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PLANTS OF THE COLONET REGION, BAJA CALIFORNIA, MEXICO, AND A VEGETATION MAP OF COLONET MESA

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ABSTRACT

The Colonet region is located at the southern end of the California Floristic Province, in an area known to have the highest plant diversity in Baja California. A preliminary list of vouchered specimens is developed for the area, and a vegetation map for Colonet Mesa is presented. The Colonet region has at least 435 vascular plant taxa, of which 383 are native to Baja California, and 52 are endemic or nearly endemic. This list includes five local endemic taxa known only from the Colonet region, 18 taxa on the California Native Plant Society List 1B of taxa that are “rare, threatened, or endangered in California and elsewhere,” and three on the Mexican NOM 059 list of protected taxa. The Mexican federal government has proposed to build a major port and a new city at Colonet. To understand the potential impact of the port on the regional biodiversity, we examine three areas—a Footprint area which will presumably be highly affected by the port, the Mesa area which contains all the known vernal pools, and a Buffer area surrounding the other two areas. The large Buffer shows the greatest number of native and endemic taxa, followed by the Mesa. The Footprint has two species of high conservation concern that are not represented elsewhere in the study area. The vegetation map of Colonet Mesa confirms the presence of large vernal pools and shows extensive maritime chaparral, neither of which has been reported from elsewhere in northwest Baja California. This report documents the high plant biodiversity of the region and highlights the rare and unique species and vegetation types of Colonet Mesa.

RESUMEN

La región de Colonet se localiza al limite sureste de la Provincia Florística de California, en un área reconocida por contar con una alta diversidad de plantas en Baja California. Una lista preliminar de especies colectadas se elaboró para el área y se presenta un mapa de vegetación para la mesa de Colonet. La región de Colonet cuenta con por lo menos 435 taxas de plantas vasculares, de las cuales 383 son nativas de Baja California y 52 son endémicas o casi endémicas. Este listado incluye cinco taxas de endemismos locales solo conocidos en la región de Colonet, 18 taxas en el listado 1B de la Sociedad de Plantas Nativas de California que son “rara, amenazada o en peligro en California y otros sitios” y tres enlistadas en la NOM 059 de las especies de protección en México. El Gobierno Federal Mexicano ha propuesto la construcción de un puerto de gran escala y una nueva ciudad en Colonet. Para entender el impacto potencial del puerto en la biodiversidad regional, examinamos tres áreas—un área de influencia la cual presumiblemente será altamente afectada por el puerto, el área de la Mesa en donde se localizan todas las charcas temporales y un área de amortiguamiento que rodea las otras dos áreas. La zona de amortiguamiento muestra el mayor número de taxas nativas y endémicas, seguida por la zona de la Mesa. La zona de influencia cuenta con dos especies de alto interés para la conservación que no se encuentran representadas en otros sitios dentro del área de estudio. El mapa de vegetación de la Mesa de Colonet confirma la presencia de grandes charcas temporales y muestra grandes extensiones de Chaparral Marítimo, no reportado en ningún otro sitio en el noroeste de Baja California. Este reporte documenta la alta diversidad de plantas de la región y resalta las especies raras y únicas, así como los tipos de vegetación de la Mesa de Colonet.

Key words: coastal development, Colonet, conservation, endemic plants, flora, maritime chaparral, maritime succulent scrub, rare plants, vegetation, vernal pool.

INTRODUCTION

The California Floristic Province (CFP) is an area of high floral biodiversity with about 4500 plant species, including a large percentage of endemic and threatened taxa (Myers et al. 2000; Brooks et al. 2002). The CFP is usually defined as the Pacific drainages extending from the Klamath Mountains in Oregon, USA, to El Rosario, Baja California, Mexico, at 30°N latitude (Hickman 1993). The Mexican part of the CFP has lower rainfall than areas to the north, transitioning to desert at about 30°N (Minnich and Franco-Vizcaíno 1998; González-Abraham et al. 2008).

