A Standardized Rapid Assessment of Vegetation and Habitat

The Methodology, Its Values and Application in California

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Vegetation: The most widely used single-factor for classifying natural communities, which can be

- readily measured, identified, and mapped
- represented at multiple scales
- monitored over time
- used as an indicator of site quality or ecosystem function
- used as a surrogate for ecological variability and processes, which occur across much of earth's land surface

Importance of Vegetation Sampling, Classification and Mapping

- Define the variation, rarity, and distribution of both vegetation and species
- Manage resources at flexible scales that apply to the vegetation and target species
- Allow for easy mapping, updating, and monitoring applications
- Model for fire, exotic species, or other disturbance indices
- Determine habitat quality
- Prioritize of lands for conservation and management

Vegetation is a more useful synthetic tool when quantified

- We can easily see vegetation patterns in the landscape
- Descriptive and quantitative information is useful and easy to record and relate
- Important implications for issues of rarity
  - Landscape-level quantification of vegetation is important for extent, quality, range of variability,and regulation

The Evolution of Rapid Assessment

- Derived from accuracy assessment forms for vegetation mapping
- Developed from veg-fest field work by CNPS
- Expanded with awareness of value to merge wildlife and vegetation data

Main Purposes of the Rapid Assessment Method

- Collect defensible data
  - to acquire general species composition and abundance info,
  - to validate vegetation types for mapping or field inventory
  - to validate Wildlife-Habitat Relationship (WHR) habitat types for mapping/inventory
- Develop distribution and range information
  - for each vegetation and habitat type in a particular ecological region and throughout the state

Why Do Rapid Assessment?

- Data collection methods for habitat/vegetation are often tedious.
  - Thus mandated monitoring and habitat assessment does not get done.
- Much of the data collected for habitat/vegetation classification and validation requires multiple samples
  - more plots = better classification and validation
- Greater Area becomes assessed
  - less time and less money than with detailed methods (mapping component)
- Basic classification and validation requires relatively little data

When Should You Use Rapid Assessment?

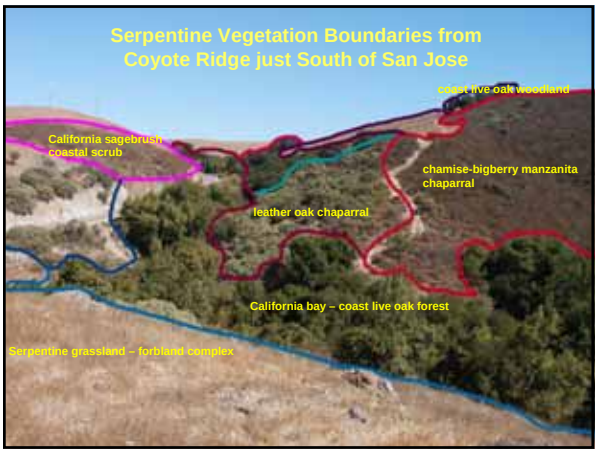
- When large areas need to be assessed for their habitat and vegetation values
  - e.g., mapping, distribution, basic habitat quality
- When vegetation and habitat classification is already fairly well understood
- When simple validation of basic attributes of vegetation/habitat is required

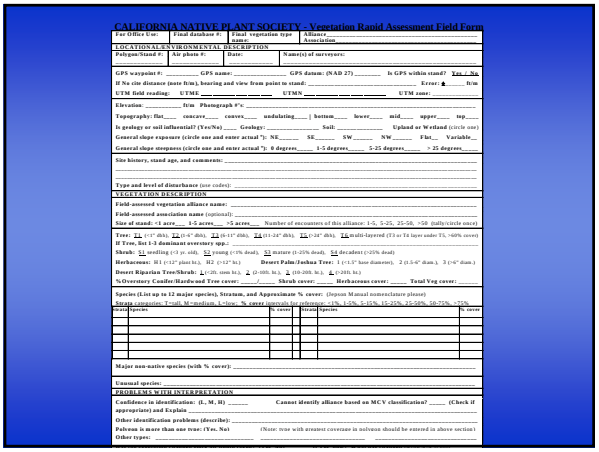
When RA is not Advised

- To substantiate and describe a new vegetation or habitat type (e.g. new association)
- For detailed long range monitoring of community/habitat functions
- For micro-habitat and within-stand assessments

The methodology and underlying assumptions:

