digitizing efforts.

Methods

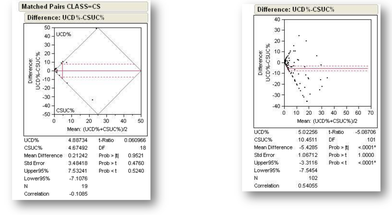
Using ArcGIS9.2, we created 500m x 500m blocks that cover the study area. Blocks overlapping > 33.4% of the 2007 Riparian Map were selected at random for re-digitization. GIS Technicians, after a period of training and cross-calibration, digitized vegetative cover with each selected block using the 2007 aerial photos as reference for interpretation. In all, 132 blocks were re-digitized for (see map above) for statistical analysis. Statistical analyses consisted of paired comparisons, first for inter-rater reliability, and second for vegetation class representation.





Results

Paired comparisons for the percent of total mapped area by vegetation class resulted in variable outcomes. This analysis showed that certain vegetation types, primarily forest types with complex signatures, are characterized differently by technicians within a GIS using aerial photographs for their definition.



Left to Right: California Sycamore (*Platanus racemosa*) and Black Walnut (*Juglans hindsii*)