The CFP of coastal Baja California can be broadly classified as consisting of three scrub communities (Garciálían et al. in press). (1) Coastal sage scrub consists of a mixture of evergreen and summer-deciduous species and is a common coastal community from Santa Barbara County, California, to Santo Tomás, Baja California (Rundel 2007). (2) Maritime succulent
scrub (also known as succulent coastal matorral) is the common coastal community to the south of coastal sage scrub and consists of a higher proportion of succulent species, often widely spaced; maritime succulent scrub can be found in southern San Diego County, California, and extends to the southern limit of the Province (Rundel 2007). (3) Chaparral, characterized by evergreen sclerophyllous shrubs, is primarily an inland community, but is also found in isolated patches on the coast, for example at Torrey Pines State Park in San Diego County, where it is called maritime chaparral (Keelley and Davis 2007). It is commonly agreed that, among the scrub communities of the southern CFP, plant species diversity is highest in the maritime succulent scrub of Baja California, with a peak in the southern part of this community from 31° to 30°N (Peinado et al. 1995; Riemann and Excurra 2007; Rundel 2007). No part of the coastal CFP in Baja California has been given legal protection under federal or local laws (Riemann and Excurra 2005).

The town of Colonet (31°5′N, 116°12′W) is about 180 km south of the border with the United States (US) on Mexican Federal Highway 1 on the Pacific coast of Baja California. Bahía Colonel (Colonet Bay) is formed at the mouths of two rivers, the Río San Rafael and—just a few miles to the south—the Río San Telmo (Roberts 1984; Baja Almanac Publishers n.d.). Punta Colonel (Colonet Point) is a coastal basalt mesa along the north bank of Río San Rafael, surrounded on three sides by sheer cliffs ca. 80 m high. Punta Colonel is more or less congruent with Colonel Mesa; the latter is defined here as the area south of the road to San Antonio del Mar, which passes along the southern limit of Johnson Ranch (a site name used in many early collections). Colonel Mesa forms the southern limit of an area of spectacular botanical diversity extending to at least Eréndira, about 25 km to the north (Fig. 1).

In 2006, the Mexican government announced plans for a container port at Colonel, with an associated town, infrastructure, and railroad following the Arroyo Seco/Río San Juan to San Matías pass and continuing on to the US (F. Ochoa Pineda, M. Carignan, C. O. García Zendejas, and J. Gleason, Report on the proposal to develop a port at Punta Colonel, Baja California, Mexico. ELAW & Defensa Ambiental del Noroeste, unpubl. report [2008]). The primary purpose of this port is to add capacity to US–Asian trade; initial capacity is estimated at 1–2 million TEUs (twenty-foot equivalent units), with construction of a city of up to 200,000 inhabitants (Dibble 2008; F. Ochoa Pineda et al., unpubl. report [2008]). The outline of the port as authorized (Secretaría de Comunicaciones y Transportes 2006, 2008) will span the coast from approximately the southern tip of Punta Colonel, past Río San Rafael, to the mouth of Río San Telmo (Fig. 1). The published outline of the port does not address or authorize any terrestrial impacts. The recent contraction of world trade has made this port less economically viable, at least in the short-term, but government officials continue to insist the port will be built (Anonymous 2009; Madrigal 2009).

Punta Colonel is known for its vernal pools and associated flora (Moran 1984; Bauder and McMillan 1998; Clark et al. 2009), including the largest vernal pools known from the CFP in Mexico (Moran 1984). The area also contains a number of local endemic plant species, as well as significant populations of many taxa listed by the US Endangered Species Act and the California Endangered Species Act (Moran 1984; Clark et al. 2009). Little has been published about the flora or fauna of the region. The goal of this paper is to develop a preliminary list of the vascular plants of the region and a map of the vegetation of Punta Colonel.

