VOLUME 5 / DECEMBER 2003

THE SAMPLER

VEGETATION COMMITTEE NEWSLETTER

Contents

Introduction by Julie M. Evens

This year's CNPS vegetation committee newsletter focuses on specific uses and applications of the CNPS system of classifying and sampling vegetation across the state. For example, local chapter members have been using the CNPS sampling methods to identify and describe high priority vegetation. Local and state agencies have also adopted the methods for statewide inventory and mapping projects, including the California Department of Parks and Recreation and California Department of Fish and Game. The first two newsletter articles reflect the use and importance of the CNPS system by local and state entities.

A principal application of vegetation classification is in the production of maps that represent the distribution of recognized vegetation and habitat types. While there are various ways to classify and map vegetation and habitats, it is important to have consistent methods to accurately represent the diversity and distribution of vegetation. The third article discusses a federal agency's emphasis on plant community classification and mapping. At this time, state and federal agencies are agreeing upon consistent protocols for classification and mapping through an interagency vegetation group. The standardized classification will be reflected in the CNPS revision of *A Manual of California Vegetation*, with should be completed in the next year.

The recognition of both rare and common vegetation types is also reflected in the laws and policies set by state and federal bodies. Specifically, vegetation and habitat are covered within the California Environmental Quality Act, Habitat Conservation Plans, and the Natural Community Conservation Planning Act with the goal of protecting natural habitat in California. The last two articles discuss the use of vegetation information in these acts and planning efforts, with our expectation that people can effect stronger legal regulations to insure protection of natural plant communities as well as individual species after reading these articles. ?

Vegetation Surveying in Santa Clara Valley
by Don Mayal

Soon after the CNPS state office hired vegetation ecologist Julie Evens in the spring of 2001, the Executive Director sent a letter to chapter presidents soliciting proposals for support for chapter vegetation projects. The Santa Clara Valley Chapter responded with a request for assistance in studying the serpentine endemics of Coyote Ridge in southern Santa Clara County. Coyote Ridge is a solid block of serpentine two miles wide and fifteen miles long, the principal home of the bay checkerspot butterfly, listed as threatened by the US Fish and Wildlife Service, and the home of a number of special status plants and animals.

Although the area has not been developed

and is outside the voter-approved greenline for urban growth of the City of San Jose, it lies beside the next available space for urban expansion. The area cries out for preservation as open space. There was relatively little hard data about the area, no funds for scientific studies, and the need for scientific data beyond the scope of chapter volunteer efforts.

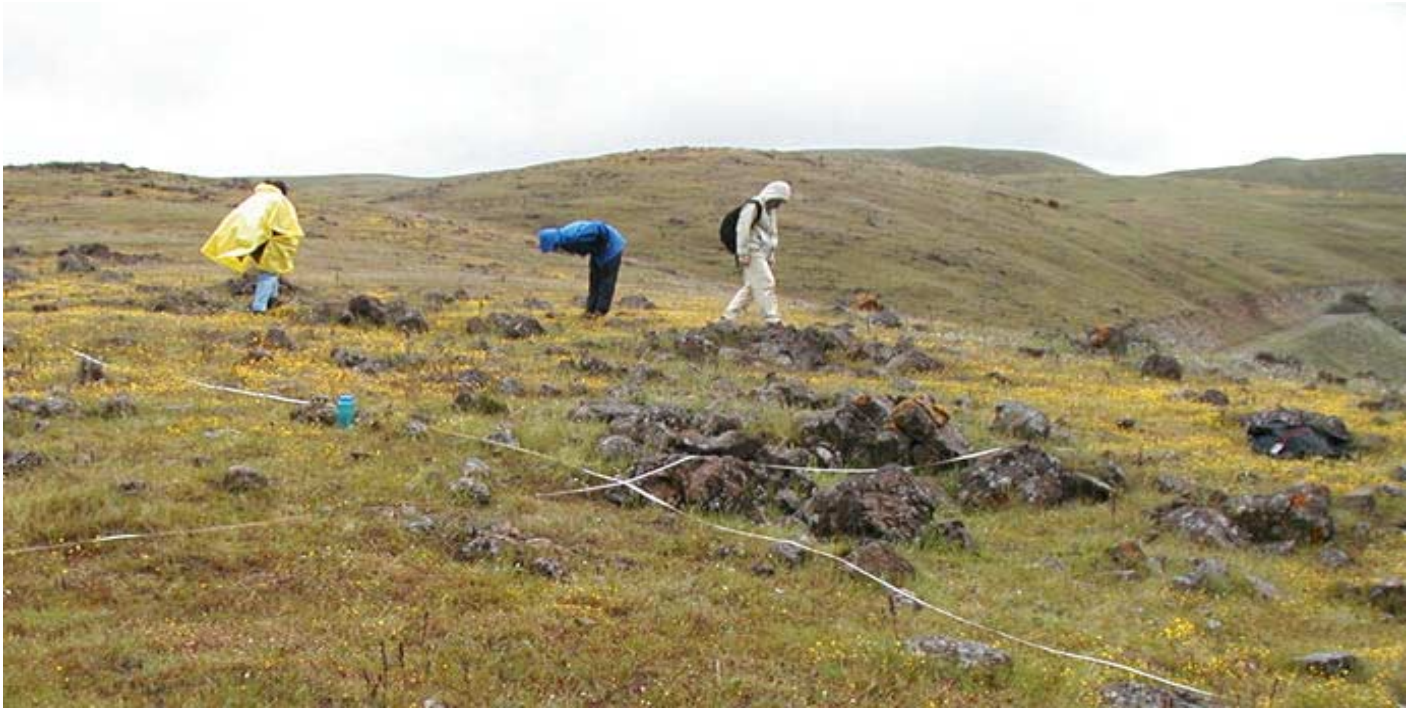
State CNPS accepted our proposal, and survey efforts on Coyote Ridge began in the fall of 2001. Julie Evens developed a data-gathering plan and trained several dozen chapter volunteers. Over the ensuing months we completed 111 rapid assessments and 90 relevés. The project is not complete but there have already been substantial benefits to the chapter, including an expanded knowledge base, new activities for chapter members, the stimulation of new research on serpentine endemics in the Santa Clara Valley, and enhanced status for CNPS as a science-based conservation organization.

