Southern California Botanists

32nd Annual SCB Symposium

Ecology and Flora of the Santa Monica Mountains

Saturday, October 28, 2006
The Ruby Gerontology Center California State University, Fullerton

Symposium

9:00 – 9:15am Introductory Comments
Naomi Fraga (SCB President)

9:15-9:45 am
Introduction to the Natural & Cultural History of the Santa Monica Mountains
Phil Rundel*[1] and John Tiszler[2] ([1]UC, Los Angeles, [2]National Park Service)

The Santa Monica Mountains present classic examples of evergreen shrublands and woodlands that characterize mediterranean-climate ecosystems. Such ecosystems, with their unique climatic regimes of mild wet winters and warm and dry summers, occur in just five regions of the world. These are California, central Chile, the Mediterranean Basin, the Cape Region of South Africa, and southwestern and South Australia. Nowhere outside of lowland tropical rainforests are there ecosystems with higher regional diversities of species, providing a strong justification for all five of these regions being designated within a small select group of regions as global hotspots of evolution. Biodiversity is particularly notable for vascular plant species in the mediterranean-climate regions. Although the combined area of these five regions is little more than 2% of the land area of the earth, they are home to approximately 50,000 species of vascular plants, 20% of the world's total. The landforms, climatic regime, and biodiversity of the Santa Monica Mountains provide an interesting comparison with two other small mediterranean-region mountain ranges with similar size and elevation - the Cape Peninsula in South Africa, and the Stirling Range in southwestern Australia. These mediterranean-climate regions, arguably more than in any other global ecosystem, offer unique opportunities to test ecological and evolutionary hypotheses relating biodiversity and ecological form to ecosystem characteristics and landscape evolution. The global significance of these ecosystems reinforces the need to continue the longstanding successes of comparative mediterranean ecosystem research.

9:45-10:15 am
Lichens of the Santa Monica Mountains
Kerry Knudsen (UC Riverside Herbarium)

Herman Hasse documented the lichen flora of the Santa Monica Mountains in 1913 in the Lichen Flora of Southern California. He reported approximately 200 lichens from the Santa Monica Mountains, a number of which may be extirpated. For the last two years lichenologist Kerry Knudsen has been resurveying the lichen flora of the Santa Monica Mountains with the goal of documenting a new baseline at the beginning of 21st century. Mr. Knudsen's work has resulted in discovery of new occurrences and taxonomic reevaluation of previous collections. To date, over 180 species have been documented. This presentation will review the lichen flora, highlighting unique and interesting species. Ecological relationships and regional and global floristic relationships will be discussed. Plans for continuing survey work will be presented.

10:15-10:45 am
Bryophytes of the Santa Monica Mountains
Paul Wilson*[1] and Tarja Sagar[2] ([1]CSU Northridge. [2]National Park Service)

Although the Santa Monica Mountains are mainly semiarid and not conducive to abundant moss cover, there are many favorable microhabitats that foster a surprisingly rich bryoflora. Paul Wilson and Tarja Sagar are currently surveying the bryoflora and have developed a list of 106 species which includes range extensions and species occurrences new to the state and the continent. Questions they are examining are how these species sort themselves across the landscape locally and regionally based on their microhabitat preferences, whether species can be predicted to occur in a location based on known environmental characteristics, if areas with high bryophyte diversity are also areas of high vascular plant diversity, and whether certain bryophyte species or suites of species tend to occur with species of special concern. This presentation will review the bryoflora, highlighting unique and interesting species. Ecological relationships and regional and global floristic relationships will be discussed. Plans to develop a web-based flora to stimulate and facilitate public involvement will also be presented.

10:45-11:00am Break

11:-11:30am

Revision of the Santa Monica Mountains Flora. Update on species status and the effort to create a comprehensive web-based flora.