BACKGROUND

Vernal pools are seasonal wetlands. Underlain by an impermeable layer, the pools fill during the wet winters and dry up during the summer (Solomeshch et al. 2007). The standing water in the spring excludes flooding-intolerant generalists, resulting in a unique flora with many endemic plants. Vernal pools also support a number of rare and endangered animals such as fairy shrimp (Branchinecta sandiegoensis Fugate), provide breeding habitat for amphibians such as the western spadefoot (Spea hammondii (Baird)), and are important habitat for migratory wading birds (Skinner 1994; Solomeshch et al. 2007; Clark et al. 2009). Loss of vernal pools has been high throughout California, and the most significant loss of habitat has been in San Diego County, where 95–97% of vernal pool habitat has been destroyed (U.S. Fish and Wildlife Service 1998; Bauder and McMillan 1998).

The only list of vernal pool plants of Baja California, and one of the few papers describing the region, was published by Moran (1984). The original extent and subsequent anthropogenic loss of vernal pools in Baja California have not been quantified, but even in 1984, a number of the known pools had been lost. Moran noted that Colonet Mesa harbors Orcuttia californica in “undoubtedly its largest stands,” as well as Eryngium aristulatum var. parishii and Navaretta fossalis. Since that time, there seemingly has been no effort to track any of these populations (U.S. Fish and Wildlife Service 2005), in spite of the potential importance of these populations to the genetic diversity of each species (Griggs 1984). All three taxa are listed under the US Endangered Species Act.

Three “local endemic” plant species have been described from the Colonet region. They are confined to the coast near or on Colonet Mesa (additional undescribed locally endemic taxa in Dudleya are discussed below). The early plant collector T. S. Brandegee discovered Centromadia perennis (Greene 1896; Lindsay 1955). Centromadia perennis is a vernal pool specialist known from the southern tip of Punta Colonel to ca. 2 km north of San Antonio del Mar. Historically, it occurred near San Quintín (Moran 1984), and was thought to be extirpated, but a small population has recently been rediscovered (Vanderplank 2010). Reid Moran collected extensively in the study area from 1946 to 1983 and documented the distribution of many species in the area, including the discovery of Berberis claireae (Moran 1982). Berberis claireae was known (before the collection noted below) only from arroyos and watercourses from Arroyo Hediondo (5 km north of the study area) to near San Antonio del Mar within a few km of the coast. Hazardsa ferrisiae is a local endemic species (with a larger distribution than the foregoing) that is known from hills a few kilometers from the coast from Punta Cabras to Camalú (Clark 1979).

Adenothamus validus is a monotypic genus restricted to Baja California from Rosarito to Colonet. The type specimen was collected by T. S. Brandegee in 1893 at Johnson Ranch (Keck 1935), a few kilometers north of San Antonio del Mar.
(notes on the location of this collection can be found in annotations attached to the herbarium voucher DS635046 at CAS). The species has not since been collected south of Arroyo Hediondo (e.g., Moran 30013 [SD]). Another highly threatened taxon in the study area is *Mammillaria louisae*. This species is known from only a few locations near San Quintín; the most northerly collection is from the “mouth of the Arroyo San Telmo” in 1960 (Moran 8261 [SD]). Because the other known populations have been reduced or extirpated (J. Rebman, pers. comm.), this population—if it still survives—may be very important to the persistence of this species in the wild.

The most narrowly restricted taxa known from the region are two (possibly three) morphologically distinct *Dudleya* that occur only on Colonet Mesa. These populations, probably related to *D. blochmaniae*, are distinct and restricted to specific areas on the mesa (Dodero 1995). Pending formal description, we refer to these populations here as *Dudleya* Species 1 and *Dudleya* Species 2. Species 1 has only been collected at a few localized areas of the mesa, in an area of perhaps 100 ha. Species 2 is known from an area of perhaps less than 10 ha in heavy clay soils. Although the exact taxonomic rank of these taxa within *Dudleya* has not been determined, they are obviously highly threatened due to their limited distribution.