Expanding our knowledge base

The surveys have greatly expanded our knowledge of this remarkable area. We have surveyed over 25 different plant associations, and we will be describing at least 10 new associations for California, such as those involving the Mt. Hamilton thistle (*Cirsium fontinale* var. *campylon*), serpentine grasslands and shrublands. Additionally, the chapter now has much more specific information on the ridge, including plant lists, new rare plant sightings, and mapping of invasive species.

An expanded plant database: Because of the survey work, we have more than doubled the list of known plants on Coyote Ridge. All plant species identified in the course of relevés and rapid assessment are now in a locational database with elevation, geographic coordinates, slope, aspect, bearing, soil characteristics, etc. A significant photo library of the surveys and plants has also been developed.

Rare plants: The survey project has substantially increased our knowledge of rare plants in this serpentine block. One new rare plant, not known at all in the Hamilton Range, the Loma Prieta Hoita (*Hoita strobilina*) was found. A new population of the state and federal listed Tiburon Indian paintbrush (*Castilleja affinis ssp. neglecta)* was found. New populations of Metcalf Canyon jewel-flower (*Streptanthus albidus ssp. albidus*), Santa Clara Valley dudleya (*Dudleya setchellii*), most beautiful jewel-flower (*Streptanthus*



Chapter members have actively collected surveys over the past two years at Coyote Ridge, just south of San Jose, increasing our knowledge of serpentine vegetation. Here they are identifying plants species in a relevé plot. Photograph by J. Evens.

albidus ssp. peramoenus), smooth lessingia (*Lessingia micradenia* var. *glabrata*), San Francisco wallflower (*Erysimum franciscanum*), fragrant fritillary (*Fritillaria liliacea*), and grand linanthus (*Linanthus grandiflorus*) have also been documented. The information has been reported to the California Natural Diversity Database (CNDDB) and relevant land managers.

Invasive species: New weed populations such as pampas grass, yellow starthistle, and the very invasive barbed goat grass have been plotted. The County's Weed management Area have been notified and control strategies discussed with the private land owners. The vegetation surveys have also provided data on the percent cover of invasive annual rye grass, which is threatening the plant habitat of the bay checkerspot butterfly and several other listed insect species. The surveys have also documented areas of overgrazing and feral pig damage that are affecting rare plant populations.

Providing new activities for chapter members

The vegetation survey work has provided a new activity for chapter members in addition to the more traditional field trips, weed pulls, pot-ups, and wildflower shows. While it requires that at least one team member can do plant identification, it also provides opportunities for those who don't do plant identification but have skills such as photography, orienteering, record-keeping, and data entry. One survey stalwart, Ben Hammett, is a retired Stanford professor who has taken many photos of survey locations and plants for the project, as a volunteer rare plant photographer for Cal Academy. He also ferries survey crews up to the ridge in his Explorer, equipped with enough gear to cross the Gobi desert. Tom Cochrane, also known as "trail traveler", has a full-time job, but spends his weekends leading CNPS field trips, working on plant lists, and on the Coyote Ridge survey crew.

Stimulating related research

Our survey activity is providing useful data to several other research projects. Stuart Weiss, who monitors the bay checkerspot butterfly population for the Butterfly Trust Fund and other conservation organizations, is making use of the relevé data collected on serpentine grasslands. Two master's degree students at San Jose State University who have been survey volunteers are now engaged in research on rare plants found on Coyote Ridge: Allison Green is doing a study of the relation of soil types to the distribution *Streptanthus albidus* ssp. *Peramoenus*, and Pamela Peterson is studying ecological factors in the distribution and diversity of rare plants on serpentine soils in the Santa Clara Valley.

Establishing CNPS as a significant science-based conservation organization

Undoubtedly the most important side benefit to the survey work is that the California Native Plant Society has become recognized as a major science-based organization. We are concerned about conservation biology and are developing valid and useful data about the ecosystems in the Santa Clara Valley. Presentations of our data have been made by state CNPS staff and chapter volunteers to the Santa Clara County Open Space Authority, the Santa Clara County Parks and Recreation Commission, the Santa Clara County Weed Management Area, and to environmental advocacy organizations and private groups. All have complimented our work and supported our efforts by sharing information, loaning equipment, and joining our survey crews as volunteers. We have supplied data on request to the Nature Conservancy and the Santa Clara Valley Water District. The US Fish and Wildlife Service has now declared the area as critical habitat for the bay checkerspot butterfly. A multi-species HCP / NCCP is now underway for the area. With this kind of respect and trust we have received from public agencies, we believe our conservation recommendations will be taken seriously. ?

A field of fragrant fritillary (*Fritillaria liliacea*). Photograph by S. San.

Use of CNPS Vegetation Standards in the State Parks System

by Roy A. Woodward

The California Department of Parks and Recreation has a mission to "…preserve biological diversity [and] protect natural resources…" Conducting worthwhile inventories of park natural resources, and subsequently monitoring the trend of those resources, is critical to fulfilling the goals outlined in the Department's mission. Vegetation mapping has been identified as one of the basic core resource inventory tasks that should be accomplished for every park, and indeed vegetation maps have been created over the years for many parks using a variety of vegetation classification systems and mapping techniques. Development of the CNPS vegetation classification system (Sawyer and Keeler-Wolf, 1995) has greatly helped standardize the way vegetation types are identified and named throughout the state. This classification system, and the accompanying standardized field sampling protocols that can be used to quantifiably classify vegetation types, has become a standard for vegetation mapping projects in the State Park System.

Vegetation sampling workshop at Sugar Pine Point State Park in the Lake Tahoe Basin. Photograph by J. Evens.

Vegetation classification and mapping in the State Park System, currently comprised of over 270 units and 1.5 million acres, is generally performed by State Park Department ecologists or contractors hired to perform a natural resources inventory. There has not been a systematic attempt to develop vegetation maps for all state parks, but this task is generally performed when a general plan is under development for a state park unit; less than half of all state parks now have current general plans. The Department seeks to cooperate with regional multi-agency classification/vegetation mapping projects, and particularly with efforts now afoot to create a statewide vegetation map over the space of only a few years that would serve as a basis for many resource assessment issues, such as land acquisition for new parks and tracking changes to vegetation type boundaries within parks.

