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Crossosoma Volume 35, Number 2 Fall-Winter 2009

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A saxicolous lichen community on sandstone in Weir Canyon. In center of picture, Candelariella rosulans (yellow) growing with Caloplaca squamulosa (orange) with Lecanora muralis (light gray) directly to left and right.

Photograph by Rolf Muertter.

Al Romspert in Madagascar, June 2006. Photo: Allan Schoenherr

DEDICATION:
Alan Romspert (Roms), 1945-2009

One of California's premier desert botanists, Alan Romspert, passed away on Wednesday, August 19, 2009. I will miss him dearly. Roms and I traveled and camped together for years. We collected plants, backpacked in the mountains, fished, and explored the southwest deserts. When I was still teaching at Fullerton College, I would stay at his house about once a week. We would sit on his front porch, drink whiskey, and solve the world's problems. He would smoke a cigar. It was kind of like Alan Shore (James Spader) and Denny Crane (William Shatner) of the television show "Boston Legal." We, of course, carried this ritual to campfires on our many camping trips.

I first met Roms in the early 1970s when he was freshly back from Viet Nam. We both took a class in Desert Biology at California State University, Fullerton. He went on to get his Bachelor's and Master's degrees there. Even though we most often thought of Romspert as a Botanist, he did his early research on the physiology of Amphibians, and he published two scientific papers on water relations in Amphibians. He also coauthored a paper with Jack Burk on the plants of the Algodones Dunes in Imperial County.

Alan was a member of Southern California Botanists since the early 1970s. Over the years, he held every office except secretary. He served as Treasurer for the last 30 years, during which time Board members will agree (or perhaps admit) that he was the glue the held the organization together. Alan kept the records, he balanced the books, wrote checks, reported our financial dealings to the IRS and kept up our non-profit status. He printed the mailing labels for *Leaflets* and *Crossosoma*, dutifully highlighting the expiration date of errant members. To save a bit of postage, he hand-delivered copies to members he knew. He sorted the mail by zip code and delivered it to the Post Office. He kept the membership records and, like a badger, he pursued members who hadn't paid their dues on time. Most of Southern California Botanists' records, materials and archives were kept in boxes at Alan's house. When it came time to distribute research grants, Alan headed the committee that read the proposals.

Roms took care of records and finances his own way. Nobody else understood it, but it always got done. He was a bit set in his ways and rarely saw reason to change them (though he did finally upgrade his ancient membership data base to a system compatible with 21st century computers). He could be a curmudgeon at board meetings, sometimes frustrating the other Directors, but entertaining to at least some (the Directors stifling their laughter or hiding it behind their paperwork).

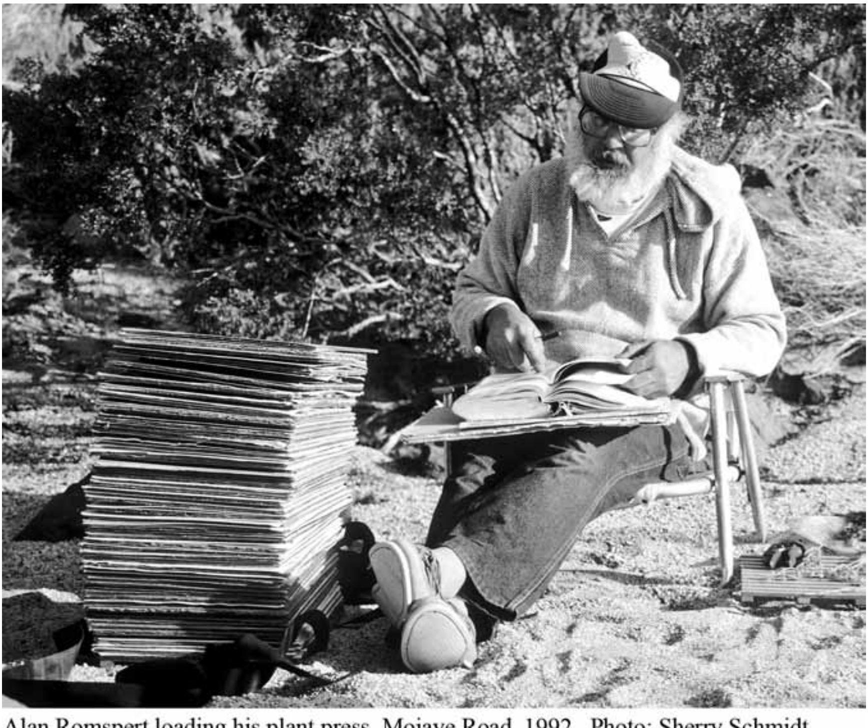
The Southern California Botanists symposium is our single, important social, scientific, and fund-raising event each year. Most of our members look forward to the long day of botany, and chance to meet new and old friends and colleagues, and maybe meet afterwards for beer. The Symposium is now in its 34th year.

Without Romspert's efforts, the Symposium would never have lasted. Each year, Roms reserved the Ruby Gerontology Center and made sure that campus security opened the doors at 7:00 am so we could start setting up. He kept track of early registrants. He would borrow a pickup truck, and sometimes single-handedly transport large folding tables from storage to the symposium site. He made the coffee, heated water, set up cold drinks, pulled tea bags, sugar, cream, napkins, hot cups, cold cups from storage, and bought doughnuts on the day of the symposium. We then set up tables and displays featuring SCB field trips, publications, and T-shirts. During the speakers' presentations he often remained outside to continue sales and welcome late-comers. He wrote receipts and tallied up the sales. He also organized and mediated the silent auction where funds for the Susan Hobbs grant were gathered. Romspert's annual symposium punch is legendary. It consisted of the sodas, bottled drinks, and powdered drinks left over from his year's camping trips, supplemented with ice and a few jugs of fruit punch or fizzy water on clearance at the market. When it was all over, Roms reported to the Board on attendance, sales, and expenses, detailing every line item to the exact penny.

In 1976, when the program started, Roms began a 23 year stint with the Desert Studies Center at Zzyzx in the Mojave Desert near Baker. His contributions to the Center are immeasurable. He was instrumental in all aspects of building or restoring the physical facilities, which were in a state of disrepair (they were originally obtained from an evangelist who ran a rehabilitation facility there, on public land, but without the permission of the BLM). As an expert on the desert flora, his knowledge was unrivaled. It was joked that he personally knew all the plants, calling them by name, "Joe," "Sally," etc. Through his botanical collecting, specimen preparation, and curation work, he produced for the Center the best herbarium in California's Mojave Desert. He collected extensively in the Panamint Mountains with the idea in mind that ultimately he would publish a flora of that mountain range. The Rancho Santa Ana Botanic Garden Herbarium now houses nearly 600 of his specimens collected in the Panamints.

At the Desert Studies Center Roms taught numerous courses sponsored through Cal State San Bernardino and other universities. I shared teaching duties with him numerous times, including recent years when he and I co-taught the "Flora of Joshua Tree National Park," offered as an extension course through the University of California, Riverside.

Among the groups to which he belonged he always was a leader. He was on the board of directors of the Desert Explorers, where his nickname was "Flower Child." Desert Explorers sponsors 4-wheel drive excursions to desert locations. Roms and I lead together many of their field trips, always incorporating natural history into them. He also organized the highly successful Silent Auction at the Desert Explorer Rendezvous. And he was active in The Ancient and Honorable Order of E Clampus Vitus (the Clampers), a service group that establishes and builds historical monuments throughout the state. Alan's love for the desert, bad roads, remote camps, and quirky sites and celebrations, may have made him an archetypical Clamper.



Alan Romspert loading his plant press, Mojave Road, 1992. Photo: Sherry Schmidt

We shall be telling Romspert stories for years. He was a skinflint and a collector. Besides plants, he collected bottles of hot sauce, and he had a huge stamp collection. I don't think he threw anything away. He saved everything including bottle caps. He clipped coupons from the "Penny Saver," and dutifully submitted receipts and rebate coupons. On desert trips he picked up discarded bottles and aluminum cans which he turned in for refunds.

Many of us remember his "thrifty" ways. He would drive out of his way to save a few pennies on gasoline. One of the great stories goes back a number of years, when Roms was part of a group that was camping in the Avawatz Mountains at Sheep Creek Springs. He had left a pair of his shoes at a microwave tower on the south road to Death Valley. He talked the group into piling into a single vehicle and driving back to retrieve his shoes. It was farther than anyone expected, but he kept reassuring them it was just a little bit farther. As it turns out it was many miles away and took about a half day of driving to retrieve his pair of nearly worn out "flip-flops." That experience, among his friends, led to a new unit of measurement known as a "Roms," an unknown distance that is probably farther than you think. "How far is it to Grinderswitch Spring?" "I'm not sure, I'd say it's about three Roms!!"

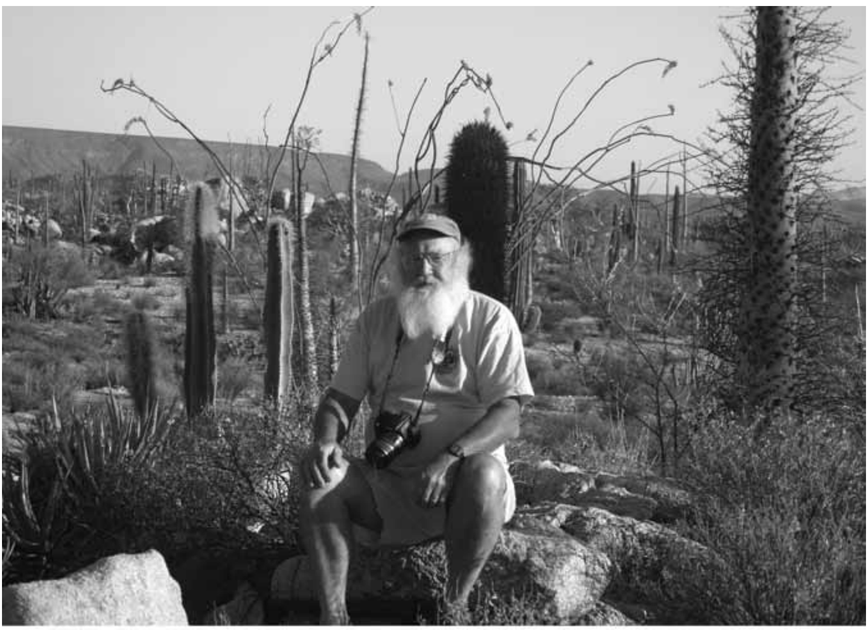
In spite of his apparent thriftiness and gruff exterior Roms was a caring and generous person. He would loan money to a hapless friend, never expecting to be repaid. He would buy something, usually at a swap meet, and then give it to a friend he thought could use it. Once, knowing I was building a new deck, he bought for me 15 gallons of the old, oil-based formula Thompson's Water Seal, and never would tell me how much it cost.