Fig. 1. Map of the Colonet region, showing the three study areas and the outline of the proposed port. The three study areas are shown in distinct colors. The Footprint is the area presumed to be affected most by the development of the port. The Mesa is hydrologically isolated and contains all the known vernal pools in the area. The Buffer is an area about 10 km wide that samples the flora of the surrounding area. The area officially authorized for the port is shown in white.
METHODS

This study is intended to document the known flora and vegetation of the Colonet region in relation to the potential threat from the proposed port development project. Because the scope of the proposed port and associated infrastructure is currently unknown, we compiled information reported in public documents (newspapers, web sites, and local planning documents) that would shed light on the size and potential impact of the port. Published news articles have spoken of a port the size of the ports of Long Beach and Los Angeles, with a town of 200,000 inhabitants or more and a port connecting the port with the US. Because of limited resources and infrastructure in the area, the port will presumably have to generate electricity, produce desalinated water, and dispose of municipal waste on-site or nearby. Some news reports have spoken of housing being built on Masa San Telmo (to the west of Highway 1 between Rio San Rafael and Rio San Telmo) and Mesa San Jacinto (the next mesa to the south). Municipal planning documents show planned “low density” development for the mesa, presumably housing and recreation (golf), with a narrow strip on the unbuildable cliffs left as a protected area. A summary of project alternatives has been published (Secretaría de Comunicaciones y Transportes 2002).

Preliminary Flora of the Colonet Region

To develop the list of vascular plants that could potentially occur in the area, we drew on four main sources: (1) a list maintained by M. Dodero and colleagues; (2) various field trips, including a collecting trip in June 2008; (3) the field collection journals of Reid Moran, Robert Thorne and Frank Gander; and (4) plant associates listed on herbarium labels from the area. Preliminary searches were made of the databases at the Mexican Biodiversity Information Network (CONABIO 2008), by taxon, and at San Diego Natural History Museum (Rebman 2008), by taxon, latitude-longitude, locality, and collector. For taxa not found in these databases, we searched in the herbaria at Rancho Santa Ana Botanic Garden (RSA), California Academy of Sciences (CAS, including the Dudley Herbarium, DS), San Diego Natural History Museum (SD), and The Huntington Botanical Garden (HNT). When we had access to the label text (i.e., all except some specimens accessed online), we georeferenced the locations or confirmed the georeferencing already made. Georeferencing was facilitated using maps (Baja Almanac Publishers n.d.), a database of place names provided by the Bajaflora database (Rebman 2008), and the “Google Earth” application. No attempt was made to confirm the identification of species on specimen sheets. Nomenclature was updated to that used by the Bajaflora database and the Checklist of the Vascular Plants of San Diego County (Rebman and Simpson 2008), using treatments found at Flora of North America (Efloras 2008), Jepson Interchange (Consortium of California Herbaria 2008), IPNI (International Plant Names Index 2008), and Tropicos (Missouri Botanical Garden 2008). We include synonyms for those taxa that have been changed since the publication of The Jepson Manual (Hickman 1993) or The Flora of Baja California (Wiggins 1980).

We used our knowledge of local occurrence, previous classifications (Bauder and McMillan 1998; Riemann and Ezcurra 2005), the SD database (Rebman 2008), the Jepson Interchange (Consortium of California Herbaria 2008), and other online databases (e.g., California Native Plant Society 2010 and CONABIO 2008) to classify each taxon as: vernal pool specialist, local endemic, (Baja) peninsular endemic, near-state endemic, listed by the California or US Endangered Species Acts, listed on the Mexican NOM 059 list of protected species, and included on the California Native Plant Society Inventory of Rare and Endangered Plants of California (“CNPS Inventory”). Near-state endemics are taxa whose Mexican range is within the state of Baja California, and extends slightly into San Diego or Imperial Counties, California.

Only taxa currently represented in herbarium specimens are included in the list that follows. Several non-native and weedy species were observed but not vouched, including: Atriplex semibaccata R.Br., Brassica tournefortii Gouan, Bromus madritensis L. subsp. rubens (L.) Husn., Chenopodium murale L., and Nicotiana glauca Graham.

Delimitation of Regions

In order to determine the possible impact of a port on the flora of the region, we defined three areas of interest within an overall study area (Fig. 1). These areas are defined by prominent geographic features (escarpments and roads).