- Visual recognition of relatively homogeneous stands of vegetation
- Estimation of cover of vegetation, species by layer
- Addresses the whole stand, not a laid-out plot
- Basic environmental variables
- GPS location for each site allows for pre-selection or *ad hoc* selection of sites to sample





CALIFORNIA NATIVE PLANT SOCIETY - Vegetation Rapid Assessment Field Form

For Office Use:	Final database #:	Final vegetation type name:	Alliance Association

LOCATIONAL/ENVIRONMENTAL DESCRIPTION

Polygon/Stand #:	Air photo #:	Date:	Name(s) of surveyors:

GPS waypoint #: _____ GPS name: _____ GPS datum: (NAD 27) _____ Is GPS within stand? Yes / No
If No circ distance (note ft/m), bearing and view from point to stand: _____ Error: ± _____ ft/m
UTM field reading: UTM5 ___ ___ ___ ___ UTM8 ___ ___ ___ ___ UTM zone:
Elevation _____ ft/m Photograph #'s: _____
Topography: flat____ concave____ convex____ undulating____ | bottom____ lower____ mid____ upper____ top____
Is geology or soil influential? (Yes/No) ____ Geology: _____ Soil: _____ Upland or Wetland (circle one)
General slope exposure (circle one and enter actual °): NE_____ SE_____ SW_____ NW_____ Flat__ Variable__
General slope steepness (circle one and enter actual °): 0 degrees____ 1-5 degrees____ 5-25 degrees____ > 25 degrees____
Site history, stand age, and comments: _____
Type and level of disturbance (see codes): _____

VEGETATION DESCRIPTION

Field-assessed vegetation alliance name: _____
Field-assessed association name (optional): _____
Size of stand: <1 acre____ 1-5 acres____ >5 acres____ Number of encounters of this alliance: 1-5, 5-25, 25-50, >50 (tally/circle once)
Tree: T1 (<1" dbh) T2 (1-6" dbh) T3 (6-11" dbh) T4 (11-24" dbh) T5 (>24" dbh) T6 multi-layered (T3 or T4 layer under T5, >60% cover)
If Tree, list 1-3 dominant overstory spp.: _____
Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), S3 mature (1-25% dead), S4 decadent (>25% dead)
Herbaceous: H1 (<12" plant ht.), H2 (>12" ht.) Desert Palm/Joshua Tree: 1 (<1.5' base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)
Desert Riparian Tree/Shrub: 1 (<20. stem ht.), 2 (>20. stem ht.), 3 (10-100. ht.), 4 (>100. ht.)
% Overstory Conifer/Hardwood Tree cover: _____/_____ Shrub cover: _____ Herbaceous cover: _____ Total Veg cover: _____

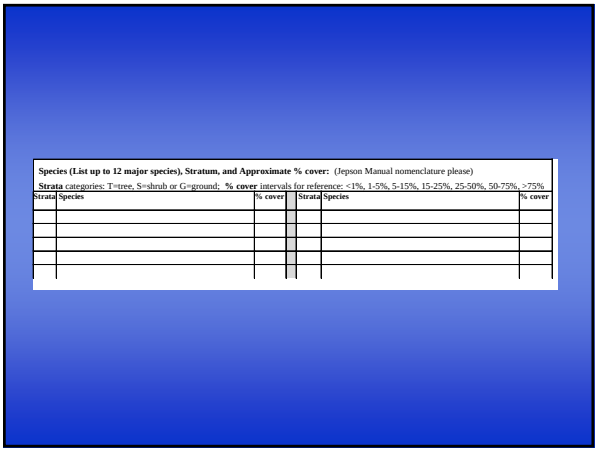
Species (List up to 12 major species), Stratum, and Approximate % cover: (Jepson Manual nomenclature please)
Strata categories: T=tree, S=shrub or G=ground; % cover intervals for reference: <1%, 1-5%, 5-15%, 15-25%, 25-50%, 50-75%, >75%