His friends will remember his famous salsa. About once a year he would buy flats of tomatoes, onions, and chiles and spend two days cooking and canning. While Dave McClanahan most often helped with the process, I will never forget the tear-streaked hours, crying, while I chopped onions. Traditionally, at Christmas, he distributed jars of salsa to anyone who would take them. Nearly everyone did. In his honor, I may never open my last jar of salsa.

It was in May of 2007 when the specter of cancer reared its ugly head. Roms and I were sitting around a campfire in Cataviña. We were on our way back from Cabo San Lucas, traveling in his black Nissan. Roms asked me about a lump under his left ear, covered by his beard. It turned out to be non-Hodgkins lymphoma. He was treated with chemotherapy and radiation and subsequently was cleared of any cancer, but apparently the chemotherapy had taken a toll on his heart. He began to experience shortness of breath and congestive heart failure was diagnosed. He had been receiving treatment for that problem, but the shortness of breath continued and in recent months he lacked energy. It didn't stop him. He continued his activities including his now famous roll-over on the road to Cataviña in 2008, and in his "newest" Nissan he accompanied the Desert Explorers on the Neal Johns trip to Baja in May 2009. In fact, Roms went fishing on Friday, August 14, two days before his long-time girl friend, Linda Harris, took him to the hospital for the last time. Once in the hospital he deteriorated rapidly. Associated with his weak heart and low blood pressure, blood supply to vital organs became diminished, ultimately leading to kidney failure and reduced liver function. Life support was removed about noon on Wednesday and he was gone by 12:15 PM.

Alan Romspert was my friend. We traveled, botanized, camped, and hiked together. I shall never forget him, one of the best friends I or anyone could ever have.

by Allan Schoenherr



Roms at Catavina, Baja California, May 2007. Photo: Allan Schoenherr

LICHENS AND LICHENICOLOUS FUNGI OF THE NORTHWESTERN SANTA ANA MOUNTAINS

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ABSTRACT: 169 taxa are reported for the northwestern Santa Ana Mountains, comprising 156 lichens and 13 lichenicolous fungi. *Sarcogyne plicata* H. Magn. is removed from synonymy with *Sarcogyne privigna* (Ach.) A. Massal.

KEYWORDS: Biodiversity, California, Fremont Canyon, Floristics, Orange County, Weir Canyon.

Fig. 1. Fremont Canyon. Photo: Janet Good.

INTRODUCTION

The Santa Ana Mountains are among the Peninsular Ranges in southern California extending over 64 km (40 miles), roughly from the Santa Margarita River in San Diego County to Santa Ana Canyon in Orange and Riverside counties. The highest peak in the range is Santiago at 1734 m (5,689 ft) (Lathrop & Thorne 1978; Boyd et al. 1995). The known vascular flora of the range consisted of 1044 known taxa in 1995 (Boyd and Roberts1995).

The northwestern end of the Santa Ana Mountains is in Orange County along the Santa Ana River west of Sierra Peak and in the foothills and valleys bordering Santiago Creek on the edge of the coastal plain. Sandstones predominate. Oak

Fig. 2. Weir Canyon sandstone slabs. Photo: Rolf Muertter

woodlands, grassland, chaparral, coastal sage scrub and riparian woodlands cover the hills and valleys. Two major canyons, Fremont Canyon (Fig. 1) and Weir Canyon on the Irvine Ranch (Fig. 2), were surveyed in 2006-2008. The elevational range of the study area was approximately 252 meters (827 feet) to 600 meters (1968 feet).

This was the first professional lichen inventory in Orange County. We collected 597 specimens of lichens and lichenicolous fungi, which were curated and databased at the Herbarium of the University of California at Riverside (UCR). Weir Canyon was surveyed in 2006. Fremont Canyon was surveyed in 2007 and 2008 after fire devastated the canyon in early 2006, and this part of the study was twice interrupted by the Weir Canyon fire in February 2007 and the Santiago fire in October 2007. Over 60 days were spent in the field. Collecting was intuitive and subjective. Some days no collections were made due to the devastation caused by the Fremont Canyon fire, which incinerated many acres of all lichens (Fig. 3). Thin-layer chromatography (TLC) was performed on selected specimens by J. C. Lendemer (NY) and J. A. Elix (CANB).

Fig. 3. Upper Fremont Canyon. Fire burned lichens off many boulders. Photo: Janet Good.

Corticolous or lignicolous lichens occur on bark or wood, even fence posts, and can be specific to certain vascular genera. Saxicolous lichens occur on various rock substrates and some species specifically occur on calcareous or acidic substrates (Fig 4). Terricolous lichens occur on soil. Some lichens are parasitic on other lichens, usually as juveniles, but become eventually independent and are termed lichenicolous lichens. Lichenicolous fungi are non-lichenized microfungi that are symbiotic with lichens and have co-evolved with them and are often host specific

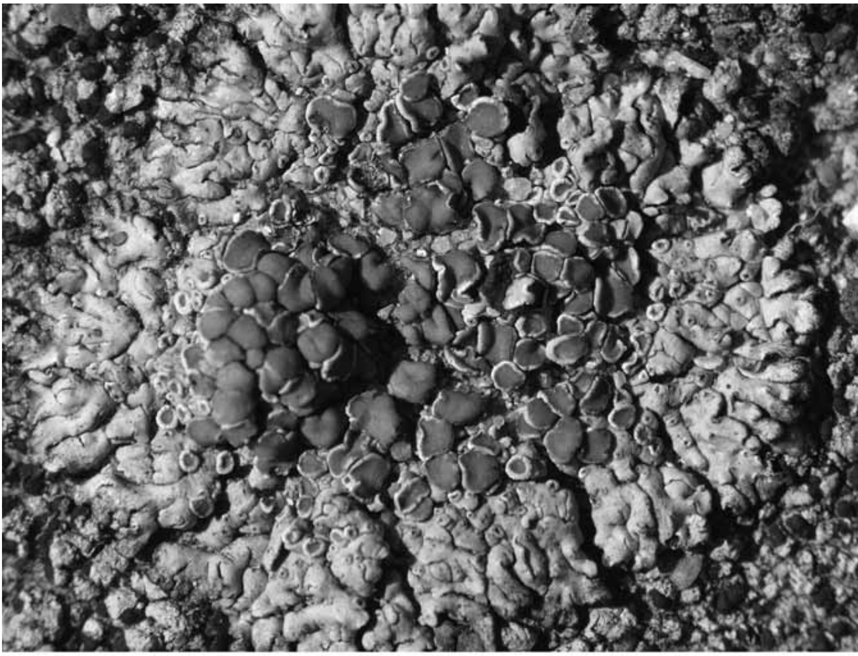

Fig. 4. *Lecanora muralis*, a common saxicolous lichen on sandstone. Photo: Rolf Muertter.

on the species or genus level. More information can be found on most species in the three volumes of the *Lichen Flora of the Greater Sonoran Desert Region* which has excellent but incomplete coverage of Southern California (Nash et al. 2002, 2004, 2007) or in the literature cited in this paper. More detailed information on individual collections is available online at the UCR Herbarium website (http://sanders5.ucr.edu/lichensflat_index.php). Abbreviations are used for Fremont Canyon (F) and Weir Canyon (W). Frequency is based on subjective observations.

CHECKLIST OF THE LICHENS AND LICHENICOLOUS FUNGI OF THE NORTHWESTERN SANTA ANA MOUNTAINS

Acarospora badiofusca (Nyl.) Th. Fr. Saxicolous. Common (F & W).

Acarospora fuscata (Schrad.) Arnold – Saxicolous. The authority for this species needs investigation. Rare (W).

Acarospora hassei Herre – Saxicolous. Infrequent on small granite pebbles and on sandstone outcrops (W).

Acarospora obnubila H. Magn. – Saxicolous. Frequent. (F).

Acarospora obpallens (Nyl. ex Hasse) Zahlbr. – Saxicolous, Terricolous. Often densely pruinose. Common (F&W).

Acarospora robiniae K. Knudsen– Saxicolous. A coastal species. One population was found on top of a sandstone outcrop (F).

Acarospora rosulata H. Magn. – Saxicolous. Treated as *A. bullata* Anzi, which we no longer recognize as occurring in North America. (Knudsen 2007; Knudsen et al. 2010). Rare (F).

Acarospora schleicheri (Ach.) A. Massal. – Terricolous. Once common in southern California (Hasse 1913). Rare on alluvium on sandstone outcrop on north ridge of Fremont Canyon (F).

Acarospora socialis H. Magn. – Saxicolous. Common (F & W).

Acarospora terricola H. Magn – Terricolous. Infrequent (F & W).

Acarospora thelococcoides (Nyl.) Zahlbr. – Terricolous. Endemic to California and Baja. Type collected by Orcutt in San Diego. Rare on alluvium on sandstone slabs. (F).

Acarospora veronensis A. Massal. – Saxicolous. Infrequent on small stones (W).

Aspicilia confusa Owe-Larss. & A. Nordin – Saxicolous. Common gray species, described from Tenaja Canyon in Santa Ana Mountains (F & W).

Aspicilia glaucopsina (Nyl. ex Hasse) Hue – Terricolous, Saxicolous. Persisting on sandstone outcrops. Infrequent (F & W).

Aspicilia pacifica Owe-Larss. & A. Nordin – Saxicolous. Maritime species. Infrequent (F & W).

Aspicilia phaea Owe-Larss. & A. Nordin – Saxicolous. Only found on small stones scattered in chaparral on ridge of Fremont Canyon (F).

Buellia badia (Fr.) A. Massal. – Saxicolous, lichenicolous. Common (F & W).

Buellia punctata (Hoffm.) A. Massal. – Corticolous. Common especially on old or dead branches of *Adenostoma fasciculatum*, *Salvia mellifera* and *Sambucus mexicana* (F & W).