An important component for a successful land management system based on vegetation classification and tracking is consistency in distinguishing specific vegetation types from place to place and over time. The CNPS system has gone further than any other technique towards accomplishing consistency and reliability. State Parks is in the midst of developing computer-based mapping systems (based on a geographic information system), digital databases, and field useable data collection systems, utilizing handheld computers and other digital devices. These systems mean more efficient use of field personnel, and more effective data assessment and change-detection analysis for managing park resources. However, the only way these procedures can work is if they are built on a reliable, scientifically quantitative, botanical basis. The CNPS vegetation classification system provides this basis. To attain a complete representation of existing vegetation and vegetation dynamics in California, we need thorough data collection, classification, and mapping statewide. Thus, State Parks is using this system to classify and map vegetation on our parklands to add to the existing knowledge base.

In the past three years, State Parks has produced highly accurate vegetation maps for several parks, including Chino Hills State Park and Wilder Ranch State Park, which have relied on the CNPS vegetation systems. In general, we find that we can accomplish a level of at least 90% accuracy if we utilize the CNPS systems (which is a

fairly high standard – there are always some complicating vegetation types that defy consistent mapping). A vegetation mapping primer has been made available to all park ecologists via the Internet at *www.parks.ca.gov/ default.asp?page_id=21737* that explains how to produce a vegetation map based on the CNPS criteria. State Park ecologists (many of whom are CNPS members) look for opportunities to coordinate with local CNPS Chapters and the members of the statewide vegetation program to forward the development of vegetation classification and mapping in the State Park System. ?

Vegetation Communities and Land Management in the United States Forest Service Pacific Southwest Region

by Hugh Safford, Tom Jimerson, Don Potter, and Sydney Smith

The US Forest Service extensively uses the concept of natural vegetation communities in planning for and carrying out land management on National Forest lands. The first of the Forest Service's 13 Guiding Principles states: "*We use an ecological approach to the multiple-use management of the National Forests and Grasslands."* In the Forest Service Manual, Series 2060 lays out *"Ecosystem classification, interpretation, and application"* as a key facet of National Forest resource management. Subseries 2060.3 requires that the Forest Service:

1. Use an ecological type classification to coordinate and integrate resource inventories and to stratify land and resource production capability and make predictions and interpretations for management.
2. Identify ecological units in inventory and use them in monitoring and evaluation, planning, and to make predictions and interpretations for resource management on National Forest System (NFS) lands.
3. Coordinate the characterization of ecological types and potential natural communities and the location and sampling of reference sites with other agencies.

In short, there is a national mandate in the Forest Service to use ecological classification as the basic frame of reference for land management. In practice, classification and mapping of vegetation communities occur under the aegis of two separate but related efforts, one dealing with current or "existing" vegetation, and another dealing with climax (to use an old and loaded term) or "potential" vegetation (what we call "Potential Natural Vegetation" or "PNV").

Classification and mapping of existing vegetation are conceptually straightforward, if not simple, and describe current vegetation composition, structure, and spatial pattern.

A major complication, both financially and logistically, is that existing vegetation maps must be regularly updated to reflect the effects of management actions, disturbances, and the like. Forest Service efforts in this realm occur at a variety of scales and are guided by the Existing Vegetation Classification and Mapping Technical Guide (EVCMTG), which will be finalized in 2004. The EVCMTG establishes agency-wide standards and procedures, and ties directly into Federal Geographic Data Committee (FGDC) standards for both physiognomic and floristic classifications. Standards for floristic classification of vegetation communities are being developed in concert with the international and US-national vegetation classification system, which also guides the State of California and CNPS vegetation classification work.

Today, PNV classification and mapping occur mostly as part of the Terrestrial Ecological Unit Inventory (TEUI) program. TEUI is a national effort to classify and delineate land units that are expected to show similar ecosystem responses to land management actions and disturbance processes. These land units, termed Terrestrial Ecological Units (TEUs), are defined by the intersection of PNV and characteristics of the physical environment (e.g. soils, climate, topography, geology). In practice, data collection, analysis and classification of PNV communities often represent the most difficult and time-consuming steps in TEUI. PNV is defined in the TEUI Technical Guide as "*The plant community that would become established if all successional sequences were completed without human interference under present environmental and floristic conditions, including those created by man".* Basically, PNV classification is a sort of habitat

typing, where the potential climax vegetation, i.e. that vegetation expected to dominate the site under present environmental conditions in the long-term absence of disturbance, acts as a surrogate for the overall environmental situation. PNV classifications necessitate detailed understanding of the ecology and successional relationships of key plant species and the communities they are part of. Once defined, PNV communities are extrapolated across the landscape and used to define site capabilities rather than present states. PNV communities are thus equal to existing vegetation communities in late seral settings (old-growth forest is an obvious example), but in many areas they may not be represented at all under current conditions.

After existing and potential vegetation communities have been categorized and spatially delineated, they become powerful tools for land management (see sidebar at right).

In practice, classification and mapping of both existing and potential vegetation are time-consuming and expensive. In the Pacific Southwest Region, we have comprehensive coverage of existing vegetation only at map scales broader than about 1:100,000, using the well-known CALVEG classification. Finer scale maps, necessary for project planning or landscape analysis, have mostly been created by Forests on an as-needed basis. Until now, there has been no agency-wide set of standards or protocols for these local mapping products, and very few of them have been based on rigorous vegetation classifications.

One of the principle aims of the Existing Vegetation Classification and Mapping Technical Guide is to provide corporate standards and protocols that local units can use to classify and map existing vegetation, and that will provide the ability to join these classifications and maps across Forests. Pacific Southwest Region ecologists have produced some detailed classifications of existing vegetation, including chaparral types in Southern California, and annual grassland types in Northwestern California; others are in development. At the Alliance level and below, the Forest Service relies mostly on the State of California and CNPS for the statewide classification system of existing vegetation (which is itself partly based on the work of Pacific Southwest Region ecologists). With respect to PNV, Pacific Southwest Region ecologists have published nearly a dozen formal vegetation classifications at the PNV Series level or below, and others are in preparation. TEUI mapping products are now completed at the 1:100,000 scale for 9 of the 18 Forests in the Region, and work is ongoing on most of the others. Regionally we recently developed a comprehensive set of electronic codes for our current set of PNV Series, and we are presently entering into the process of correlating these types and developing crosswalks to other classification systems such as A Manual of California Vegetation (CNPS) and Wildlife Habitat Relationships (State of California).