Arthur C. Gibson* and Barry A. Prigge (University of California, Los Angeles)

Plant identification is the prerequisite first step in assessing land parcels for conservation or development, for determining regional commonality of each species, and to evaluate impacts of invasive plant species on the health and future of native populations. In the greater metropolitan region of Los Angeles, there is a critical need to know the current status of plants in local wildlands, especially when being impacted by heavy recreational use, commercial and residential development, plant invasions, and episodic fires. Beginning with Abrams in 1904, each generation has produced better tools for the Greater Los Angeles Region to use in identifying its plant species, but the task requires always an update of the species inventory, corrections in nomenclature and systematics, better and more accurate descriptions, modified keys for identification, and improved illustrations. we will report on progress for a new flora for the Santa Monica Mountains and Simi Hills (900 km2), that will not only far exceed all previous attempts for completeness, but also will have the capability of being updated without ever needing to be reprinted. The flora, in preparation since 2000, will be sent for publication in 2009, then followed directly by a website to post the species descriptions, the identification keys, the specimen database online, a polyclave for identification of the entire flora, and, later, serve as a site permitting future floristic additions. We have three specific objectives. (1) As much as possible, produce a flora that eliminates the need for the public to consult with and rely upon herbarium taxonomists and traditional herbarium resources. (2) Find ways and provide tools for the user to identify any plant in fresh condition virtually at any stage of growth. (3) Produce monographic quality descriptions of every species, for the full range of features but occurring only within the range. Taxonomists no longer are standard on academic faculties, and there is low public accessibility to herbarium materials; for Objective 1, therefore, we want to take the identification, especially of little-understood groups, out of the hands of specialists and make it possible for researchers and learned, serious amateurs to make dependable determinations on their own. For Objective 2, we want to make this treatment fully useful to field researchers and naturalists, who require accurate and rapid identifications from living materials. For Objective 3, we want our descriptions, generally about three times longer than in the Jepson Manual, plus colored images, to become a reasonable substitute for monographs of the past, to which the general public has no ready access. We will be providing the user with a set of very high quality descriptions of the local populations for ca. 1200 taxa (= 1/7 Jepson) and keys designed specifically for use on the forms encountered within our specific region. This, we hope, can become a new model and standard of excellence for California, and a primary source for monographers of each genus covered by our flora.

11:30–12:15pm

Vegetation Communities of the Santa Monica Mountains and their relationship to other southern California vegetation.

Todd Keeler-Wolf*$_1$, Julie Evans*$_2$, Julie Christian$_3$, Robert Taylor$_3$, Ed Reyes$_4$ ($_1$California Department of Fish and Game, $_2$California Native Plant Society, $_3$National Park Service, $_4$Aerial Information Systems)

In January the California Department of Fish Game and the California Native Plant Society working with the National Park Service completed a five-year effort to create a vegetation classification of the Santa Monica Mountains, Simi Hills and environs. The classification defines 84 vegetation alliances or unique stands and 204 associations or phases. It is based on an agglomerative cluster analysis of field data on 254 species from 3,912 vegetation stands in a 97,100 ha study area. This presentation will provide an overview of the Santa Monica Mountains vegetation clasisfication, highlight unique vegetation types, and discuss relationships with findings from other recent classifications in Southern California (e.g. western Riverside County, San Dieguito River Drainage in San Diego County, Los Padres National Forest, and several southwest coastal locations). The state-wide CDFG/CNPS vegetation classification program will also be presented.

12:15–2:00pm Lunch

Picnic at the Fullerton Arboretum

2:00–2:30pm

Wildfire influences on vegetation in the Santa Monica Mountains.

Marti Witter$_1$, Robert Taylor*$_1$ and Stephen D. Davis ($_1$National Park Service, $_2$Pepperdine University)

We have used data on the fire history of the Santa Monica Mountains to examine the drivers of the current wildfire environment and how species' response to fire can be influenced by altered fire regimes.