Strata	Species	% cover	Strata	Species	% cover

Major non-native species (with % cover): _____
Unusual species: _____

PROBLEMS WITH INTERPRETATION

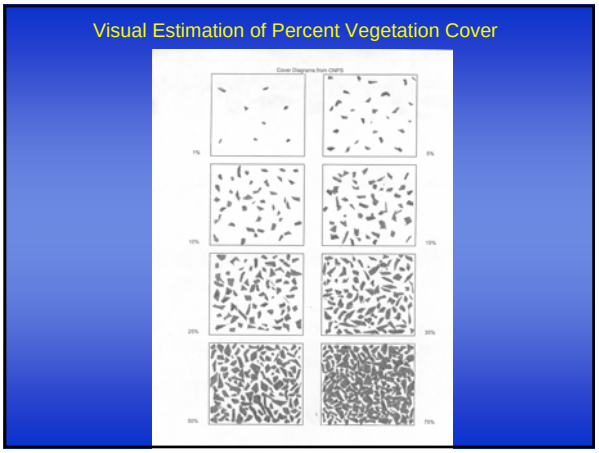
Confidence in identification: (L, M, H) _____ Cannot identify alliance based on MCV classification? _____ (Check if appropriate) and Explain _____
Other identification problems (describe): _____
Polyzon is more than one tree: (Yes, No) (Note: tree with greatest coverage in polygon should be entered in above section)
Other types: _____

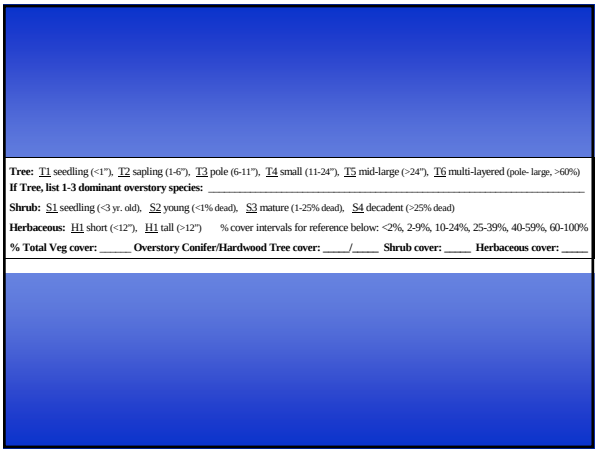


Species (List up to 12 major species), Stratum, and Approximate % cover: (Jepson Manual nomenclature please)

Strata categories: T=tree, S=shrub or G=ground; % cover intervals for reference: <1%, 1-5%, 5-15%, 15-25%, 25-50%, 50-75%, >75%

Strata	Species	% cover	Strata	Species	% cover





Tree: T1 seedling (<1"), T2 sapling (1-6"), T3 pole (6-11"), T4 small (11-24"), T5 mid-large (>24"), T6 multi-layered (pole- large, >60%)
If Tree, list 1-3 dominant overstory species: _____
Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), S3 mature (1-25% dead), S4 decadent (>25% dead)
Herbaceous: H1 short (<12"), H1 tall (>12") % cover intervals for reference below: <2%, 2-9%, 10-24%, 25-39%, 40-59%, 60-100%
% Total Veg cover: _____ **Overstory Conifer/Hardwood Tree cover:** _____/_____ **Shrub cover:** _____ **Herbaceous cover:** _____

How Rapid is RA?

- Nested Quadrats (2-4 hours)
- CNPS point-intercept (1.5-2.5 hours)
- CNPS Releve (30 minutes-2 hours)
- Rapid Assessment (10-30 minutes)

Vegetation Classification

- What is classification?
  - to order the patterns of plant distribution on a landscape
- Multiple classifications exist in CA, based on data OR various presumptions
  - Based on field samples OR anecdotal and qualitative
  - Quantitatively analyzed OR not
  - Defensible OR not
- Some are hierarchical, some are not
  - hierarchical method allow you to shift between any spatial scale, or focus on the scale/resolution most important in your study

Why have a Detailed and Hierarchical Classification?

- To define the many types of chaparral, grasslands, woodlands, forests, and wetlands
- To have consistent representation of the different vegetation types
- Some vegetation is too fine-scale to map, yet the surveys will identify and classify them and thus record further information on biodiversity
- To develop the best possible models for habitat
- To more accurately address the needs of all habitats of species at different scales and resolutions

Comparison of Holland Communities and Manual of California Vegetation Alliances for Coastal Sage Scrub

- Holland : Central (Lucian) Coastal Scrub
- Central Dune Scrub
- Northern (Franciscan) Coastal Scrub
- Venturan Sage Scrub
- Northern Coastal Bluff Scrub

- *Artemisia californica*
- *A. pycnocephala*
- *Ambrosia chamissonis*
- *Baccharis pilularis*
- *Ericameria ericoides*
- *Lupinus albifrons*
- *L. chamissonis*
- *Mimulus auriantiacus*
- *Salvia mellifera*
- *Toxicodendron diversilobum*

CNPS – MCV Classification: The Floristic Levels

- Alliance

The basic, generic unit of floristic classification, usually by the dominant and characteristic plant species in the upper layer of vegetation.