Buellia ryanii Bungartz – Saxicolous. Only found on small stones of granite or rhyolite washed out of the sandstone. Infrequent (F & W).

Buellia sequax (Nyl.) Zahlbr. – Saxicolous. Common (F & W).

Buellia tesserata Körb. – Saxicolous. Maritime species. Rare (F).

Caloplaca arenaria (Pers.) Müll. Arg. – Saxicolous. Common (F & W).
Caloplaca atroflava (Turn.) Mong. – Saxicolous. On concrete. Rare (W).
Caloplaca bolacina (Tuck.) Herre – Saxicolous. Maritime species. Frequent (W).
Caloplaca citrina (Hoffm.) Th. Fr. – Saxicolous. Wetmore's concept of this species is heterogeneous and includes a common saxicolous leprose taxon found in Riverside County (Wetmore 2007). It is unclear whether this taxon is *C. citrina* s. str. *Caloplaca* taxonomists in Europe are skeptical that *C. citrina* even occurs in North America (Vondrak , pers. comm.) Rare (W).
Caloplaca crenulatella (Nyl.) Oliv. – Saxicolous. Common (F&W).
Caloplaca decipiens (Arnold) Blomb. & Forss. – Saxicolous. Frequent (F).
Caloplaca epithallina Lynge – Lichenicolous fungus common on saxicolous crustose lichens (F & W).
Caloplaca microphyllina (Tuck.) Hasse – Corticolous. Abundant on one *Quercus agrifolia* (W).
Caloplaca nashii Nav.-Ros., Gaya & Hladun – Saxicolous. Common (F & W).
Caloplaca pyracea (Ach.) Th. Fr. – Corticolous. This name is tentatively used in California for those species treated by Wetmore on bark as *Caloplaca holocarpa* (Wetmore 2007; Arup 2009). Common on *Quercus agrifolia*, chaparral and old coastal sage shrubs (F & W).
Caloplaca saxicola (Hoffm.) Nordin – Saxicolous. Infrequent (F).
Caloplaca squamosa (B. de Lesd.) Zahlbr. – Saxicolous. Frequent (F).
Caloplaca subsoluta (Nyl.) Zahlbr. – Saxicolous. Rare (W).
Candelaria pacifica Westberg – Corticolous, occasionally saxicolous. Common on *Quercus agrifolia*, chaparral and coastal sage shrubs (F & W).
Candelariella aurella (Hoffm.) Zahlbr. – Saxicolous. Common (F & W).
Candelariella rosulans (Müll. Arg.) Zahlbr. – Saxicolous. Infrequent (F).
Candelariella vitellina (Hoffm.) Müll. Arg. – Saxicolous. Frequent (F & W).
Carbonea latypizodes (Nyl.) Knoph & Rambold – Saxicolous. Common (F & W).
Cercidospora caudata Kernst. – Lichenicolous fungus infrequent on apothecia of *Caloplaca squamosa* (F).
Chyrsotrix candelaris (L.) J.R. Laundon – Corticolous. Probably heterogeneous in California and needs to be revised. Abundant on occasional *Quercus agrifolia* (W).
Cladonia acuminata (Ach.) Norrlin – Terricolous. This specimen contained norstictic acid. The specimen was poor and could not be identified positively by morphology and our identification awaits verification by further collections. If positively identified the species would be new state record. (Tucker & Ryan 2006). Rare (W).
Cladonia chlorophaea (Flörke ex Sommerf.) Spreng. – Terricolous. Infrequent (F & W).

Cladonia fimbriata (L.) Fr. – Terricolous and sometimes lignicolous. Infrequent (W).

Cladonia hammeri Ahti – Terricolous. Endemic to southern California and Baja. Infrequent (F & W).

Cladonia nashii Ahti – Terricolous. Common (F & W).

Cladonia pyxidata (L.) Hoffm. – Terricolous. Infrequent (F).

Cladonia scabriuscula (Delise) Nyl. – Terricolous. Commonly found on detritus beneath chaparral (F & W).

Cladonia subfimbriata Ahti – Terricolous. Infrequent. (W).

Collema tenax (Sw.) Ach. – Terricolous, sometimes saxicolous on sandstone. Frequent (W).

Dermatocarpon americanum Vain. – Saxicolous. Rare, though often common in southern California (F).

Dimelaena radiata (Tuck.) Müll. Arg. – Saxicolous. A dominant maritime species which occurs inland at scattered locations to Bautista Canyon at base of San Jacinto Mountains. Infrequent (F & W).

Diploicia canescens (Dicks.) A. Massal. – Corticolous. A maritime species. This is the farthest from coast it has been collected in southern California. Rare on *Malacothamnus fasciculatus* and *Quercus agrifolia*. (W).

Diploschistes actinostomus (Ach.) Zahlbr. – Saxicolous. Common on sandstone on upper ridges of Fremont Canyon (F).

Diploschistes muscorum (Scop.) R. Sant. – Terricolous, lichenicolous. Common lichen parasitic on *Cladonia* species (F & W).

Diploschistes scruposus (Schreb.) Norman – Saxicolous. Common (F & W).

Diplotomma alboatrum (Hoffm.) Flot. – Saxicolous. Syn. *Buellia alboatra*. The genus placement is still open to question and the species is in need of revision. One locally abundant population on sandstone (F).

Endocarpon loscosii Müll. Arg. – Terricolous. Frequent but often sterile, spreading by anastomosing rhizohyphae (F & W).

Endocarpon pallidulum (Nyl.) Nyl. – Saxicolous. Infrequent (F & W).

Endocarpon pusillum Hed. – Terricolous. Common (F & W).

Flavoparmelia baltimorensis (Gyel. & Fóriss) Hale – Saxicolous. Locally abundant on shaded sandstone slab on a north-facing slope of Weir Canyon (W).

Flavoparmelia caperata (L.) Hale – Corticolous. Frequent on *Quercus agrifolia* (W).

Flavopunctelia flaventior (Stirt.) Hale – Corticolous. The most common macrolichen on *Quercus agrifolia* (F & W).

Flavopunctelia soredica (Nyl.) Hale – Saxicolous, corticolous. Rare (W).

Fuscopannaria coralloidea F. M. Jørg. – Terricolous. Rare (W).

Gelatinopsis acarosporicola Kocourk. & K. Knudsen –Lichenicolous fungus on *Acarospora socialis* described from and currently only known from Fremont Canyon (Kocourková & Knudsen 2009). Rare (F).

Hyperphyscia adglutinata (Flörke) H. Mayrh. & Poelt– Corticolous. Abundant on scattered *Quercus agrifolia* (F & W).

Intralichen baccisporus D. Hawksw. & M.S. Cole – Lichenicolous fungus infrequent on apothecia of *Caloplaca* species (F).

Lecania brunonis (Tuck.) Herre – Saxicolous. Common (F & W).

Lecania cyrtella (Ach.) Th. Fr. – Corticolous. Rare on dead branches of *Salvia mellifera* (W).

Lecania hassei (Zahlbr.) W. Noble – Saxicolous. Syn. *Lecania brattiae*. Common (F & W).

Lecania naegelii (Hepp.) Diederich & v.d. Boom. – Corticolous. Rare on *Malacothamnus fasciculatus* (W).

Lecania toninioides Zahlbr. – Terricolous, rarely saxicolous. Rare on sandstone (F).

Lecanora caesiorubella Ach. – Corticolous. Rare on *Qurcus agrifolia* (W).

Lecanora gangaleoides Nyl. – Saxicolous. Frequent (F & W).

Lecanora hagenii (Ach.) Ach. – Corticolous, saxicolous. Frequent on sandstone and concrete (F & W).

Lecanora munzii K. Knudsen & Lendemer – Corticolous. On dead weathered chaparral wood on ground. Recently described from Claremont (Knudsen & Lendemer 2009). Rare (W).

Lecanora muralis (Schreb.) Rabenh. – Saxicolous. Common (F & W).

Lecanora pseudistera Nyl. – Saxicolous. Common (F & W).

Lecanora simeonensis K. Knudsen & Lendemer – Lignicolous. On wood of *Adenostoma fasciculatum*. We recently described this species from San Simeon (Lendermer & Knudsen 2009). The thallus was leprose and no fertile specimens were seen. This report extends the range south from Montaña de Oro in San Luis Obispo County. Infrequent on chaparral (W).

Lecanora subimmergens Vain. – Saxicolous. Common (F & W).

Lecidea cinerata Zahlbr. – Saxicolous. Rare California endemic originally described from the Santa Monica Mountains on the slope below the Hollywood sign (Hasse 1913). Rare (F).

Lecidea fuscoatra (L.) Ach. – Saxicolous, terricolous. Common (F & W).

Lecidea laboriosa Müll. Arg. – Saxicolous. Common (F & W).

Lecidea tessellata Flörke – Saxicolous. Common montane species above 6000 feet. Rare in survey area (F).

Lecidella asema (Nyl.) Knoph & Hertel – Saxicolous, rarely terricolous. Common (F & W).

Lecidella stigmatea (Ach.) Hertel & Leuckert – Saxicolous. Infrequent (F).

Lepraria adhaerens K. Knudsen, Elix & Lendemer – Saxicolous, terricolous. Common (F & W).

Lepraria borealis Lohtander and Tønsberg – Saxicolous. Rare on moss and sandstone. (W).

Lepraria caesioalba (B. de Lesd.) J.R. Laundon – Coticolous, saxicolous, terricolous. Two chemotypes. Frequent (F & W).

Lepraria santamonicae K. Knudsen & Elix – Saxicolous, terricolous. Frequent (F & W).

Lepraria texta K. Knudsen, Elix & Lendemer – Saxicolous, terricolous. Frequent (F),

Lepraria xerophila Tønsberg – Terricolous. Common maritime species. Rare (W).

Leptogium arsenei Sierk – Saxicolous. Rare (W).

Leptogium palmatum (Huds.) Mont. – Terricolous. Rare (W).

Leptogium plicatile (Ach.) Leight. – Saxicolous. Single small population on wet shaded calcareous sandstone in oak woodland. Rare (W).

Leptogium tenuissimum (Dicks.) Körb. – Terricolous. Rare (W).