The Santa Monica Mountains are dominated by shrubland vegetation types which are especially prone to burning in severe wildfires. Fires burn the most land in the fall, when hot, dry Santa Ana winds fan flames through dry vegetation to produce large, intense, fast-moving wildfires. Large fires occur because once started, they can not be controlled

under these extreme climatic conditions. In coastal Mediterranean shrublands like the Santa Monica Mountains, large fires are not due to the unnatural accumulation of fuels from fire suppression but by the combination of vegetation type, climate and topography. Our data show that recent fires are not any larger or more intense than they were in the past and that large fires burn through all vegetation age classes. The major change that has occurred in the fire regime has been an increase in both the number of fires and the total amount of area burned. The large areas burned in the major fires create extensive, homogeneous areas of similar vegetation age classes which correspond to the time since the last fire. Currently the vegetation is dominated by younger age classes: almost 30% of the vegetation is less than 13 years old, 40% is in the 20-30 year age class and 25% in the 30+ age class. Old growth chaparral occurs in only a few pockets that have experienced little or no fire and represents only a tiny fraction (< 2%) of the total vegetation. Many areas of the Santa Monica Mountains have been burned repeatedly during the 81 years of the fire record. The average fire return interval is 32 years, much shorter than the presumed prehistoric fire regime. This has created a fine-grained, complex mosaic of fire history across the landscape. Although average statistics such as the average fire return interval are useful for comparing regional fire patterns, one of the most important factors to vegetation recovery is the length of the interfire interval. Native shrub species have been extirpated in some areas where short interfire intervals have occurred. We will discuss how an altered fire regime, plant life histories, and plant physiological properties affect landscape level vegetation patterns.

2:30–3:15pm
Interactive effects of freezing and drought on the distribution of chaparral shrubs in the Santa Monica Mountains.
Stephen D. Davis*$_1$ and R. Brandon Pratt$_2$
($_1$Pepperdine University, $_2$CSU Bakersfield)

A profound shift in chaparral species composition occurs from coastal to inland sites of the Santa Monica Mountains of southern California. Coastal sites rarely experience air temperatures below 0 °C whereas just 5 to 6 km inland, cold valleys experience temperatures as low as -12 °C. Seasonal drought can last 6 to 8 months and may extend, on rare occasions, into the month of December, coincidental with the onset of winter freeze. Both water stress and freezing, by independent mechanisms, can induce embolism in stem xylem and block water transport from soil to leaves, leading to branchlet dieback or shoot death. Shrubs partially dehydrated at the onset of freezing events are particularly susceptible. The interactions of drought and freezing may be an underappreciated selective force that in part regulates plant distribution patterns in the Santa Monica Mountains. *Ceanothus megacarpus*, *C. spinosus*, and *Malosma laurina* dominate the non-freezing landscape of coastal exposures, whereas *C. crassifolius* and *Rhus ovata* dominate inland cold air drainages. Because *C. spinosus* and *M. laurina* form lignotubers they can persist immediately upslope of cold valleys through vegetative resprouting after periodic freeze-induced death of shoots. Because *C. megacarpus* and *C. crassifolius* are not capable of vegetative resprouting (non-sprouters after shoot death by freezing), they are either eliminated from cold inland sites (*C. megacarpus*) or are adapted to freezing in combination with drought (*C. crassifolius*). In some cases, stems are more susceptible to freezing induced dysfunction than leaves (*R. ovata*) whereas in other species, both stems and leaves are extremely resistant to freezing-induced dysfunction, even when partially dehydrated (*C. crassifolius*). In the case of *M. laurina*, both stems and leaves are susceptible to freezing with total shoot dieback at -6 °C. However, stunted individuals of *M. laurina* may occur at -9 °C sites in the Santa Monica Mountains through repeated sprouting success. It appears that a suite of factors, including resprout success and susceptibility of leaves and stem xylem to the interactions of drought and freezing, control the distribution of chaparral shrubs in the Santa Monica Mountains.