Footprint.—The Footprint of the port consists of the area where reports have described possible development of a town (Secretaría de Comunicaciones y Transportes 2002): Mesa San Telmo and Mesa San Jacinto, extending from the coast inland to Highway 1 and including the riparian areas of the San Telmo and San Rafael rivers west of the highway. While this area is presumably much larger than that necessary for development (ca. 2–3 times the current area of Ensenada), it contains the areas most amenable to development, many of which are currently extensively farmed, with little native vegetation in upland areas.

Mesa.—The Mesa is the part of Punta Colonet south of the road from Colonet to San Antonio del Mar, including the dunes and lagoon around San Antonio del Mar. This area is often referred to as Mesa de Colonet (Moran 1984). This area contains almost all of the vernal pools and sandstone outcrops in the region, and was an area of particular interest to biologists before the port was announced. The Mesa is rather flat, underlain by basalt, about 80 m above sea level, and hydrologically isolated from the rivers and arroyos to the south and north. While the center and east sides of the Mesa have been extensively altered by grazing and agriculture, much of the southern and northern parts harbor seemingly intact native vegetation with few introduced species.

Buffer.—To understand the possible impact of the port, and to include species from the area that had not been collected from the two above areas, we defined a Buffer area that extends ca. 10 km to the north and east of the Mesa and Footprint, excluding areas south of San Vicente that are intensively farmed. The surface areas of the Footprint, Mesa, and Buffer areas are ca. 190 km², 130 km², and 480 km², respectively.

Vegetation Map

A photomosaic of the peninsula was obtained from Terra Peninsular, AC. This is a true-color image made during late
Table 1. Taxa occurring in three study areas of the Colonet region in Baja California, Mexico.

<table>
<thead>
<tr>
<th>Category</th>
<th>Footprint</th>
<th></th>
<th>Mesa</th>
<th></th>
<th>Buffer</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>All species and subspecies</td>
<td>17</td>
<td>73</td>
<td>99</td>
<td>225</td>
<td>182</td>
<td>302</td>
<td>435</td>
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<td>Native</td>
<td>12</td>
<td>64</td>
<td>87</td>
<td>204</td>
<td>159</td>
<td>268</td>
<td>333</td>
</tr>
<tr>
<td>Local endemics</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Endemics and near-state endemic</td>
<td>2</td>
<td>14</td>
<td>11</td>
<td>27</td>
<td>21</td>
<td>35</td>
<td>52</td>
</tr>
<tr>
<td>NOM059</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>CNPS Lists 1–4</td>
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<td>16</td>
<td>34</td>
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<td>52</td>
</tr>
<tr>
<td>CNPS List 1B</td>
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<td>6</td>
<td>6</td>
<td>10</td>
<td>5</td>
<td>8</td>
<td>18</td>
</tr>
</tbody>
</table>

For each study area, the number of species, subspecies or varieties that occur uniquely in that area, and the total number of taxa known from that area, are shown as “unique” and “total”, respectively. The first number for each area represents the number of taxa that could be lost from the study region if that area were destroyed, and the second number represents the number of taxa that would be included if that area were completely protected. The final column is the total number, for the study region, of taxa for each classification. Local endemics are species found only in the Colonet region and include two undescribed taxa. Endemics are species endemic to the Baja California peninsula; near-state endemics are species endemic to the state of Baja California that extend slightly into San Diego or Imperial Counties in California. CNPS Lists 1–4 include plants listed in the California Native Plant Society’s Inventory of Rare and Endangered Plants. CNPS List 1B taxa are those considered globally endangered, threatened or rare.

RESULTS AND DISCUSSION

Preliminary Flora of the Colonet Region

We found 1180 plant specimens in the study region that we could georeference to one of the three areas of interest: Footprint, Mesa, or Buffer. These specimens were used as the primary data for the flora presented here.

The preliminary vascular flora of the Colonet region (Appendix 1) shows the 435 distinct taxa (species, subspecies, varieties, and hybrids) occurring within the study area. Of these taxa, 383 are native. Excluding subspecies, varieties and hybrids, the flora has 424 distinct species, of which 373 are native. The list includes 35 taxa endemic to the Baja California peninsula—of which five are local endemics—and 17 taxa that are near-state endemics.