For example, in a Black Cottonwood Alliance, the cottonwood is conspicuous or predominate in the tree canopy.

Although Black Cottonwood may occur along with trees such as willows and maples, and numerous other shrubs and herbs, those other species typically cover less ground and are less characteristic of the alliance than cottonwood.

CNPS – MCV Classification: The Floristic Levels

- Association

The smallest, most fundamental unit of classification, analogous to the species in organism taxonomy.

Associations are subdivisions of alliances based on constant patterns of subordinate species within an overall pattern of alliance dominance. These patterns are typically geographically more specific than alliances. Thus, associations tend to be locally distributed and indicative of a certain environment or ecosystem in a local setting.

For example, Jeffrey Pine Woodland Alliance is widespread in coastal and inland mountains in California, while Jeffrey Pine – Idaho Fescue Association is only found on serpentine in Northwestern California. It has an incredibly high native plant and sensitive species diversity,with over 18 sensitive plant species

The Values of a Unified Classification

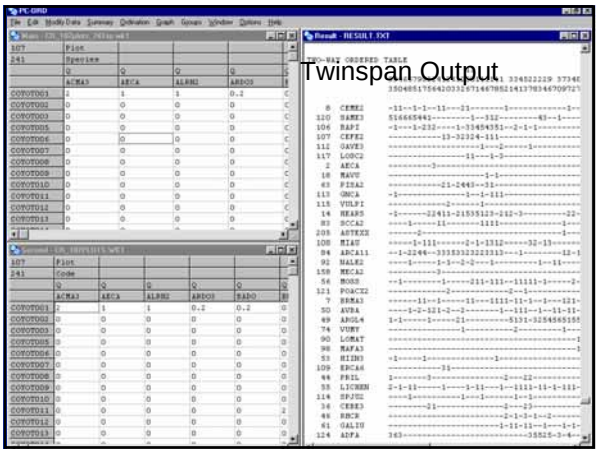
- Common language that any biologist can interpret
- Scientific standardization in language and in method for developing it
  - e.g., Coastal terrace prairie, central maritime chaparral
- Defensible for rarity and unique as well as common values, useful for regulatory purposes or restoration
- If different classification schemes are used in different areas, they cannot be compared
- Accurate testable maps require same of a classification

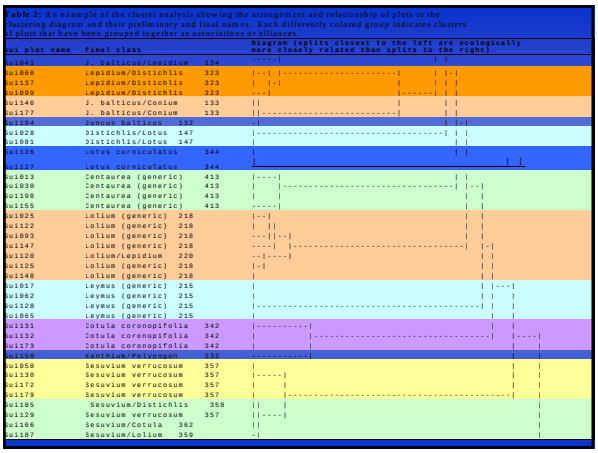
Process of Quantitative Vegetation Classification

1) Review existing data sources
   - Published field guides to plant associations
   - Literature on research and classification
   - Unpublished research work and data
   - Existing vegetation data
2) Initial Vegetation Classification List
   - List created from best available sources and general ecological knowledge
3) Stand and Plot-based Data Collection

Process of Quantitative Vegetation Classification

3) Analyze Data
   - Examine integrity of data, and separate different data types
   - Run outlier analysis on different sets
   - Run presence absence Cluster Analysis and/or Two-Way Indicator SPecies ANalysis and
   - Run permutations of Cluster Analysis and Twinspan
   - Run Indicator Species Analysis on main break points
   - Develop decision rules for main alliance/association breaks in analysis
4) Produce Keys and Descriptions
5) Produce Crosswalks between Other Classification Systems