3:15–3:30pm Break

3:30–4:15pm
Rare, threatened and endangered plants of the Santa Monica Mountains. Their status and efforts toward conservation and recovery.
Christy Brigham*$_1$, Ann Dorsey$_2$ and Jolene Pucci$_{1,2}$
($_1$National Park Service, $_2$CSU Northridge)

There are nine federally listed taxa that occur within the Santa Monica Mountains Simi Hills area. We discuss the general problems facing all nine of these species in the complex management and ecological matrix of the Santa Monica Mountains. In addition, we review the status and recent research findings concerning *Pentachaeta lyonii* and endangered *Dudleya* taxa.
In general, rare plants in the Santa Monica Mountains face a number of challenges. Increasing urbanization results in both direct habitat loss and a suite of other ecological impacts. All of the rare species currently listed by state or federal agencies appear to have historically had a small number of population occurrences due to either strict habitat requirements and/or strong dependence on disturbance. Thus habitat loss in these species is of particular concern since it is reducing an already small number of occurrences down to an incredibly small number of occurrences. For example,

Pentachaeta lyonii was known from 38 occurrences at the time of the recovery plan (1999) but is now known from only 30 sites with the majority (21) on private property. Other than direct habitat loss, other challenges to persistence in these species include: invasion of non-native plants, disturbance from land management activities, disturbance from recreation, and overall habitat degradation. Potential, but as of yet undocumented, impacts include fragmentation effects on pollinator service, impacts of changes in pollinator communities, potential impacts of global climate change, and disruption of gene flow.

Our recent research has focused on *Pentachaeta lyonii* and *Dudleya* taxa within the mountains. Field competition trials with *Pentachaeta* have documented significant declines in plant height and flower production when plants compete with non-native species such as annual grass, *Centaurea* melitensis and *Erodium* species. However, habitat manipulations found no direct impacts on *Pentachaeta* numbers when non-native plants were removed but did find significant impacts on native annuals associated with Pentachaeta. The combination of these two results suggests that while non-native plants have a significant direct impact on *Pentachaeta* growth and reproduction, other factors such as safe sites for germination, may also limit *Pentachaeta* field populations. In addition, survey work and experimental seed additions have shown that establishment of new *Pentachaeta* populations may be limited by seed availability and that site invasion by annual grass may cause local population extirpation.

One area of research on *Dudleya* includes biological aspects as they relate to the relative fitness of rare and common taxa. These aspects focus on reproduction. Inflorescence size, fruit number, number of seeds per fruit, seed size, seed germination percentages, and seedling survival were tracked for eight *Dudleya* taxa (five threatened, one rare, and two common). Rare species had shorter inflorescences and fewer fruits than common species.

Poster Session

Costs and benefits of chaparral fuel modifications in southern California

Richard W. Halsey[1] and Jon E. Keeley[2,3]
([1]The California Chaparral Field Institute, P.O. Box 545, Escondido, CA 92033, [2]USGS, Western Ecological Research Center, Sequoia-Kings Canyon Field Station, Three Rivers, CA 93271; [3]Department of Ecology and Evolutionary Biology, University of California, Los Angeles, CA 90095)

Here we evaluate the full costs, both economic and ecological costs to fuel modification in these chaparral shrublands and match these with the benefits resulting from these treatments, with the purpose of developing a more strategic approach to treatment application on these landscapes. Potential benefits of fuel modification include barriers to fire spread and defensible space for suppression activities. Whether or not these benefits are realized is a function of weather conditions associated with the fire event and geographical placement of fuel modification treatments. Resource benefits may also arise by providing corridors for wildlife movement. Costs include funds for installation and maintenance and resource impacts such as providing sinks for alien plant populations and encouraging their spread into wildland areas, as well as contributing to erosion and slope instability, and swapping hazardous fuels for highly combustible grasses that enhance the risk of ignition. In southern California chaparral fires that ignite under moderate weather conditions behave differently from fires driven by severe autumn Santa Ana winds. Under the former conditions, a chaparral fire might well lay down upon reaching young fuels. However, the massive 2003 Cedar Fire clearly showed that even a landscape-scale mosaic of stand age classes, including many young stands—some from recent fuel manipulations—cannot stop a chaparral fire under severe weather conditions, at least not until the weather changes. Cedar Fire behavior relative to fuel age will be evaluated at several critical junctures of that fire.