Lichenoconium lecanorae (Jaap) D. Hawksw. – Lichenicolous fungus on apothecia of *Lecanora muralis*. Frequent (F).

Lichenoconium lichenicola (P. Karst.) Petrak & H. Sydow – Lichenicolous fungus infrequent on *Physcia dimidiata* (F).

Lichenostigma cosmopolites Hafellner & Calat. – Lichenicolous fungus frequent on *Xanthoparmelia* species (F).

Lichenostigma rugosum Thor – Lichenicolous fungus frequent on *Diploschistes* species (F).

Lichenostigma subradians Hafellner, Calat. & Nav.-Ros. – Lichenicolous fungus frequent on *Acarospora socialis* (F).

Micarea microccoca (Körb.) Gams ex Coppins – Corticolous. Rare on mature bark of old half-dead *Sambucus mexicana* (F).

Miriquidica scotopholis (Tuck.) B.D.Ryan & Timdal – Saxicolous. Common (F & W).

Peltula bolanderi (Tuck.) Wetmore – Saxicolous. Rare (W).

Peltula euploca (Ach.) Poelt – Saxicolous. Infrequent (F).

Peltula obscurans var. ***hassei*** (Zahlbr.) Wetmore – Saxicolous. Infrequent (F).

Peltula obscurans (Nyl.) Gyeln. var. ***obscurans*** – Saxicolous. Rare (W).

Phaeophyscia hirsuta (Mereschk.) Essl. – Corticolous. Infrequent on *Quercus agrifolia* (W).

Phaeophyscia sciastra (Ach.) Moberg – Saxicolous. Rare (W).

Physcia adscendens (Fr.) H. Olivier – Corticolous, infrequently saxicolous. Common on *Quercus agrifolia*, chaparral and coastal sage shrubs (F & W).

Physcia biziana (A. Massal) Zahlbr. – Corticolous. Rare on *Adenostoma fasciculatum* (W).

Physcia dimidiata (Arnold) Nyl. – Saxicolous. Common (F & W).

Physcia tribacia (Ach.) Nyl. – Saxicolous. Infrequent (F & W).

Physconia isidiigera (Zahlbr.) Essl. – Corticolous, saxicolous. Frequent on sandstone and *Quercus agrifolia* (F & W).

Placidium lacinulatum (Ach.) Breuss – Terricolous. Common (F & W).

Placidium squamulosum (Ach.) Bruess – Terricolous. Infrequent (W).

Placopyrenium noxium Breuss – Saxicolous. Second known population in California (Breuss 2009). Rare (F).

Placynthiella hyporhoda (Th. Fr.) Coppins & P. James – Terricolous. Infrequent (W).

Placynthiella uliginosa (Schrad.) Coppins & P. James – Terricolous, saxicolous. Frequent (W).

Polysporina simplex (Davies) Vězda – Saxicolous. Common (F & W).

Polysporina subfucescens (Nyl.) K. Knudsen & Kocourk. – Lichenicolous fungus common on saxicolous crustose lichens (F & W).

Psora californica Timdal – Terricolous. Infrequent (F & W).

Psora luridella (Tuck.) Fink – Saxicolous, Terricolous. Frequent (F & W).

Psorothicia montinii (A. Massal.) Forss. – Saxicolous. Infrequent (W)

Psorotichia schaereri (A. Massal.) Arnold – Terricolous. Infrequent (W).

Rinodina species – Terricolous. Endemic to California and will be described by John Sheard. Rare (F & W).

Rinodina gennarii Bagl. – Saxicolous. Maritime species, infrequent on concrete of old flood control wall and on rhyolite (F & W).

Rinodina intermedia Bagl. – Terricolous. Infrequent (F & W).

Sarcogyne arenosa (Herre) K. Knudsen & Standley – Saxicolous. Common (F & W).

Sarcogyne plicata H. Magn. – Saxicolous. The name *Sarcogyne privigna* (Ach.) A. Massal. was applied to this taxon (Knudsen & Standley 2007) and *S. plicata*, described from Upland, was treated as a synonym (Knudsen & Lendemer 2005). Recent unpublished molecular analysis of specimen from Fremont Canyon showed it was not conspecific with *S. privigna* in Fennoscandia (Westberg, pers. comm.) In this paper we resurrect *S. plicata,* but it may not apply to all taxa in California. Frequent (F & W).

Sarcogyne reebiae K. Knudsen – Saxicolous. Described from Weir Canyon (Knudsen & Standley 2007). Infrequent (W).

Sarcogyne regularis Körb. – Saxicolous. Infrequent (W).

Sarcogyne similis H. Magn. – Saxicolous. Common (F & W).

Strangospora deplanata (Almq.) Clauz. & Cl. Roux – Corticolous. Rare on mature bark of old half-dead *Sambucus mexicana* (F).

Stigmidium fuscatae (Arnold) R. Sant. – Lichenicolous fungus on *Acarospora obpallens*. We will revise this taxon in southern California. Rare (F).

Stigmidium squamariae (B. de Lesd.) Cl. Roux & Triebel – Lichenicolous fungus on apothecia of *Lecanora muralis*. Infrequent (F).

Stigmidium xanthoparmelium Hafellner – Lichenicolous fungus on *Xanthopamelia* species. Infrequent (F).

Teloschistes chrysophthalmus (L.) Th. Fr. – Corticolous. Rare on *Malacothamnus fasciculatus* (W).

Thelomma mammosum (Hepp ex Hartung) Tibell – Saxicolous. Coastal species. Infrequent (W).

Thelomma santessonii Tibell – Saxicolous. Maritime species. A single population was discovered on ridge of Fremont Canyon (F).

Toninia tristis (Th. Fr.) Th. Fr. – Saxicolous. Infrequent. (F).

Trapelia coarctata (Turner ex Sm.) M. Choisy – Saxicolous, terricolous. Frequent (F & W).

Trapelia glebulosa (Sw.) J.R. Laundon – Saxicolous, terricolous. Frequent (F & W).

Trapelia placodioides Coppins & P. James – Saxicolous, terricolous. Locally common, but probably rare in survey area after the Weir Canyon fire because it occurred on slope within dense chaparral (W).

Trapeliopsis bisorediata McCune & Camacho – Saxicolous, terricolous. Rare on sandstone (W).

Trapeliopsis flexuosa (Fr.) Coppins & P. James – Lignicolous. On dead and old burnt wood (F & W).

Trapeliopsis glaucopholis (Nyl. ex Hasse) Printzen & McCune – Saxicolous, terricolous. Frequent (F & W).

Trapeliopsis steppica McCune & Camacho – Saxicolous, terricolous. This is the second population discovered in Santa Ana Mountains. Rare (F).

Umbilicaria phaea Tuck – Saxicolous. Infrequent. (F).

Verrucaria calkinsiana Servít – Saxicolous. Common (F & W).

Verrucaria furfuracea (B. de Lesd.) Breuss. – Saxicolous. Frequent (W).

Verrucaria fusca Pers. ex Ach. – Saxicolous. Frequent (F & W).

Verrucaria fuscoatroides Servít – Saxicolous. Infrequent (W).

Verrucaria memnonia (Flot. ex Körb.) Arnold – Saxicolous. On small hard granite rocks washed out of sandstone deposits. Infrequent (F & W).

Verrucaria onegensis Vain. – Saxicolous. Rare (F).

Verrucaria turgida Servít – Saxicolous. Rare (F).

Verrucaria viridula (Schrader) Ach. – Saxicolous. Infrequent (F).

Xanthoparmelia amableana (Gyeln.) Hale – Saxicolous. Infrequent (F).

Xanthoparmelia cumberlandi (Gyeln.) Hale – Saxicolous. Common (F & W).

Xanthoparmelia lineola (E.C. Berry) Hale – Saxicolous. Infrequent (F).

Xanthoparmelia mexicana (Gyeln.) Hale – Saxicolous. Common (F & W).
Xanthoparmelia neotartica Hale – Terricolous. Infrequent (F & W).
Xanthoparmelia novomexicana (Gyeln.) Hale – Saxicolous. Infrequent (F).
Xanthoparmelia subplitti Hale – Saxicolous. Infrequent (F).
Xanthoparmelia verruculifera (Nyl.) O. Blanco, A. Crespo, Elix, D. Hawksw. & Lumbsch – Saxicolous. Rare (F).
Xanthoria polycarpa (Hoffm.) Th. Fr. ex Rieber – Corticolous. Infrequent on *Malacothamnus fasciculatus* and *Adenostoma fasciculatum* (W).
Xanthoria tenax L. Lindblom – Corticolous. Common on willows and chaparral before the Weir Canyon fire (W).

CONCLUSIONS

We report 169 taxa in 56 genera for the northwestern Santa Ana Mountains, comprising 156 lichens and 13 lichenicolous fungi. Two species were described new to science, *Sarcogyne reebiae* from Weir Canyon (Knudsen & Standley 2007) and *Gelatinopsis acarosporicola* from Fremont Canyon (Kocourková & Knudsen 2009). Four recently described species have paratype locations in Fremont Canyon and Weir Canyon: *Lepraria adhaerens* (Knudsen et al. 2007), *L. santaemonicae* (Knudsen & Elix 2007), *L. texta* (Knudsen & Elix 2007), and *Lecanora munzii* (Knudsen & Lendemer 2009). John W. Sheard (SASK) is currently in the process of describing the terricolous *Rinodina* species included in the checklist which is also known from the Santa Monica Mountains. Previously *Carbonea latypizodes* (Knudsen et al. 2008), *Cercidospora caudata* (Etayo et al. 2007), *Lichenostigma rugosum* (Knudsen & Kocourková 2008) and *Trapelia placodioides* (Knudsen 2006) were reported new for California from Fremont Canyon and Weir Canyon. We believe the total species diversity would have been higher if Fremont Canyon had been surveyed before the devastating fire. Some lichens considered rare in Weir Canyon may have been locally extirpated by the fire of 2007, especially species on bark and wood.

While the authors consider plants and animals the most important biological resources on public lands, lichens are a significant resource in relatively undisturbed habitats. Over 1500 taxa of lichens, lichenicolous fungi, and allied microfungi have been reported from California (Tucker & Ryan 2006) and the numbers of known taxa increase regularly, despite any reductions of numbers through taxonomic advances. For instance, based on continuing research, 298 taxa occur in the Santa Monica Mountains (Knudsen & Kocourková 2009) and 387 taxa on Santa Rosa Island (Knudsen unpublished). The lichens and lichenicolous fungi we report in this paper may comprise fewer than half of the species that occur in the Santa Ana Mountains. We expect the total diversity of lichens and lichenicolous fungi to be at least 280 species, over one fourth of the total diversity of the vascular flora (which includes native and non-native plants). All lichens and lichenicolous fungi reported here are apparently native to the range.