Formation Category	Suisun Classification Name	Holland code	Holland name	WHR code	WHR name
Tall Wetland Graminoids (generic) (>1 m)		52200	coastal brackish marsh coastal and valley	SEW	saline emergent wetland
	Arundo donax	52410	freshwater marsh	FEW	fresh emergent wetland
	Phragmites australis	52200	coastal brackish marsh	SEW	saline emergent wetland
	Phragmites/Scirpus	52200	coastal brackish marsh	SEW	saline emergent wetland
	Phragmites/Xanthium	52200	coastal brackish marsh	SEW	saline emergent wetland
	Scirpus americanus (generic)	52200	coastal brackish marsh	SEW	saline emergent wetland
	Scirpus americanus/Lepidium	52200	coastal brackish marsh	SEW	saline emergent wetland
	Scirpus americanus/Potentilla	52200	coastal brackish marsh	SEW	saline emergent wetland
	Scirpus americanus/S. Californicus-S. acutus 113	52200	coastal brackish marsh	SEW	saline emergent wetland
	Scirpus californicus/S. acutus	52200	coastal brackish marsh	SEW	saline emergent wetland
	Scirpus (californicus or acutus)/Rosa	52200	coastal brackish marsh	SEW	saline emergent wetland
	Scirpus (californicus or acutus)-Typha sp.	52200	coastal brackish marsh	SEW	saline emergent wetland
	Scirpus (californicus or acutus)/Wetland Herbs	52200	coastal brackish marsh coastal and valley	SEW	saline emergent wetland
	Typha species (generic)	52410	freshwater marsh	FEW	fresh emergent wetland
	Typha angustifolia/Distichlis	52200	coastal brackish marsh	SEW	saline emergent wetland
	Typha angustifolia/Phragmites	52200	coastal brackish marsh coastal and valley	SEW	saline emergent wetland
	Typha angustifolia/Polygonum-Xanthium-Echinochloa	52410	freshwater marsh	FEW	fresh emergent wetland
	Typha angustifolia/S. americanus	52200	coastal brackish marsh	SEW	saline emergent wetland

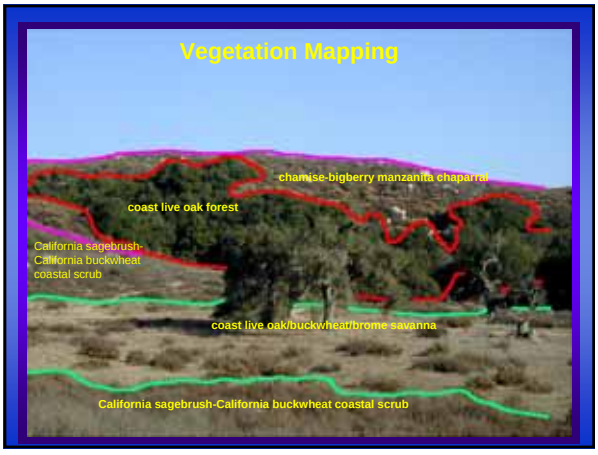
The Difference Between a Classification and a Map

Classification:

- Based on ground data collected from species composition and structure
- Based on a "scaleless" view of stands of vegetation
- Analytical representation of composition and structure of stands of vegetation

Map:

- Based on the best interpretation of data collected from the ground
- Based on an imposed scale (mmu, base resolution) of the source imagery used
- An interpretation of stands based on the above considerations



Primary Purposes of Fine-Scale Vegetation Mapping

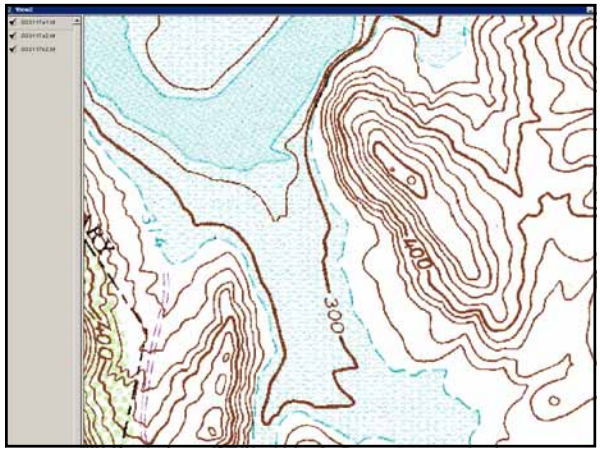
- Assess the different types of vegetation, as a measure of biodiversity
- Accurately depict locations and acreages of the different vegetation types
- Enable detailed monitoring of habitats and target species
- Assist in management of quality reserve sites
- To better understand the value of preserves and how they can integrate to protect and restore natural habitats and species
- Perform landscape and watershed analyses