Rare and Common *Dudleya* Species in the Santa Monica Mountains

Ann Dorsey (CSU Northridge)

Dudleyas are succulent perennials, five of which are restricted to the Santa Monica Mountains and federally listed as threatened. Three common species occur locally as well. This study compares differences in plant characteristics (inflorescent height, number of fruits, number of leaves, rosette diameter, and longest leaf length) that affect reproductive output, habitat features (slope and aspect), and population densities. Rare species had shorter inflorescences, fewer fruits, smaller rosettes, shorter leaves, denser populations, and grew closer to north than common species. Furthermore, plant characteristics were positively correlated with population density and aspect. The next stage of the study will focus on and the performance of seedlings (seedling survival, photosynthetic rates, water use efficiencies). Ultimately, the purpose of the study is to find reasons for the differences in the abundances of these taxa.

The Vascular Flora of the Verdugo Mountains and San Raphael Hills, Los Angeles County, California

Valerie Soza[1], LeRoy Gross[2], Steve Boyd[2], Naomi Fraga[2] ([1]University of Washington Department of Biology, [2]Rancho Santa Ana Botanic Garden)

The Verdugo Mountains and San Raphael Hills are an island of wildlands, surrounded by the growing urbanization of the greater Los Angeles area. The region is situated near the cities of Burbank (to the south), Glendale (to the east), and Los Angeles (to the north and west). The study site is bounded by US Highway 210 to the north, California Highway 2 to the east, and US Interstate 5 to the south. The region is a northwest to southeast tending range and is situated between the San Gabriel and Santa Monica mountains, range in elevation from ca. 600 to 3100 feet, and is comprised of mostly metamorphic and granitic rock, interspersed with small patches of volcanic and marine sedimentary rock. The Verdugo Mountains and San Raphael Hills are under the jurisdiction of the three above-mentioned cities, along with private in-holdings, and a portion belonging to the Santa Monica Mountains Conservancy, with approximately 4,000 publicly-owned acres. Past agricultural and ongoing urbanization development has radically altered the landscape in much of the surrounding area, but significant portions of the Verdugo Mountains and San Raphael Hills remain intact. A floristic study of the Verdugo Mountains and San Raphael Hills was undertaken from 2000 to 2003 to provide the needed baseline inventory. Few herbarium collections have been made in the region and most of those in the earlier part of the 20th century. Plant communities of the area are chaparral, coastal sage scrub, riparian, oak woodland, and valley grassland. Several fires occurred between 1999 and 2002 allowing extensive documentation of fire followers for the area. A survey of historical collections from 6 herbaria combined with field work was undertaken to complete the floristic study. To date 724 taxa have been documented, including 5 taxa considered rare or endangered by the California Native Plant Society.

The Society of Herbarium Curators

Sula Vanderplank (Rancho Santa Ana Botanic Garden)

The purpose of the society is to promote and expand the role of herbaria in botanical research, teaching, and service to the community at large, to provide a forum for discussion and action on all issues confronting herbaria, and to extend its efforts and interject its influence toward the protection and preservation of endangered herbaria. In particular, regional networks will be used to reach out to groups that have been historically underrepresented in the botanical and conservation communities and SHC will work to support herbaria of all types, and help develop community standards of curation. Our newsletter The Vasculum is out now, this is a great time to join us and help support herbaria around the world.

Vendors

California Native Plant Society – Santa Monica Mountains Chapter

F.M. Roberts Publications

Freedom Embroidery

National Park Service - Santa Monica Mountains National Recreation Area

San Diego Plant Atlas
http://www.sdnhm.org/plantatlas/

Cal-IPC http://www.cal-ipc.org/

SCB Silent Book Auction proceeds go to the Susan Hobbs Grant for field research.

SCB Special Publication – Ecology and Flora of the Santa Monica Mountains
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