Only one floristic study of lichens has been published on the Santa Ana Mountains, based on a short survey of the Santa Rosa Plateau (Weber & Bratt 1987). Many of that paper's taxonomic concepts and species concepts are now archaic due to rapid advances in lichen taxonomy spearheaded by the Sonoran lichen flora project (Nash et al. 2002, 2004, 2007). Weber and Bratt reported approximately 78 species. Without a revision of the specimens and based on our knowledge of the Santa Rosa Plateau, approximately 49 species they reported also occur in the northwestern Santa Ana Mountains. The main difference is the lichen flora on oaks is more diverse on the Santa Rosa Plateau because of apparently higher relative annual humidity (particularly from fog incidents) and the occurrence of Engelmann oaks and scrub oaks besides *Quercus agrifolia*. Our checklist can be used as the foundation of a preliminary checklist of the whole range as well as for Orange County. This paper represents the first installment of our continuing floristic study of the Santa Ana Mountains. Our next paper will be a study of the Santa Rosa Plateau.

Before grazing and the dominance of invasive plants, the valley grasslands in Fremont Canyon and Weir Canyon may have supported more extensive biological soil crusts of lichens and bryophytes, native grasses and annuals. Terricolous lichens were probably common in biological soil crusts and included species extirpated from study area like *Aspicilia praecrenata* (Nyl. ex Hasse) Hue. Most terricolous lichens are now rare or infrequent. Terricolous lichens now subsist as relics in microhabitats on thin-soiled slopes, on decaying sandstone, or on consolidated soil in pockets on sandstone outcrops. The most common terricolous lichen we found in Weir and Fremont Canyons was the pioneering *Cladonia nashii,* which can grow on slopes of loose alluvium and road cuts as well on decaying or re-consolidated sandstone.

The Tecate cypress (*Cupressus forebesii*) grove was visited before the Fremont Canyon fire devastated it. The trees did not support lichens.

Two lichens, *Lecanora munzii* and *L. simeonensis*, were collected in upper Weir Canyon. These species are lignicolous, growing on the wood of older chaparral and coastal sage shrubs. They are rare, like *Cyphelium brachysporum* Nádv. (Lendemer et al. 2008) described from Murrieta, probably because more frequent fires are reducing mature stands where their substrates are found. Both these species may have been extirpated from Weir Canyon by the fire of 2007 and were not documented from Fremont Canyon.

A number of maritime species, common on the coast of southern California and on the Channel Islands, occur in the northwestern Santa Ana Mountains, approximately 14-17 miles (22-27 km) inland from the coast. All were rare or infrequent.

We only report 13 species of lichenicolous fungi. The number of lichenicolous fungi reported here does not include at least five taxa probably new to science we discovered in Fremont Canyon (after the fire) which were all rare. We were unable to collect sufficient material for descriptions. The first, *Endococuus thelommae* Kocourk. & K. Knudsen, has been accepted for publication in Germany in a forthcoming volume of *Bibliotheca Lichenologica*. Sufficient type material was finally collected on Santa Rosa Island.

Lichens grow very slowly, especially in Mediterranean climates based on our observations, with most lichens growing only micro-millimeters in an average rain year and probably not at all during drought episodes. The recovery of the lichen biota in the northwestern Santa Ana Mountains will be a slow process taking decades. It is tragic that both of these fires were caused by humans, the Weir Canyon fire by arson and the Fremont Canyon fire through mismanagement of a controlled burn.

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LITERATURE CITED

Arup, U. 2009. The *Caloplaca holocarpa* group in the Nordic countries, except Iceland. *Lichenologist* **41**: 111-130.

Boyd, S., T.S. Ross and F. M. Roberts, Jr. 1995. Additions to the vascular flora of the Santa Ana Mountains, California. *Aliso* **14**(2): 105-108.

Boyd, S., T.S. Ross and D. Bramlett. 1995. Vascular flora of the San Mateo Wilderness Area, Cleveland National Forest, California. *Aliso* **14**(2): 109-139.

Breuss, O. 2009. A synopsis of the lichen genus *Placopyrenium* (Verrucariaceae), with descriptions of new taxa and a key to all species. In: *Biodiversity and ecology of lichens – Liber Amicorum Harrie Sipman*.

Aptroot, A., M. R. D. Seaward and L. B. Sparrius (eds.) *Bibliotheca Lichenologica* **99:** 93-112. J. Cramer, Berlin & Stuttgart, 2009.

Etayo, J., J. Kocourková and K. Knudsen. 2007. New records of lichenicolous fungi for California. *Bulletin of the California Lichen Society* **14**(2): 37-39.

Hasse, H. E. 1913. The lichen flora of southern California. *Contributions from the United States National Herbarium* **17**: 1-132.

Knudsen, K. 2006. Noteworthy collections: Lichens and lichenicolous fungi. *Crossosoma* **32**(1): 31-33.

Knudsen, K. 2007. *Acarospora*. In: T. H. Nash, III, C. Gries and F. Bungartz (eds.) *Lichen Flora of the Greater Sonoran Desert Region. Volume 3,* pp. 1-38*,* Lichens Unlimited, Arizona State University, Tempe.

Knudsen, K. and J. A. Elix. 2007. A new *Lepraria* (Stereocaulaceae) from the Santa Monica Mountains in southern California. *The Bryologist* **110**(1): 115-118.

K. Knudsen and J. A. Elix. 2007. *Lepraria*. *In:* T. H. Nash, III, C. Gries and F. Bungartz (eds.) *Lichen Flora of the Greater Sonoran Desert Region. Volume 3,* pp. 384-390, Lichens Unlimited, Arizona State University, Tempe.

Knudsen, K., J. A. Elix, and J.C. Lendemer. 2007. *Lepraria adherens*: a new species from North America. *Opuscula Philolichenum* **4**: 5-10.

Knudsen, K. and J. Kocourková. 2008. New records of lichen and lichenicolous fungi from California. *Crossosoma* **34**(1): 37-39.

Knudsen, K. and J. Kocourková. 2009. Lichens, Lichenicolous and Allied Fungi of the Santa Monica Mountains, Part 4: Additions and Corrections to the Annotated Checklist. *Opuscula Philolichenum* **7**: 29-48.

Knudsen, K. and J. C. Lendemer. 2005. Changes and additions to the checklist of North American lichens - III. *Mycotaxon* **93**: 277-281.

Knudsen, K & J. C. Lendemer. 2009. Two new species of *Lecanora* with gyrophoric acid from North America. *Opuscula Philolichenum* **7**: 21-28.

Knudsen, K., B. Owe-Larsson, J. A. Elix, J. C. Lendemer and J. Kocourková. 2008. Lichens and lichenicolous fungi of the Santa Monica Mountains, Part 3: additions and corrections to the annotated checklist. *Opuscula Philolichenum* **5**: 53-60

Knudsen, K., V. Reeb, M. Westberg, R. Srikantha and D. Bhattacharya. 2010. *Acarospora rosulata* in Europe, North America and Asia. *Lichenologist* **42**(4): not assigned.

Knudsen, K. and S. M. Standley. 2007. *Sarcogyne*. In: T. H. Nash, III, C. Gries and F. Bungartz (eds.) *Lichen Flora of the Greater Sonoran Desert Region. Volume 3,* pp. 289-296. Lichens Unlimited, Arizona State University, Tempe.

Kocourková, J. and K. Knudsen. 2009. *Gelatinopsis acaarosporicola* (Helotiaceae), a new lichenicolous fungus on *Acarospora socialis* from western North America. *The Bryologist* **112**(2): 363-367.

Lathrop, E. W. and R. F. Thorne. 1978. A Flora of the Santa Ana Mountains, California. *Aliso* **9**(2): 197-278.

Lendemer, J.C. and K. Knudsen. 2009. Two new usnic acid-containing species of *Lecanora* from western North America. *Opuscula Philolichenum* **6**: 73-80.

Lendemer, J.C., J. Kocourková and K. Knudsen. 2008. Studies in lichens and lichenicolous fungi: notes on some taxa from North America. *Mycotaxon* **105**: 379-386.

Nash III, T.H., B.D. Ryan, C. Gries, and F. Bungartz (eds.) 2002. *Lichen Flora of the Greater Sonoran Desert Region, Vol. 1,* Tempe, Arizona: Lichens Unlimited, Arizona State University, 532 pp.

Nash III, T.H., B.D. Ryan, P. Diederich, C. Gries, and F. Bungartz (eds.) 2004. *Lichen Flora of the Greater Sonoran Desert Region, Vol. 2,* Tempe, Arizona: Lichens Unlimited, Arizona State University, 744 pp.

Nash III, T.H., C. Gries, and F. Bungartz (eds.) 2007 (2008). *Lichen Flora of the Greater Sonoran Desert Region, Vol. 3,* Tempe, Arizona: Lichens Unlimited, Arizona State University, 567 pp.

Tucker, S.C. and B.D. Ryan. 2006. *Constancea* **84**: *Revised Catalog of Lichens, Lichenicoles, and Allied Fungi in California* (http://ucjeps.berkeley.edu/ constancea/84/). Acccessed May, 2009.

Weber, W. A. and C. Bratt. 1987. Lichens and bryophytes of the Santa Rosa Plateau Nature Conservancy Reserve, Riverside County, California. *Evansia* **4**: 21-25

Wetmore, C. M. 2007. *Caloplaca*. In: T. H. Nash, III, C. Gries and F. Bungartz (eds.) *Lichen Flora of the Greater Sonoran Desert Region. Volume 3,* pp. 179-220. Lichens Unlimited, Arizona State University, Tempe.

NEW RECORDS OF LICHENS AND LICHENICOLOUS FUNGI FOR CALIFORNIA I.

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ABSTRACT: Three species of lichens, two which occur in intertidal zone, and three lichenicolous fungi are reported new for California: *Arthonia epiphyscia, Dactylospora saxatilis*, *Rhizocarpon effiguratum, Unguiculariopsis lettaui, Verrucaria prominula,* and *Wahlenbergiella striatula*.