In summary, the Forest Service recognizes the importance of the natural community concept, and its fundamental value to science-based, sustainable land use management. In the

Information about existing vegetation, PNV, and stand history can be combined to provide much of the information necessary to (among other things):

1. Describe the diversity of vegetation communities and component plant and animal species occupying an area.
2. Stratify the landscape for the purposes of land management planning.
3. Characterize the effects of disturbances or management actions on species and community distributions.
4. Characterize the effects of disturbances or management actions on species and community distributions.
5. Document successional relationships and communities within ecological types.
6. Streamline monitoring design.
7. Assess resource conditions, and evaluate forest and rangeland health.
8. Determine land capability and suitability for proposed management actions.
9. Assess risks for invasive species, fire, insects and disease.
10. Conduct project planning and landscape- and watershed-analysis, and predict activity outcomes.
11. Facilitate extrapolation of analysis results to similar field conditions elsewhere.
12. Effectively communicate with the public and other land management agencies.

Pacific Southwest Region, we are actively involved in the classification and mapping of existing and potential vegetation communities. Products deriving from the definition and delineation of these community types constitute a major part of the scientific fundament upon which many of our most important management decisions rest. ?

CEQA and Rare Vegetation Communities

By Keith G. Wagner

In enacting the California Environmental Quality Act (CEQA; see sidebar this page), the Legislature declared that it is the policy of the state *"to preserve for future generations representations of all plant and animal communities"* (PRC §21001c). This article discusses sections of the CEQA Guidelines that can be used by the public to help protect rare plant communities.

Public participation in the CEQA process is important since the lead agency, consultants, and project proponents may not be aware of the existence or rarity of one or more plant communities on the proposed project site. In addition, public participation establishes one's standing in the event that legal challenge becomes necessary. Optimally, one should provide comments as early as possible, and consistently throughout each phase of CEQA's public process. This includes scoping comments, comments on draft environmental documents that are released for public review, and commenting at any public hearings for the project. By participating in the CEQA process, one may also be able to convince the project proponent and decision makers to make changes that will reduce or avoid the project's impacts on rare plant communities.

In providing comments, the focus should be on identifying and presenting the agency with "substantial evidence" supporting your assertions. CEQA defines "substantial evidence" to include *"facts, reasonable assumptions predicated on facts, and expert opinion supported by facts."* It is not "*argument, speculation, unsubstantiated opinion or narrative…*" (PRC § 21080(e).)

The following provisions of the CEQA Guidelines address the potential for significant, adverse impacts to rare plant communities. Where such impacts are identified, they must be addressed during environmental review, either through the incorporation of mitigation measures and alternatives that will *clearly* avoid or mitigate the impacts to less-than-significant levels (in which case a mitigated negative declaration may be prepared), or through the analysis of such measures in an Environmental Impact Report (EIR), in situations where it appears that the project may have remaining, unavoidable impacts.

Communities supporting rare species

Section 15065 of the Guidelines requires preparation of an EIR when the project has the potential *to "reduce the number or restrict the range of an endangered, rare or threatened species."* Impacts to plant communities that either support or are dominated by one or more rare, threatened or endangered (RTE) species should therefore be addressed during environmental review. In cases where an RTE plant is a dominant in the community or in which an RTE animal depends on the community, one can request that impacts to the functioning of the *entire* community, and not just direct impacts to the RTE species, should be addressed and mitigated to the extent feasible.

Communities threatened with elimination

Section 15065 of the Guidelines also applies where substantial evidence indicates that *"the project has the potential to … threaten to eliminate a plant or animal community."* This is admittedly a perilously low standard, similar to the "jeopardy" standard of the state and federal endangered species acts. However, there may be instances in which a large development would threaten to completely eliminate a plant community, either

CEQA (Pub. Resources Code, §21000 et seq.) is a complex area of law that includes the Act itself, the CEQA Guidelines (Cal. Code Regs., tit. 14, ch. 3, §15000 et seq.) and CEQA case law. Excellent resources for understanding and applying this law for resource protection include the Planning and Conservation League's "Community Guide to the California Environmental Quality Act" by J. William Yeates (see *www.pcl.org*), and "How to Comment on a CEQA Document" by T. Peterson in *Fremontia* 29 (3-4):27-37.

through direct or indirect impacts. If there is a fair argument that this would be the case, an EIR must be prepared.

Riparian habitats

The state recognizes the substantial ecological role that riparian habitat plays and its significant historical loss, and so section IV (b) of the Environmental Checklist (Appendix G of the Guidelines) requires the lead agency to consider whether the project would have *"a substantial adverse effect on any riparian habitat."*

Wetlands

Section IV(c) of the Checklist asks if the project would have *"a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means."* Although the scope of wetland communities that fall under Section 404 protection was recently limited by a recent U.S. Supreme Court decision, *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers* (2001) 531 U.S. 159, impacts to the state's wetlands arguably should still be considered significant *regardless of their section 404 status* because the State of California and the Fish and Game Commission (FGC) have independently recognized the value of the State's wetlands with a "no net loss of wetlands" policy.

Overview of southeastern portion of Suisun Marsh, DFG Grizzly Island Wildlife Area, showing a mosaic of grassland and emergent marsh vegetation created partially by different management practices. Photograph by T. Keeler-Wolf.

Previously identified sensitive natural communities

Section IV (b) of the Checklist asks if the project would have *"a substantial adverse effect on any…sensitive natural community identified in local or regional plans, policies, regulations…"* Similarly, IV (e) asks if the project will "*conflict with any local policies or ordinances protecting biological resources…."* Thus, if protection of important natural communities is contemplated by the overlying General Plan or local ordinances, adverse impacts to such communities caused by a specific project should be viewed as significant. For example, the Land Use and Circulation Element of the Solano County General Plan states that the *"…County shall protect its … lowland grasslands which are critical habitats for marsh-related wildlife,"* and so if a project would destroy lowland grassland near Suisun Marsh, the impact should be considered significant.