A number of taxa found in the study area are listed as rare or protected. The CNPS Inventory lists 52 taxa, including 18 taxa on the list 1B (“Plants rare, threatened, or endangered in California and elsewhere”). Ten taxa are listed under either the US or California Endangered Species Acts (California Native Plant Society 2010). The Mexican NOM 059 “list of species at risk” (Secretaría de Medio Ambiente y Recursos Naturales 2002) includes three species from the study region. These species, and their classification status, are: *Callitropsis forbesii* (listed as *Cupressus forbesii*, protected); *Cylindropuntia californica* var. *rosarica* (listed as *Opuntia rosarica*, protected); and *Ferocactus viridescens* var. *viridescens* (listed as *F. viridescens*, threatened). A fourth listed species, *Pinus muricata* D.Don, in danger of extinction, occurs just to the north of the study region (e.g., *Moran 29467* [SD]; Minnich 1987).

We subdivided the results by species found in the Footprint, Mesa and Buffer (Table 1). This analysis gives us a very rough idea of the proportion of biodiversity attributable to each of the three areas. Note that these numbers must be taken as only a rough estimate—sources of error include different collection efforts for the areas, the fact that an exhaustive search for specimens was not made, and changes in habitat and land use since the collections were made (note that some taxa are vouchered with very old specimens, some over 100 years ago). But, even with these caveats, much of the biodiversity of the region is found in the Mesa and Buffer regions; indeed, the only region in which all five local endemic species are known to occur is the Mesa. The Footprint has a distinctly less diverse flora, as measured by this list, which may be surprising given the large riparian area encompassed by the Footprint. Possible reasons for these differences include edaphic factors, the larger area of the Buffer (about 2.5–3.5 times larger), unknown differences in collecting effort, and—we believe—the extensive areas already converted to agriculture in the Footprint. However, between two and 21 endemic or near-endemic taxa are unique to one—and not the other two—areas and would be threatened by development.

In June 2008, we spent two days collecting in the Colonet region. We found a specimen of *Berberis claireae* in a canyon at the south end of the Mesa (30°57.750′N, 116°17.807′W). This is the first population known from south of San Antonio del Mar, and expands the north–south range of this species from ca. 12 km to ca. 35 km. This collection suggests that there may be other novel plants to be found in the region.

Vegetation Map

It is inherently difficult to classify coastal scrub vegetation (Rundel 2007), in part because of a large number of local endemics with limited range. Our classification is based on regionally-developed descriptions of maritime succulent scrub, coastal sage scrub, and maritime chaparral (Keeley and Davis...
2007; Rundel 2007), which attempt to create broad classifications, in part by combining dominant congeners (such as Salvia spp.) that share structural and phenological characteristics.

The communities we mapped include:

1. Maritime succulent scrub.—This vegetation type is dominated by Agave shawii subsp. shawii, Dudleya engins, Euphorbia misera, and Rosa minutifolia, with less dominant Aesculus parryi, Artemisia californica, Bergerocactus emoryi, Encelia californica, and Rhus integrifolia. In the field, what we classify as maritime succulent scrub is obviously a mixture of at least three vegetation types, which we could not resolve on the aerial photos. These three (unmapped) subtypes consist of drained soils with more Agave shawii subsp. shawii, Dudleya engins, and Euphorbia misera; clayey soils with Deinandra fasciculata, and Rosa minutifolia; and linear sandy hummocks or stabilized dunes that are dominated by the larger shrubs such as Aesculus parryi, Rhus integrifolia, and Salvia brandegeei. These sandy areas have a rich concentration of shells, presumably from the Native American population that inhabited the region (Moore 1999). Maritime succulent scrub was further classified according the degree of disturbance: “intact” refers to areas with low levels of disturbance, or where grazing has reduced but not eliminated native vegetation, while “low quality” describes areas in which the vegetation has been highly impacted by bulldozers or anthropogenic fire. Our experience is that even the low quality areas will restore themselves, and are already undergoing that process.