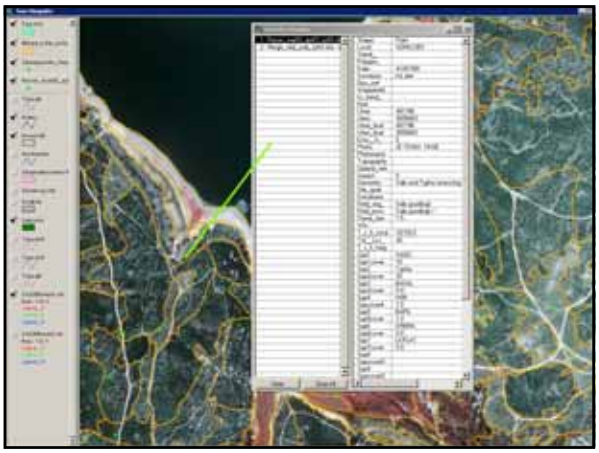
Mapping Process

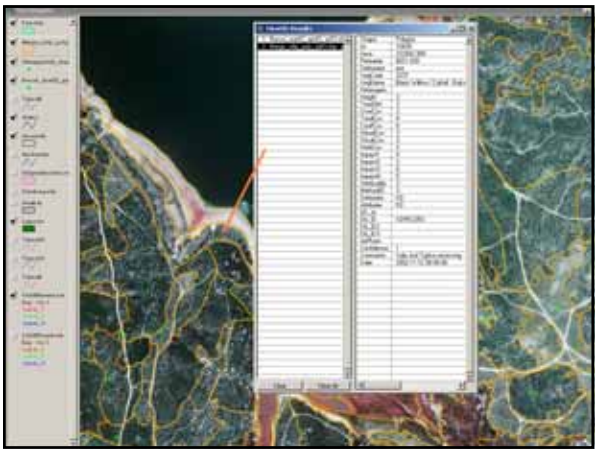
- Existing GIS info (e.g., imagery, topographic layer, other environmental info)
- Preliminary floristic classification
- Field survey points
- Reconnaissance
- Mapping classification
- Photo interpret and delineate polygons
- Mapping database linked to polygons

Standardized Techniques for Mapping, Updating, and Monitoring

Example from the San Dieguito River Park





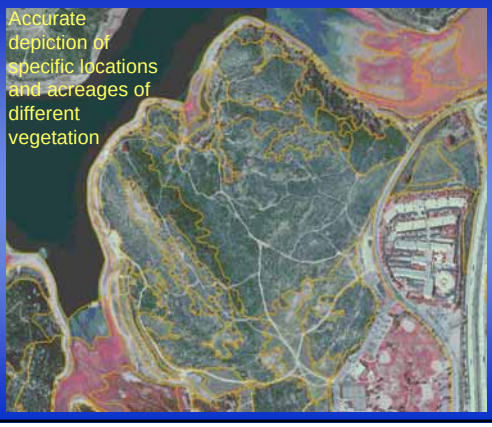


Mapping General Types of Vegetation and their Extent

- Most vegetation maps produced with little field data
  - Leads to a simplistic and coarse level mapping
- May be adequate for the general location of habitats
- Will not be adequate for conservation planning, land management, and perpetuation of habitats and species over time

Advantages of Fine-Scale Mapping

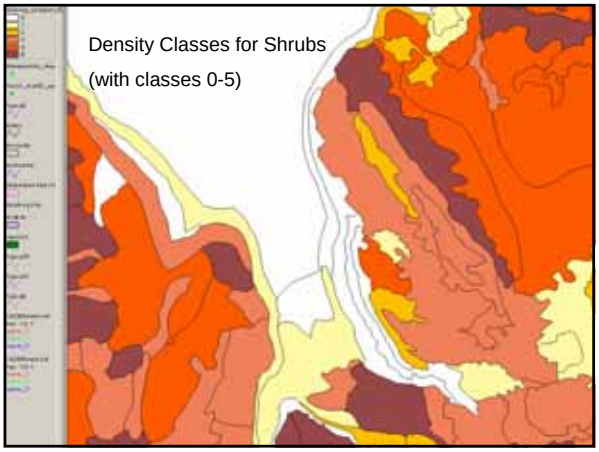
- Finer scale methods are required
  - to understand the specific habitat requirements of many species
  - to define rare plant communities
- More detailed information - structure and species composition
  - to detect change over time
  - to ensure sustainability of habitat/vegetation