Sensitive natural communities identified by resources agencies

Section IV (b) also asks if the project will have a substantial adverse impact on a "*sensitive natural community identified …by the California Department of Fish and Game or US Fish and Wildlife Service."* The state's vegetation classification, which is based on CNPS's *A Manual of California Vegetation* and the state's Vegetation MOU Group, is a work in progress and requires thor-

ough classification and mapping of vegetation statewide before a full understanding of community sensitivity is gained. However, the California Natural Diversity Database maintains a list of all vegetation communities that have been identified so far (*www.dfg.ca.gov/whdab/pdfs/natcomlist.pdf*). Communities that are indicated by an asterisk on this list are considered sensitive in that they have 100 or less viable occurrences in the state based on the Department's best information about distribution and the likelihood of the community being found in currently unmapped areas. If the project will impact one of these sensitive communities, you may make an argument that impacts to it will be significant.

Other rare communities, not previously identified

If the CEQA guidelines, as discussed above, do not specifically address a potential rare plant community on the project site, comments about such communities will have to be based on accompanying submittals to establish the nature and existence of the community. If a project will clearly result in the destruction or degradation of a potential rare plant community, one should carefully document and present evidence that the community is, in fact, a distinct, rare community. Many plant communities still need better definition with scientific data collection. "Substantial evidence" that a community is distinct and that is it rare might be established, for example, through vegetation sampling, classification, and mapping. This may mean that a study has to be done quickly, which can be difficult without access to the site or where the project proponent does not agree to have a study done. However, one might be able to provide substantial evidence that a study *should* be done, based on a reasonable inference founded on expert opinion or facts that *are* available, that a rare community exists onsite.

For example, if the soils, geology, topography, and aerial photographic signature are similar to a nearby site that is both sampled and mapped as a rare community, one might reasonably infer that the plant community on the project site could be the same. Current vegetation mapping techniques use this type of inference all of the time, since some areas are accessible and sampled in a mapping effort while other areas are not accessible. The accuracy assessment of the mapping (which hopefully was conducted) would test the assertions of the mapping of the nearby area and provide a measuring stick of the likelihood of any particular mapped vegetation stand actually being that type. Thus, if an unvisited area of a given signature is 80%-90% likely to be correctly identified according to the accuracy assessment, one might be able to make a "reasonable inference" based on this scientific fact (i.e., "substantial evidence") that the area is really that community type. This is one of the reasons that accurate and well-tested vegetation mapping will do a great deal for conservation advocacy. If no map and accuracy assessment of an adjacent area is available, one might provide "substantial evidence" that a rare vegetation type is likely to occur on the site by collecting data from one or more stands in an adjacent or nearby area with similar environmental characteristics and photographic signature (or similar appearance through binoculars) to the community on the project site.

The key to effectively using the CEQA process to protect rare plant communities is to relentlessly focus on gathering and submitting

Englemann oak (*Quercus englemannii*) woodland is recognized as a rare plant community in California. Near Santa Ysabel, San Diego County. Photograph by J. Evens.

"substantial evidence" in the form of *facts*, *expert opinion*, and *reasonable inferences* based on those sources. If you are providing previously undocumented evidence that a community on the project site is likely rare and should be addressed under CEQA, you must *clearly* establish 1) the facts that support your assertions and 2) the credibility of the methodology used in identifying or describing the rare plant community. Provide your credentials if you are a botanist or biologist. After consulting with your local CNPS chapter or the state organization, state that you are representing the California Native Plant Society and demonstrate that you have used the accepted methodology in describing the rare community. ?

Importance of Vegetation in Regional Conservation Planning

by Julie M. Evens and Todd Keeler-Wolf

Natural communities defined

Conservation action can be directed at many levels, from genus and species to entire ecosystems. One such level is the natural community, which is recognized as "an assemblage of species that co-occur in defined areas and that potentially interact in the landscape at certain times" (Grossman et al. 1998). The Nature Conservancy has used this term widely over the past three decades (Mayberry 1999) to represent a coarser level of biological diversity assessment than single species. The use of natural communities for conservation is often referred to as "the coarse filter approach" (TNC 1982). This implies that communities address the issues of biodiversity conservation that would not be addressed using the "fine filter approach" of individual rare species conservation. Along with rare plants and animals, natural communities are one of the main elements of biological diversity tracked by state and national biodiversity centers such as the Department of Fish and Game's California Natural Diversity Database. Natural communities can be operationally and quantitatively defined as separate entities using the criteria of distinct and repeated co-occurrence of species that prefer a particular environmental setting (see figure on page 11).

Biologists and ecologists have created naming conventions for natural communities, including the international classification for terrestrial ecological communities (Grossman et al. 1998; on-line version available at *www.natureserve.org/explorer/classeco.htm*). Research data and publications in California support this classification system of natural communities, such as CNPS's *A Manual of California Vegetation* (Sawyer and Keeler-Wolf 1995). The state and international classification systems consist of a seven-level hierarchy, in which lower finer levels are nested into progressively coarser levels. At the finest levels, the hierarchy is defined by plant species composition, with the "association" at finest level and the "alliance" at the next highest level. At the coarser levels such as the "formation" or "class", the hierarchy uses physical criteria such as plant lifeform and leaf morphology. An example "association" from northern California is old-growth redwood forest with sword fern and redwood sorrel in the understory.

How natural communities fit into conservation planning efforts

In recent Natural Community Conservation Planning (NCCP) and Habitat Conservation Plan (HCP) efforts, greater importance has been given towards conserving sets of co-occurring species, unique species interactions, and ecosystem functions, instead of conserving a single species in a particular setting. Conservation biologists and land use planners agree that long-range planning efforts are generally more effective when they incorporate all of the sensitive species in a particular area using their habitats as an "umbrella" to afford them protection. Because there are shared issues of habitat and site quality among different species, biologists and planners are working towards conserving groups of species in their habitats while allowing for planned development and loss of habitat area. In this respect, a natural community can represent a given species' habitat.

However, natural communities are biological units in and of themselves, and thus, it is important to look at the site quality of each community, the acreage of each community, and the corridors between them, each of which facilitates inventorying and mapping. In defining the landscape as discrete natural communities, people can effi-

ciently track the amount of area that each natural community encompasses without tracking every individual plant or animal species. “By describing, tracking, and preserving these ecological communities, [we, *sic*] are able to protect a complex suite of interactions not easily identified and protected through other means” (Grossman et al. 1998).