KEYWORDS: Biodiversity, *Collemopsidium*, rising sea levels.

INTRODUCTION

In 2008 we began studying the intertidal zone for lichens in southern and central California with Othmar Breuss of Austria. We are concerned with what species occur in California and the impact of rising sea levels on their diversity. So far lichens are rare in the intertidal zone in southern and central California, with algae winning the competition for intertidal space. The cyanolichen *Collemopsidium sublittore* (Leighton) Grube & B. D. Ryan is the most common species. In this paper we report two new records of intertidal lichens for California.

Lichenicolous fungi are a successful and diverse group of fungi which are growing on the thallus and apothecia of lichens. Generally they occur in habitats that have long ecological continuity. Over 1500 species of lichenicolous fungi species are known to science (Lawrey and Diederich 2003). In 2008 we recognized 108 described species of lichenicolous fungi as occurring in California (Kocourková

& Knudsen, unpublished), excluding lichenicolous lichens, some allied fungi and dubious reports that we have not verified (Tucker & Ryan 2006). In publications of this year, including this paper, we reported 13 species new to California of which 6 were new to North America (Lendemer et al. 2009; Kocourková 2009; Kocourková & Knudsen 2009c; Knudsen & Kocourková 2009) and described 5 new species which occur in California (Knudsen et al. 2009; Knudsen & Kocourková 2009; Kocourková 2009; Kocourková and Knudsen 2009a & 2009d) for a total of 127 species. We expect the reported diversity of lichenicolous fungus species for the state to at least double in next ten years. Taxa new to science are still easily found in California and we are in the process of describing over a dozen species from the state, with three already in review or press. Our good friend and colleague Paul Diederich of Luxembourg will probably describe at least three new species from central California.

The Species

1. *Arthonia epiphyscia* Nyl. has a widespread distribution and is known from Africa, Asia, Europe, and North and South America, and is restricted to species of *Physcia* (Kocourková 2000; Grube 2007). It has distinctive superficial black ascomata that are easily seen on the white thallus of *Physcia* species. Though the host *Physcia adscendens* is one of the most common lichens in California on coastal sage shrubs and chaparral as well as oaks, *A. epiphyscia* is proving to be rare. The collection was made during the Bioblitz held by the San Diego Natural History Museum in 2009.

Specimen examined: San Diego Co.: San Diego, Mission Trails Regional Park, Visitor Center Loop Trail, 32° 49’ 18” N, 117° 03’ 18” W, 84 m, on *Physcia adscendens* on *Artemisia californica*, May 1, 2009, *Knudsen* 10970 (UCR).

2. *Dactylospora saxatilis* (Schaerer) Hafellner is a lichenicolous fungus widespread on *Pertusaria* species in Europe, North America, Asia and Africa (Hafellner 1979, 2004). It has black lecideine apothecia with dark brown one-septate ascospores and asci with an external gelatinous sheath which is I+ blue (euamyloid). It was rare on *Pertusaria* on Santa Rosa Island, but *Skyttea pertusariicola* Diederich & Etayo was frequent.

Specimen examined: Santa Barbara County: Santa Rosa Island, Channel Islands National Park, hillside above Beecher’s Bay, 33° 59’ 13” N, 120° 01’ 13” W, 46 m, on *Pertusaria flavicunda*, Oct. 15, 2006, *Knudsen* 7496.2 (UCR).

3. ***Rhizocarpon effiguratum*** (Anzi) Th. Fr. is a lichen which is often parasitic on *Pleopsidium flavum* (Bellardi) Körb. (which is a yellow lichen common on granite in southern California above 6000 feet). Previous reports from California were questionable (Tucker & Ryan 2006) and it is currently known from southwestern North America only from Arizona in the San Francisco Peaks and Mt. Baldy in the White Mountains (Feuerer & Timdal 2007). *Rhizocarpon effiguratum* was rare on the top of Santa Rosa Mountain.

Specimen examined: Riverside County: Santa Rosa Mountain, ridge toward Toro Peak, 33° 32' 11" N, 116° 27' 24" W, 2416 m, Jul. 18, 2009 *Knudsen* 11499 w/ *Tom Chester* et al. (UCR, MIC).

4. ***Unguiculariopsis lettaui*** (Grummann) Coppins is a parasymbiotic or slightly parasitic fungus often forming galls on the fruticose lichen *Evernia prunastri*. It is wide-spread in Europe and Macronesia (Diederich & Etayo 2000). It was recently reported new from North America from a single collection from Oregon (Diederich 2002). We report the second collection from North America from Marin County. The black ascomata have distinct appendages and simple hyaline ascospores 6–8 × 3–4 μm.

Specimen examined: Marin County: Point Reyes National Seashore; Earthquake Trail across road from the Bear Valley Visitors' Center, near wood bridge over brook, 38° 04' N 122° 79' W, 31 m, on *Evernia prunastri* on bark of *Alnus rubra*, July 10, 2008, *Kocourková* & *Knudsen,* IAL Excursion (PRM 915120).

5. ***Verrucaria prominula*** Nyl. was collected on Point Loma in the upper littoral zone on sandstone, where it is rarely submerged. It is distinguished by its relative small ascospores and relatively large perithecia with thick involucrellum and is known from Asia, Europe, North America and Tasmania (Orange et al. 2009). It is new to California.

Specimen examined: San Diego County: Point Loma, Cabrillo National Monument: tidepools, 32° 40' 8" N 117° 14' 42" W, 0.5 m, July 30, 2008, *Knudsen* 10685 w/ *Kocourková* (UCR).

6. ***Wahlenbergiella striatula*** (Wahlenb.) Gueidan & Thüs occurred in the intertidal zone with red algae, green seaweed, and barnacles on basalt on the western tip of West Anacapa below Rat Rock and has a subgelatinious greenish-black thallus with black spots or ridges. Though cosmopolitan (Orange et al 2009), it is new for California.

Specimen examined: Ventura County: West Anacapa Island, Channel Islands National Park, below Rat Rock 34° 0' 50" N 119° 26' 32" W, 0 m, on basalt, Nov. 19 2008, *Knudsen 10685 w/ Kocourková* (UCR).

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LITERATURE CITED

Diederich, P. 2002. New species and new records of American lichenicolous fungi. *Herzogia* **16**: 41–90.

Diederich, P. and J. Etayo. 2000. A synopsis of the genera *Skyttea, Llimoniella*, and *Rhymbocarpus* (lichenicolous Ascomycota, Leotiales). *Lichenologist* **32**(5): 423–485.

Grube, M. 2007. *Arthonia*. In: T. H. Nash, III, C. Gries and F. Bungartz (eds.) *Lichen Flora of the Greater Sonoran Desert Region*. *Volume 3*, pp. 39–61, Lichens Unlimited, Arizona State University, Tempe.

Feuerer, T. & E. Timdal. 2004. *Rhizocarpon*. In: T. H. Nash, III, C. Gries and F. Bungartz (eds.) *Lichen Flora of the Greater Sonoran Desert Region*. *Volume 3*, pp. 456–466, Lichens Unlimited, Arizona State University, Tempe.

Hafellner, J. 1979. *Karschia*. Revision einer Sammelgattung an der Grenze von lichenisierten und nichtlichenisierten Ascomyceten. *Nova Hedwigia*, Beih. **62**: 1–248.

Hafellner J. 2004. *Dactylospora*. In: T.H. Nash, III., B. D. Ryan, P. Diederich, C. Gries, and F. Bungartz, F. (eds.), *Lichen Flora of the Greater Sonoran Desert Region, Vol. 2*, pp. 645–648. Lichens Unlimited, Arizona State University, Tempe, Arizona.

Knudsen, K. and J. Kocourková. 2009. Lichens, Lichenicolous and Allied Fungi of the Santa Monica Mountains, Part 4: Additions and Corrections to the Annotated Checklist. *Opuscula Philolichenum* **7**: 29-48.

Knudsen, K., Kocourková, J. and J. Etayo. 2009. A new species of S*phaerellothecium* (Mycosphaerellaceae) on *Placidium lacinulatum*. *Opuscula Philolichenum* **6**: 41–44.

Kocourková, J. 2000. Lichenicolous fungi of the Czech Republic (The first commented checklist). *Sborník Národního Musea v Praze, Rada B* **55**(3–4): 59–169.

Kocourková, J. 2009. Observations on the genus *Neolamya,* with the description of the new species *N. xanthoparmeliae* (Ascomycota, genera incertae sedis). *Opuscula Philolichenum* **6**: 137–148.

Kocourková, J. and K. Knudsen 2009a. *Gelatinopsis acarosporicola* (Helotiaceae), a new lichenicolous fungus on *Acarospora socialis* from western North America. *The Bryologist* **112**(2): 363–367.

Kocourková, J. and K. Knudsen. 2009b. *Stigmidium epistigmellum* (Mycosphaerellaceae), a lichenicolous fungus from maritime *Caloplaca* in North America. *The Bryologist* **112**(3): 578–583.

Kocourková, J. and K. Knudsen. 2009c. Three Lichenicolous Fungi new for North America. *Evansia* **26**(3): 148-151.

Kocourková, J. and K. Knudsen. 2009d. A new species of *Stigmidium* (*Mycosphaerellaceae*, Ascomycetes) from western North America. *Czech Mycology* **61**(1): 73–80.

Lawrey, J. D. and P. Diederich. 2003. Lichenicolous fungi: interactions, evolution, and biodiversity. *The Bryologist* **106**: 81–120.

Lendemer, J. C., J. Kocourková and K. Knudsen. 2008: Studies in lichens and lichenicolous fungi: more notes on some taxa from North America. *Mycotaxon* **108**: 491–497.

Orange, A., D. L. Hawksworth, P. M. McCarthy and A. Fletcher. 2009. *Verrucaria*. In C.W. Smith, A. Aptroot, B. J. Coppins, A. Fletcher, O. L. Gilbert, P.W. James and P. A. Wolseley (eds.) *The Lichens of Great Britain and Ireland,* pp. 931–957, Slough, United Kingdom: Richmond Publishing Company.

Tucker, S. C. and B. D. Ryan. 2006. Revised catalog of lichens, lichenicoles, and allied fungi in California. *Constancea* **84**: 1–275 + 1–52.