Existing Coarser County Mapping Effort As Comparison

Predictive Value of Map will Enhance the Decisions about Management

- Diversity of habitats can be differentiated
- More precise location information for specific habitats of target species
- Specific management issues can be addressed and analyzed

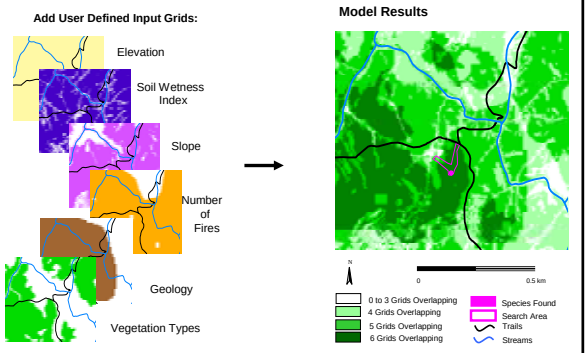


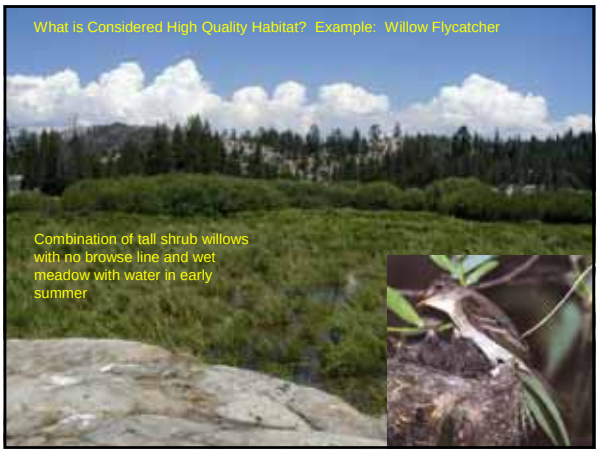
Hulsea brevifolia: USFWS Species of Local Concern, Forest Service Sensitive, CNPS 1B

Mapping _Hulsea brevifolia_ populations to derive habitat characteristics

- Intersect population location with vegetation map
- Derive vegetation type and canopy density
- Derive other habitat characteristics

Using a GIS Model to Predict Rare Plants Locations in Yosemite NP





Looking to the Future with Detailed Inventory and Mapping

- Detailed mapping with field vegetation surveys
- Model for future regional planning efforts around the State
- Provide a synoptic view of vegetation for future conservation planning, long-range monitoring and management priorities

Aspects of Vegetation Science Used in Integrative Vegetation Projects

- Vegetation sampling
- Data analysis
- Classification
- Reporting and archiving
- Mapping
- GIS analysis and modeling
- Conservation Planning
- Resource Management

Final Map and Classification Products

- Full accuracy assessment
- Quantitative classification with keys
- Descriptions of all newly defined vegetation
- Crosswalks to other classifications
- Digital map and database
- Plot samples database

Collaboration

- California Native Plant Society - Local Chapters and State staff
- Department of Fish and Game – Wildlife and Habitat Data Analysis Branch, Resource Assessment Program
- Other State and Federal Agencies – NPS, USFS, CDF, State Parks, UC, etc.
- Other Agencies and Organizations – Joint Powers of Authority, County Parks, City governments, land conservancies, etc.
- Vegetation MOU group
  - » Data collection
  - » Data analysis
  - » GIS data
  - » Land access
  - » Sharing of information

A Manual of California Vegetation - Revision

- Addition of over 200 new alliances (400 total),
  - Based on vegetation sampling and mapping efforts over past 7 years
- New format for descriptions
- Additions of regional information, disturbance effects, and vegetation dynamics
- Regional CNPS efforts will be given recognition
  - E.g. Santa Clara Valley Chapter verifies 3 associations of *Quercus durata* alliance with vegetation surveys
- Goal: Draft by Spring of 2005
  - Publication by CNPS in 2006