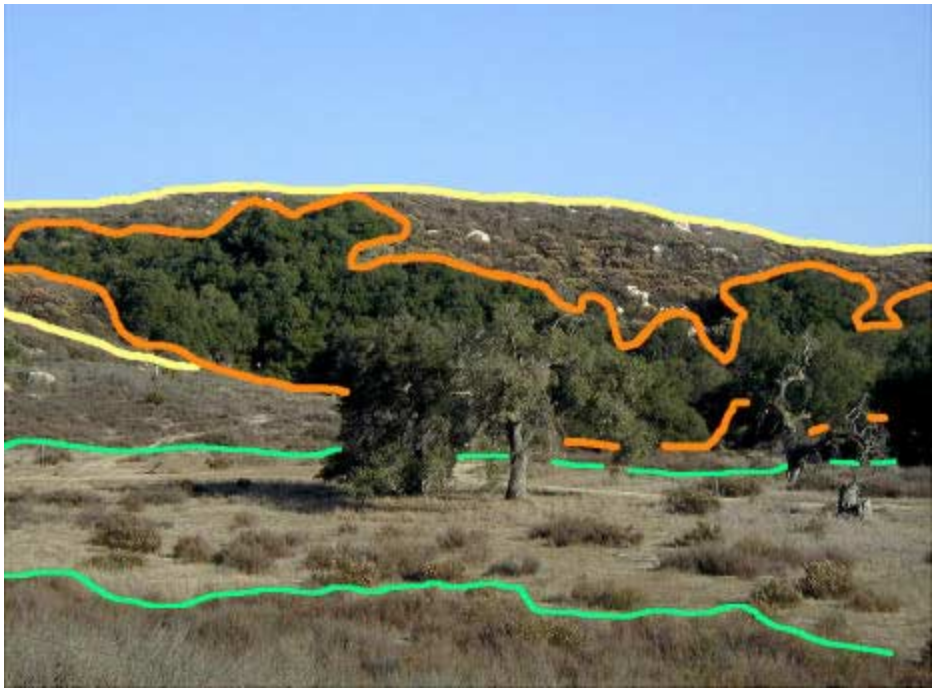
While there are different approaches used to define natural communities, the most widely used single factor for classifying them is “vegetation”. Vegetation can be readily measured, identified, and mapped. It can be represented at multiple scales and monitored over time. It can serve as an indicator of site quality or ecosystem function (such as climatic pattern or energy flow). Vegetation acts as a surrogate for the ecological variability and processes that occur on much of the earth’s landmass.

How natural communities have been included in past plans

In HCPs, natural communities often serve the role of critical habitat for rare animals and plants. In this way, natural communities have been defined coarsely (e.g., riparian scrub/woodland, coastal sage scrub) in attempts to protect rare species (usually animal species). Further, maps of natural communities are only sometimes created in HCP efforts, as broad categories for critical habitats. Because of the sociopolitical expediency in plan development, there have been imprecise delineations of natural communities and critical habitats for special species. For example, the habitat or natural community for the rare California gnatcatcher has been defined as any coastal sage scrub, regardless of plant species composition, structure, or abundance (e.g., City of San Diego 1997). In reality, these birds rely almost entirely on a certain subset of vegetation that is included within the broad definition of coastal sage scrub (Atwood and Bontrager 2001).

In NCCPs, natural communities are a standard part of the process, and along with rare species, are considered separate elements of conservation. Natural communities are defined, and certain communities are determined to be rare and of high conservation priority. The definitions and conservation of natural communities are not solely dependent on rare species, because natural communities are recognized as biological units in and of themselves.

In general, natural communities are being identified up-front in the draft planning process of both HCPs and NCCPs. Once identified, they are required to be mapped for an NCCP but not for an HCP. However, the best science has not been available or used to determine what the full range of communities are, which ones are most suitable as critical habitat for rare species, and what the differences are between each of them. Thus, it has been impossible to consistently map and monitor natural communities in previous plans. The result: plans for conservation of valid natural communities and valid critical habitat for species become obscure, and plans for development become more imposing.



An example of community boundaries (from the top to bottom above): chamise-bigberry manzanita chaparral, coast live oak forest, California sagebrush-California buckwheat coastal scrub, coast live oak/California buckwheat savanna, and California sagebrush-California buckwheat coastal scrub. Near Sage, western Riverside County. Photograph by T. Keeler-Wolf.

Shortfalls of past planning efforts

The main shortfall in HCP/NCCP planning is that there has not been enough available, up-front natural community data. For example, natural communities have been anecdotally defined and mapped by consulting firm biologists and local agencies, without standard definitions within or between planning areas. Natural communities have been considered inconsequentially as afterthoughts once target species have been identified, so that little time has been spent in defining and depicting them. Therefore, communities have been too broadly defined, and the locations and acreages of critical habitat for rare species have been concomitantly broadly and inaccurately defined.

The maps of NCCP (or HCP) efforts have mainly been based on Wildlife-Habitat Relationships (WHR) or Holland systems for naming/identifying plant communities. However, these systems have been inconsistently and inaccurately used. WHR is a system set up to define habitats specifically for vertebrate animal species (Mayer and Laudenslayer 1988), and it was not developed for mapping vegetation diversity or for mapping habitats for all animal species. Secondly, Holland (1986) is and out-of-date system that was used to qualitatively define habitats and vegetation. This system did not completely define all the vegetation types across the state, and it did not describe habitats in an even-handed fashion across the state. For example, some Holland types were coarsely described (such as the broad coastal sage scrub and chaparral types in Southern California) and some were more finely described (such as mountain hemlock, lodgepole pine, and whitebark pine types in subalpine Sierra Nevada). Because this system is qualitative, there are no clear distinctions between the different habitats and vegetation types.

Research biologists have found that many animal distributions are strongly correlated with plant species composition and structure, two important features that have not been well defined in the past maps of natural communities. The habitat definitions of certain target species are quite explicit. For example, the California gnatcatcher prefers open sage scrub with California sagebrush (*Artemisia californica*) as a dominant or co-dominant species (Atwood and Bontrager 2001). The gnatcatcher is more abundant near sage scrub-grassland interface than where sage scrub grades into chaparral. Dense sage scrub is occupied less frequently than more open sites. It is mostly absent from coastal areas dominated by black sage (*Salvia mellifera*), purple sage (*S. leucophylla*), or lemonadeberry (*Rhus integrifolia*). Yet much mapping of gnatchatcher habitat overlooked these details by not identifying variables of plant species, cover/abundance, and structure. Thus, it suggests all areas with a label of “coastal sage scrub” have a more or less equal likelihood of containing this bird species.