COST AND EFFECTIVENESS OF SMALL-SCALE *FOENICULUM VULGARE* CONTROL METHODS

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ABSTRACT

Information on effective methods of controlling invasive plants is crucial to land managers and others who seek to restore their lands to a more natural state. Much of the literature on invasive plant removal techniques focuses on large invasions and explores the methods appropriate for those situations. However, information regarding small invasions and effective control methods utilizing the limited materials available to individuals and small organizations is less widely available and often anecdotal. This study, conducted during the summer of 2006 at two sites in Salinas, California, examined three methods of controlling a small-scale infestation of fennel (*Foeniculum vulgare*) to identify which would be most effective and economical. The methods were: digging out individual plants with a shovel, chopping the plants repeatedly with a machete, and chopping the plants and immediately spraying the stumps with the herbicide Rodeo. Digging up each plant was the most effective method; chopping and spraying was a close second. Chopping repeatedly without herbicide treatment was not effective, resulting in apparent mortality rate very similar to that seen among untreated plants. Of the two effective methods, chopping and spraying was the least expensive. Digging the individual plants was the most time consuming and the most expensive. My recommendation for controlling *F. vulgare* based upon these results is to chop and spray when soils are hard and herbicide application is permitted, and to dig up each plant when soils are soft or where herbicide use is not an option.

KEYWORDS *Foeniculum vulgare*, fennel, anise, small-scale invasions, glyphosate, Rodeo, herbicide, invasive plants, cost-effectiveness

INTRODUCTION

Invasive plants are defined as non-native plants that have been introduced to an area and are able to produce reproductive offspring at considerable distance from the parent plant, creating the potential to spread extensively (Richardson et al. 2000). Estimated economic costs associated with invasive species in the United States include $97 billion in damage to agriculture, forestry, and the environment by 79 species between 1906 to 1991 (Pimental et al. 2000) and $125 billion spent on control per year (Myers and Bazely 2003). Though some plant expansion beyond native environments occurs naturally due to climate and habitat changes, invasions have been caused by intentional or unintentional introduction by human activity (Luken and Thieret 1997; Pyšek et al. 2004). Invasive plants are estimated to occupy over 100 million acres in the United States and to be spreading at a rate of 3 million acres per year (Myers and Bazely 2003).

Foeniculum vulgare Miller, commonly known as fennel, sweet fennel, aniseed, anise or sweet anise, was introduced to California from the Mediterranean region at least 120 years ago (Klinger 2000). It generally occurs in open, disturbed areas or along roadsides (Brenton and Klinger 2002). *Foeniculum vulgare* has some value as an agricultural crop (Brenton and Klinger 2002) and has likely escaped from cultivation several times (Klinger 2000). The California Invasive Plant Council ranks *F. vulgare* high on the California Invasive Plant Inventory Database, reflecting the species' level of adverse ecological impact in California (California Invasive Plant Council 2009). *Foeniculum vulgare* is a perennial herb that grows rapidly and spreads by seed or re-growth from its root crown (Klinger 2000). A single *F. vulgare* plant can produce thousands of seeds during its first growing season, and hundreds of thousands of seeds during the plant's second year (Erskine Ogden and Rejmánek 2005). *Foeniculum vulgare* may compete with other plants for resources (Holloran et al. 2004) or exclude them altogether by creating nearly monotypic stands (Bell et al. 2008). It successfully competes with native perennials in coastal sage communities, probably due in part to its ability to grow during the summer when most native species are dormant (Weber 2003). The ability of *F. vulgare* to re-sprout from its root stock can hinder determination of plant mortality because seemingly dead plants may resprout the following year, as illustrated in Bell et al. (2008).

The purpose of this project was to test three *F. vulgare* control methods to determine which worked most effectively and economically at two locations in Salinas, California: Natividad Creek Park and Upper Carr Lake. Klinger (2000) recommended controlling light infestations by digging out individual plants. However, in heavy clay soils, as found at both sites, digging up each plant is labor intensive. Several studies of large-scale *F. vulgare* control on Santa Cruz Island, California, have included controlled burns and aerial herbicide application (Brenton and Klinger 2002; Erskine Ogden and Rejmánek 2005), neither of which is appropriate for small-scale infestations in public parks within city limits. Herbicides that have been effective in controlling *F. vulgare* are: amine and ester formulations of triclopyr (Garlon 3A and Garlon 4), and glyphosate as Roundup (Klinger 2000).

I partnered with Return of the Natives (RON) to use two of their restoration areas as study sites. Return of the Natives also provided the tools and materials used in this project. Return of the Natives is a non-profit restoration and education project that has been working to restore native habitats by removing invasive plants and planting natives at Natividad Creek Park since 1995 and Upper Carr Lake since 2003.

METHODS

Study Area

Upper Carr Lake includes a large pond frequented by water birds, a bike path, and several restored areas, including the hillside near a county yard. This hillside is the location of one *Foeniculum vulgare* invasion in the park and served as one study site. Natividad Creek Park contains common city park facilities as well as several open fields with a mix of native and exotic plant life. One of these fields and an adjacent hillside, bordered by Freedom Boulevard and Nogal Drive, is another *F. vulgare* location, selected as my second study site.

Each site was approximately one acre in area, with widely spaced, typically young *F. vulgare* individuals spread throughout. Clumps of *F. vulgare* tended to be small, with the plants widely dispersed. When measured on 26 June 2006, most specimens were taller than 120 cm. Plant circumference was measured at 20 cm above the ground; most plants in the study had a circumference of 10 to 40 cm. The soil at both sites was very hard-packed, and the surrounding vegetation consisted of non-native annual grasses with a few native bunch-grasses and young oak trees (*Quercus* sp.), coyote brush (*Baccharis pilularis*), and other native trees, shrubs, and grasses that were planted as part of a restoration program for the park. Other invasives, such as curly dock (*Rumex crispus*), bristly oxtongue (*Picris echioides*), and English plantain (*Plantago lanceolata*), were also present.

Experimental Design

I randomly selected 50 *Foeniculum vulgare* plants at Natividad Creek Park and 50 plants at Upper Carr Lake. Each selected plant was randomly assigned to one of four different treatment methods, with 25 plants per method. Treatment began on 10 July 2006. The methods were:

- <u>Control</u>: No treatment other than removal of any flower heads to prevent seeding.
- <u>Chop Repeatedly</u>: Plants were chopped with a machete to 20 cm or less above the ground. They were revisited every two weeks to chop any new growth.

- Chop and Spray: Plants were chopped with a machete to 20 cm or less and then immediately sprayed with the herbicide Rodeo. This was the only treatment method with two people working together on the same plant. These plants were not retreated.
- Dig: Plants were dug up with a shovel to remove as much of the root and rootcrown as possible.

Time spent on each plant for all methods except the control was recorded to calculate the cost of labor (Results section, below). For the chop and spray treatment I used 25 ml of Rodeo mixed with water and no surfactant in a standard, one-liter spray bottle. Half of the mixture remained after treating all 25 plants in the treatment group.

Treatment was halted on 4 September 2006, after a final round of chopping and an assessment of all plants. The plants were visually evaluated and placed into one of three categories:

- Apparent mortality: Plants showed no new growth and any remaining foliage was brown and shriveled. Actual mortality could not be confirmed, as a longer monitoring period would be needed to establish true mortality (Bell et al. 2008).
- Stressed: Plants were obviously unhealthy, often with yellowed, drooping leaves.
- Alive: Plants were green or showed signs of healthy new growth.

Data Analysis

I computed the total time spent per plant, as well as the mean time per method. This was converted into mean cost per plant for each method by assuming a pay rate of $10 per person-hour based upon the pay rate for a Return of the Natives "Weed Warrior." I also created a tally of the survivability per method in Microsoft Excel and then imported that data into SPSS where I ran a chi-squared (x^2) test on the survivorship versus the method used. I calculated the cost of Rodeo used by assuming a price of $60.00 per gallon.

RESULTS

Control Efficacy

The most successful method I tested, which resulted in 100% apparent mortality, was digging the individual plants out. Chop and spray was a close second with 96% apparent mortality. The method of chopping repeatedly was ineffective, resulting in survivability very similar to that of the control plants (x^2 = 67.706, p<.001) (Fig. 1).

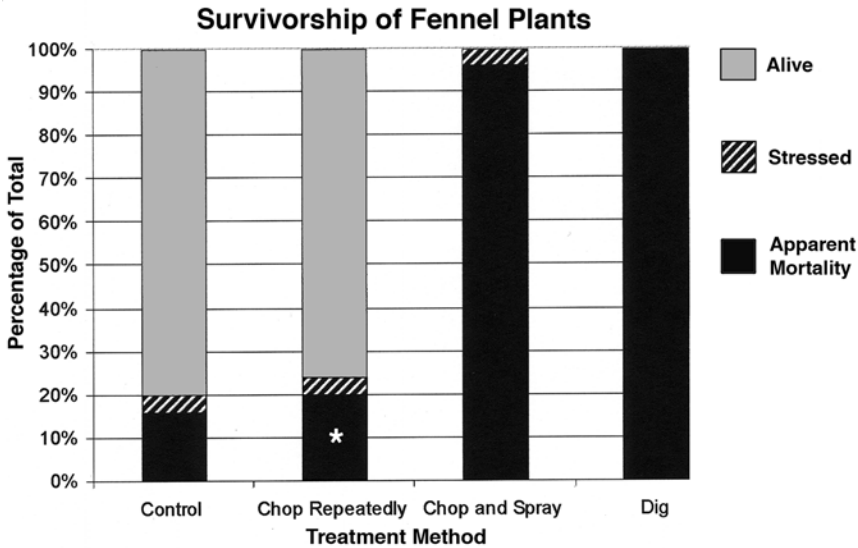

Fig. 1 - Cumulative *Foeniculum vulgare* survivorship in each of the four treatment methods. *Two plants listed as dead in the chop repeatedly method could not be located during and after a re-treatment day on 21 August 2006.

Cost

The most expensive method was digging, with an average cost of $3.49 per stressed or apparent dead plant (based on estimated labor cost of $10 per hour per person). The least expensive was chop and spray, with an average labor cost for two people of $0.16 per plant ($0.08 per person per plant) and an average herbicide cost of less than one cent (0.79) per plant. Chopping repeatedly was also fairly inexpensive (Table 1). These costs only include time spent at each plant and excludes all travel and preparation time.