After conducting extensive surveys of birds and small mammals in coastal sage scrub, U.C. Riverside professor John Rotenberry and others (manuscript in review) found that there was enormous diversity in shrub species composition and this diversity shifts or “turns-over” across the range of southern California “coastal sage scrub”. Their results emphasized the fact that by using a simplified habitat definition, most maps conceal habitat variation to which animal species respond.

Coastal sage scrub habitat with California sagebrush (*Artemisia californica*) and California buckwheat (*Eriogonum fasciculatum*) dominating is juxtaposed with increasing development, south of Escondido in San Diego County. Photograph by C. Clifford.

Consequences of natural communities being defined generically

In the past 10 years of HCP and NCCP efforts, natural communities have been defined generically. These definitions have been mainly qualitative with general names such as coastal sage scrub (including Diegan, Riversidean, and Venturan sub-types), mixed oak woodland, chaparral, and montane coniferous forest. Dominant plant species and the structure are not consistently defined, and landscapes are grossly oversimplified. Further, various natural communities have been missed because they have used predetermined classifications such as Holland (1986). The Department of Fish and Game (DFG) does not accept this system anymore and is using the same system as CNPS, *A Manual of California Vegetation,* including its most recent updates (see the DFG website at *www.dfg.ca.gov/whdab/pdfs/natcomlist.pdf*).

The generic view of vegetation mapped in these plans does not match most species' requirements for habitat. Because these maps have been used to quantify specific acreages for generic natural communities, these maps will only identify very generic priorities for conservation. One serious consequence is that much more "appropriate habitat" for a species has been represented than there actually is. Clearly, this reduces the probability of establishing viable preserves for many of these species. We need better definitions of natural communities if we are to insure representation and mitigation for all levels of biodiversity in the state.

Further, there have been major discrepancies in the ways vegetation have been represented. Consulting biologists have inconsistently named and mapped vegetation types, partially because they have not used quantitative definitions of natural communities through specific on-the-ground identification of local species composition and abundance. Also, the biologists have had difficulty interpreting the different vegetation types during their mapping, because only minor field verification efforts have occurred in the process. Because there is not enough information available or collected and not enough time provided at the beginning of a planning process, ambiguous community definitions and inaccurate mapping have resulted. In southern California, oak woodlands sometimes have been mapped as different types based on the dominant oak species present, such as coast live oak, Engelmann oak, or black oak; however, in other cases in the same mapping effort they have been mapped more generically as "oak woodlands" or simply "woodlands and forests". Thus, vegetation has not been mapped repeatably or accurately across the same planning area let alone two different planning areas. Another example is the inconsistent mapping of chaparral in Riverside County. Consulting biologists had difficulty in interpreting different types of chaparral because of the scale of the aerial photography; thus, the acreages of the chamise chaparral, redshank chaparral, and semi-desert chaparral mapping units have been likely misrepresented. For the same reason, other types of chaparral that are known to occur in the area were not differentiated (Dudek 2003; online version at *www.rcip.org/mshcpdocs/vol2/appendixA/3_2.pdf*). This type of mapping results in an under-representation of rare vegetation types and poor representation of critical habitats for rare species, which translate to lower representation of them in the conservation plan.

As planning processes continue over the course of many years, the existing map products will not be very reliable for the long-term monitoring of species and natural communities because they coarsely define the vegetation. They lack additional important structural attributes, such as, overstory height, overstory cover, and density. They also lack site quality information such as cover of invasive exotic plants and degree of "roadedness." If a baseline vegetation map is to be used for conservation planning, restoration, and monitoring over time, the maps should be created with more data collection to better define the vegetation and increase accuracy of these efforts.

What we have learned about the shortfalls, and how to apply the lessons to future efforts

By participating in collaborative agency projects in various parts of California, CNPS has found that higher quality vegetation data are needed to support successful long-term conservation planning. This includes more detailed representation of all local vegetation types through field data collection, so that the differences of vegetation types can be depicted quantitatively with species composition, structure, and

abundance information. Of course, detailed types can be aggregated up into larger units (such as the standard hierarchical units in the international classification).

Thus, CNPS advocates and supports vegetation mapping and classification efforts that rely upon quantitative field data collection and analysis. We recommend that HCP and NCCP efforts use the same classification system as our publication, *A Manual of California Vegetation* (MCV), and its recent and ongoing updates from DFG to identify existing vegetation types. This system has a standard methodology including survey protocols to describe vegetation alliances and associations in a consistent and quantitative manner through species composition, abundance, structure, and environmental information. This system is standardized with NPS, USGS, and TNC/NatureServe methods (*biology.usgs.gov/npsveg/fieldmethods/index.html*). However, not all vegetation types in California have been currently defined either quantitatively or descriptively. Over the past 10 years with data collection using standard methods tied to specific mapping efforts, local vegetation types have been additionally quantified, which were not previously defined.

More useful, local data can and should be captured from each polygon of vegetation mapped. This will add to value of the map product (e.g., species composition, cover, height, and site quality). Such a vegetation map coupled with field data collection is more likely to capture the variation in vegetation to which animals as well as plants respond. While animals or plants may not be cued into a single vegetation type (they may be too rare or rely more on structure of vegetation across an array floristic vegetation types), additional attributes such as height, vegetation layering, cover, and exotic plant species invasion are likely to assist in better definition of critical habitat.