Table 1 – Cost average and range per-plant, by treatment method.

	Chop Repeatedly	Chop and Spray	Dig
Average Cost	$0.22	$0.16	$3.49
Minimum Cost	$0.06	$0.06	$0.36
Maximum Cost	$0.77	$0.31	$11.33

DISCUSSION

Chopping and spraying each *Foeniculum vulgare* plant with herbicide was the least expensive and second most effective method, even with the added cost of Rodeo and the labor costs for two people. Herbicide use was determined by subtracting the amount of the solution remaining from the initial amount. Rodeo costs US $50.00 - $60.00 per gallon, depending on the source. Assuming a cost of $60.00 per gallon, the cost of the herbicide used was about 79/100 of a cent, or less than a penny, per plant. Though Roundup is a more common glyphosate formulation than Rodeo, I chose Rodeo because it was already available through Return of the Natives. Furthermore, Rodeo is preferable for use in riparian or aquatic sites because the surfactant in Roundup (and often added to Rodeo) has shown deleterious effects upon amphibians (Relyea 2005; Trumbo 2005). All herbicide applications for this work were on upland sites and no surfactants were used.

Digging was the most effective method of controlling *F. vulgare*, but was labor intensive, averaging about 20 minutes for each plant. One notable plant took 68 minutes to dig out. The time may be reduced by using a different tool, such as a Pulaski or mattock instead of a shovel, however in my experience, it is very difficult to judge how much of the root has been removed with the Pulaski, since the tool is well suited to chopping away at the root but it is not very precise in digging. I used a shovel so that removal of the large, fleshy part of the root could be reliably determined. None of the plants had their entire root removed; once the large, bulbous portion of the root was dug up, fibrous parts of the root remained which I was unable to fully extract. Holloran et al. (2004) suggests that removing the top three to six inches of the root crown will kill the plant if the entire root cannot be removed. The monitoring portion of my study was too short to conclusively demonstrate if the small root fragments left behind after digging were enough to permit re-sprouting.

Based upon my results, for small populations of *F. vulgare* I recommend digging up each plant when soils are soft, such as during the rainy season. During the summer, when the ground is too hard to dig up each plant quickly, I recommend chopping and spraying. Ideally, most removal of small and scattered populations of *F. vulgare* would take place in conditions where digging is the appropriate method. Unfortunately *F. vulgare* is often more visible during the summer, after it has sent up flower stalks, which necessitates a viable alternative to digging in hard soils.

The tools used in this project, particularly the machete for chopping and shovel for digging, were chosen from personal experience, and for their appropriateness to the methods I was testing. Aside from the alternative digging tools already mentioned, loppers could also be used in place of the machete. The *F. vulgare* at my study sites were too widely spaced to justify the use of mowing, though brush cutters could be a possible alternative. However, Brenton and Klinger's (2002) study on Santa Cruz Island found that cutting the plants before herbicide application did not lead to a greater reduction in *F. vulgare*, possibly because the fallen stems intercepted the spray. In comparison, my study was much smaller and focused upon widely spaced individual plants instead of plots with dense *F. vulgare* stands. I was able to clear the stalks and other cuttings from the cut section and apply herbicide directly to the exposed cut.

The team of Bell et al. (2008) intensively studied herbicide control of *F. vulgare* and found more success with broadcast application as opposed to spot spray applications, though again their study site was much larger than mine and supported a denser *F. vulgare* infestation. Their results also showed that initial assessments of *F. vulgare* mortality can be misleading as the percent control decreased over time. Triclopyr and a mixture of glyphosate and triclopyr were more effective than glyphosate alone, especially low dosages of glyphosate.

Flaming was discarded as a method since Erskine et al. (2005) indicated that burning the plants was only useful in removing the previous year's dead stalks and Klinger (2000) reported that burning is not an effective control method by itself. I observed that *F. vulgare* quickly regenerated from its root crown after fire and was one of the first plants to re-emerge in a field that burned in June 2006 next to the Natividad Creek Park site (Briscoe 2006). I did not find any references in the literature that documented the effect of fire upon the seed bank of *F. vulgare*.

The disappearance of two plants in the chop repeatedly group partway through the study was particularly curious as they had been reliably located during three previous re-treatments. Anecdotally I observed a *F. vulgare* plant in a different part of the park yanked underground, possibly by a California pocket gopher, and it's possible that the two plants in my study were preyed upon in a similar manner. Studies on gopher depredation of *F. vulgare* would be interesting. Further studies on how much root needs to be removed to prevent *F. vulgare* from re-sprouting and seed bank viability of *F. vulgare* after fire would be particularly useful.

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LITERATURE CITED

Bell, C. E., T. Easley, and K. R. Goodman. 2008. Effective fennel (*Foeniculum vulgare*) control with herbicides in natural habitats in California. *Invasive Plant Science and Management* **1**: 66-72.

Brenton, R.K. and R.C. Klinger. 2002. Factors influencing the control of fennel (*Foeniculum vulgare* Miller) using Triclopyr on Santa Cruz Island, California, USA. *Natural Areas Journal* **22**(2): 135-147.

Briscoe, A. 2006 June 16. Winds fan fire in North Salinas. *The Monterey County Herald* Sect A1.

California Invasive Plant Council. California Invasive Plant Inventory Database *http://www.cal-ipc.org/ip/inventory/weedlist.php* Accessed 2009 September 22.

Erskine Ogden, J.A. and M. Regmánek. 2005. Recovery of native plant communities after the control of a dominant invasive plant species, *Foeniculum vulgare*: Implications for management. *Biological Conservation* **125**: 427-439.

Holloran, P., A. Mackenzie, S. Farrell, and D. Johnson. 2004. *The Weed Worker's Handbook: A Guide to Techniques for Removing Bay Area Invasive Plants*. The Watershed Project and California Invasive Plant Council, Richmond, CA.

Klinger, R.C. 2000. *Foeniculum vulgare*. Pages 198-202 *in* C.C. Bossard, J.A. Randall, and M.C. Hoshovsky (editors). *Invasive Plants of California's Wildlands*. University of California Press, Berkeley, California.

Luken, J.O. and J.W. Thieret. 1997. *Assessment and Management of Plant Invasions*. Springer, New York, NY.

Myers, J.H. and D.R. Bazely. 2003. *Ecology and Control of Introduced Plants*. Cambridge University Press, Cambridge, UK.

Pimental, D., L. Lach, R. Zuniga, and D. Morrison. 2000. Environmental and economic costs of nonindigenous species in the United States. *BioScience* **50**(1): 53-65.

Pyšek, P., D. M. Richardson, M. Rejmánek, G. L. Webster, M. Williamson, and J. Kirschner. 2004. Alien plants in checklists and floras: towards better communication between taxonomists and ecologists. *Taxon* **53**: 131-143.

Relyea, R.A. 2005. The lethal impact of Roundup on terrestrial and aquatic amphibians. *Ecological Applications* **15**(4): 1118-1124.

Richardson, D. M., P. Pyšek, M. Rejmánek, M. G. Barbour, F. D. Pannetta, and C. J. West. 2000. Naturalization and invasion of alien plants: concepts and definitions. *Diversity and Distributions* **6**: 93-107.

Trumbo, J. 2005. An assessment of the hazard of a mixture of the herbicide Rodeo and the non-ionic surfactant R-11 to aquatic invertebrates and larval amphibians. *California Fish and Game*. **91**(1): 38-46.

Weber, E. 2003. *Invasive Plant Species of the World: A Reference Guide to Environmental Weeds*. CABI Publishing, Cambridge, MA.

NOTEWORTHY COLLECTION
RIVERSIDE COUNTY, CALIFORNIA

Cynanchum utahense (Engelm.) Woodson (Asclepiadaceae) - Riverside County. *Duncan S. Bell 273* (RSA, duplicates to be distributed) 19 April 2009. Palen/McCoy Wilderness Area, west side of the Arica Mountains. Collections taken from sandy wash at 34.010° N, 114.939° W, ca. 1280 ft. elev. Large population of *Cynanchum utahense* observed in main drainage wash on the west side of the mountain range over a linear distance of about 300 m. All plants in flower with approximately 30% of plants with both flowers and fruit. Growing with *Ambrosia dumosa, Androstephium breviflorum, Hesperocallis undulata, Larrea tridentata, Loeseliastrum matthewsii, Malacothrix glabrata, Oenothera deltoides, Psorothamnus spinosus, Rafinesquia neomexicana, Stephanomeria exigua*.

Previous knowledge. *Cynanchum utahense* occurs from southwestern Utah, through the Mojave Desert across southern Nevada, western Arizona, to the Sonoran and Mojave deserts in California (Munz 1974, Flora of Southern California, UC Press, Berkeley; Cronquist et al. 1984, Intermountain Flora Vol. IV, New York Botanical Garden, Bronx, NY; McLaughlin 1993, Jour. Arizona-Nevada Acad. Sci. 27:169-187). Most collections of *Cynanchum utahense* in California have been from San Bernardino County; many of these are from the southwestern section of the Twentynine Palms Marine Corps Base. It is on CNPS List 4.2, that is, a plant of limited distribution (watch list), fairly endangered in California (*cnps.site.aplus.net/cgi-bin/inv/inventory.cgi*, visited 1 Nov 2009). The Consortium of California Herbaria (*ucjeps.berkeley.edu/consortium/*, visited 1 Nov 2009) reports ten collections from San Diego County, mostly within the Anza-Borrego area, and only one collection from Imperial County, at Coyote Wells, south of Anza-Borrego Desert State Park. It reports two collections from Riverside County, one of which has incorrect location data, and was actually collected in San Diego County (K. Brandegee, April 1899, San Felipe). The only reported *C. utahense* collection made within Riverside County is Theo Glenn's no. 91-84; May 8, 1991 (UCR) from the Sonoran Desert, Big Maria Mtns., north of Blythe. Except for Glenn's one specimen, there is a wide gap in *C. utahense's* apparent distribution between western Arizona and all collections from other California counties.

Significance. This collection documents a large population (more than 500 individuals) from a broad geographic area where only one other specimen is reported. This occurrence suggests that there may be other *C. utahense* populations in unexplored or under-collected desert washes and canyons.

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