Particular importance to increasing the value of vegetation mapping for natural community conservation is high accuracy, predictability, and repeatable methodology. Tests of accuracy need to be a regular part of each product to ensure its accountability and reliability. CNPS recommends levels of accuracy of at least 80-90% for each mapping

We recommend that you consider the following items when reviewing and commenting on a NCCP or HCP:

- Did the effort include a map of the vegetation/natural communities, and if not, why did the plan exclude this?
- Did the effort have a quantitatively based classification system (e.g, *A Manual of California Vegetation* / international vegetation classification) for defining natural communities?
- Have local experts or state ecologists been consulted on the methodology for classifying and mapping the natural communities?
- For target species involved in the plan, do the map and classification clearly define their critical habitats through such attributes as plant species composition and abundance, plant structure, and overall cover?
- Is the classification and map hierarchical in nature so that target species with different habitat requirements (fine to coarse scale levels) can be modeled?
- Has the plan recognized all the important vegetation/habitat types known in the area by local experts, state classifications, and/or additional surveys, and have the types been appropriately mapped?
- Is there field vegetation data associated with the effort, and is it publicly available for examination?
- Was the mapping methodology defined, and was the map accuracy assessed at a high level of confidence (around 80-90%)?
- Can the mapping methodology be reproduced for re-mapping and monitoring efforts that cover the long-range viability of the plan?
- Do the map and the classification include multiple attributes (such as percent vegetation cover, overstory height/structure, site quality information/degree of disturbance), which will be useful for long-term habitat quality ranking, monitoring, and modeling?

effort. Standard repeatable techniques need to be employed that will facilitate updating maps in the future, and these techniques should be described in detail for each plan. Only when we have established standards can we match and compare different areas across the state or the same area over time. Only in such ways can the successes or failures of conservation plans can be gauged and appropriate adaptive measures be taken.

Additional information

For additional images and text associated with this article, please see the CNPS website for a PowerPoint presentation: *www.cnps.org/vegetation/NaturalCommunitiesInConservation Plans.htm*

References

Atwood, J.L. and D.R. Bontrager. 2001. California gnatcatcher (*Polioptila californica*). Pages 1-32 in: Poole, A. and F. Gill (Editors). The Birds of North America, No. 574. The Birds of North America, Inc. Philadelphia, PA.

City of San Diego. 1997. Multiple Species Conservation Program City of San Diego MSCP Subarea Plan. Community and Economic Development Department. San Diego, CA.

Dudek. 2003. Western Riverside County Multiple Habitat Species Conservation Plan, Final MSHCP, Volume II. Dudek & Assoc., Inc. Encinitas, CA.

Grossman D.H., Faber-Langendoen D., Weakley A.S., Anderson M., Bourgeron P., Crawford R., Goodin K., Landaal S., Metzler K., Patterson K.D., Pyne M., Reid M., and L. Sneddon. 1998. International Classification of Ecological Communities: Terrestrial Vegetation of the United States. Volume I, The National Vegetation Classification System: Development, Status, and Applications. The Nature Conservancy. Arlington, VA.

Holland, R.F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Unpublished report. State of California, The Resources Agency, Department of Fish and Game, Natural Heritage Division. Sacramento, CA.

Mayberry, K.P. (Editor). 1999. Seeing the Forest and the Trees: Ecological Classification for Conservation. The Nature Conservancy. Arlington, VA.

Mayer, K.E. and W.F. Laudenslayer, Jr. (eds.). 1988. A Guide to Wildlife Habitats of California. State of California, Resources Agency, Department of Fish and Game. Sacramento, CA.

Sawyer, J.O. and T. Keeler-Wolf. 1995. A Manual of California Vegetation. California Native Plant Society. Sacramento, CA.

The Nature Conservancy (TNC). 1982. Natural Heritage Program Operations Manual (unpublished). The Nature Conservancy. Arlington, VA. ?

Author Contact Information (alphabetical)

Julie M. Evens is Vegetation Ecologist, CNPS, 2707 K Street, Suite 1, Sacramento, CA 95816, 916/327-0714 or *jevens@cnps.org*

Tom Jimerson is Zone Ecologist, Six Rivers National Forest, 1330 Bayshore Way, Eureka, CA 95501

Todd Keeler-Wolf is Senior Vegetation Ecologist, Department of Fish and Game, 1416 Ninth Street, 12th Floor, Sacramento, CA 95814, 916/324-6857 or *tkwolf@dfg.ca.gov*

Don Mayall is Rare Plant Chairperson for the CNPS Santa Clara Valley Chapter, 531 Alger Avenue, Palo Alto, CA 94306 or *seleve@ix.netcom.com*

Don Potter is Province Ecologist, Stanislaus National Forest, 19777 Greenly Road, Sonora, CA 95370

Hugh Safford is Regional Ecologist, USDA-Forest Service, 1323 Club Drive, Vallejo, CA 94592, 707/562-8934 or *hughsafford@fs.fed.us*. † He is the author for correspondence regarding the US Forest Service article.

Sydney Smith is Province Ecologist, Modoc National Forest, 800 West 12th Street, Alturas, CA 96101

Keith A. Wagner is Associate Attorney, Law Office of J. William Yeates, 8002 California Avenue, Fair Oaks, CA 95628, 916/860-2000 or *kwagner@enviroqualitylaw.com*

Roy A. Woodward is Coordinator of the Inventory, Monitoring, and Assessment Program, California Department of Parks and Recreation, P.O. 942896, Sacramento, CA 94296-0001, 916/651-6940 or *rwoodw@parks.ca.gov* ?

CNPS

2707 K Street, Suite One
Sacramento, CA 95816
916/447-2677 voice
916/447-2727 fax
cnps@cnps.org email
www.cnps.org web

The mission of the California Native Plant Society is to increase understanding and appreciation of California's native plants and to conserve them and their natural habitats through science, education, advocacy, horticulture, and land stewardship.

Acknowledgements

This 2003 *Sampler* newsletter has benefited from the kind assistance of many CNPS Committee and Chapter members, who wrote, reviewed, and/or edited final drafts. All the authors (listed on p. 15) are thanked for their time in writing well-crafted and informative articles. Diana Hickson and Deb Hillyard provided substantive review and revisions, and David Tibor incorporated the materials into a new publication layout.

Much appreciation and recognition goes out to our past *Sampler* editors and publishers, Steve Hartman and Joan Stewart, who have provided the foundation and continuance of the newsletter over the past seven years. Steve and Joan will be donating additional time over the next couple of months to get all the past *Sampler* newsletters onto the CNPS website in PDF format, so that everyone can download the previous copies.
Julie M. Evens

Many thanks go out to CNPS chapter members statewide who have contributed countless hours towards vegetation sampling, such as here at Coyote Ridge in Santa Clara County. These efforts feed accurate vegetation classifications and maps, critical for conservation work. Photograph by S. San.