2. Chaparral.—Chaparral on the Mesa is dominated by Adenostoma fasciculatum, Cneoridium dumosum, Hazardia squarrosa var. grindelioides, Rhus integrifolia, and Salvia brandegeei. Agave shawii subsp. shawii and Dudleya engins also occur here but are less conspicuous than the larger shrubs. Maritime chaparral occurs only on sandstone outcrops and, as far as we know, the major extent of this vegetation in Baja California is limited to Colonet Mesa.

3. Coastal sage scrub.—This vegetation type is dominated by Artemisia californica and Salvia munzii with Adenostoma fasciculatum, Aesculus parryi, Dudleya engins, Encelia californica, Simmondsia chinensis, and Stenocereus geyoides; Agave shawii subsp. shawii is nearly absent. Although a number of endemics and near-state endemics occur here, the dominance of Artemisia and Salvia make this vegetation similar to the coastal sage scrub of southern California. Coastal sage scrub is found here only on north- and east-facing canyon walls.

4. Vernal pools.—Vernal pools were recognized by their morphology and as large areas of sparse vegetation. Species that occur here include Centromadia perennis, Deinandra fasciculata (shallow pools), Eryngium aristulatum var. parishii, Lasthenia gracilis (shallow pools), and Orcuttia californica (deeper pools). Some of the pools have been plowed and sown and have scarce native vegetation. Vernal pools in the Colonet region range from small pools <50 m in diameter to the largest pools known from NW Baja California, up to 1.4 km along the major diameter. Intermittent riparian areas also often support vernal pool species, but were not so mapped.

5. Dunes.—The study area has both active dunes and mostly stabilized dunes. The stabilized dunes support Abronia umbellata var. umbellata, Helianthus niveus, and Lotus nuttallianus, while the active dunes have sparse vegetation with Abronia maritima var. maritima, A. umbellata, Cressa sp., Distichlis spicata, Lotus argophyllus, and—surprisingly—Tamarix ramosissima growing through the sand.

6. Riparian and lagoon.—Arroyo San Antonio and Arroyo El Salado join and flow to San Antonio del Mar, where they form a lagoon behind the beach. We included approximately the last 2 km of the arroyo and the lagoon in Fig. 1. Salt marsh was not mapped.

The vegetation map for Punta Colonet is shown in Fig. 2. It must be noted that land use has changed since this map was made (Jun 2008), and there has been additional destruction of native vegetation. The major native vegetation types shown on the map are maritime succulent scrub and maritime chaparral, the latter dominating the south-central part of the peninsula. We believe that this is the largest extent of maritime chaparral in the CFP in Mexico.

A study of vegetation along a transect from Colonet to the Sierra San Pedro Márir has been conducted using phytosociological methods (Peinado et al. 1994). This study reported one mid-elevation and three low-elevation vegetation types that seem comparable to our classification. Although we used different methods but identical vegetation types, our coastal sage scrub appears to be identical with their Salvia munzii-Artemisietum californicae, and our maritime succulent scrub includes their classifications Bergerocacto emoryi-Agavetum shawii and Rosa minutifoliace-Aesculetum parryi. Our maritime chaparral is similar to their Adenostometum fasciculati, which they recognized as an upland, transitional, fire-maintained vegetation occurring no lower than 150 m elevation. We cannot evaluate the role of fire in the maritime chaparral in the Colonet region (see Van Dyke and Holl 2001), but many of the co-occurring species of the presumed inland climax vegetation type were absent. Because of the different species composition, we expect that the dynamics of Adenostoma fasciculatum-dominated chaparral differs between coastal and inland locations, emphasizing the regional uniqueness of maritime chaparral.

The dimensions and distribution of vernal pools are apparent from Fig 2, with four large pools located in the middle of the Colonet peninsula. These pools are unique in Mexico, and probably in the CFP south of Santa Rosa Plateau (Riverside County, California), by virtue their depth and size. Even though they are heavily impacted by agriculture and grazing, these pools still maintain a number of vernal pool species, including the locally endemic Centromadia perennis. These pools support the only known extant population of Orcuttia californica in Baja California. Other notable vegetation areas are the active dunes and lagoon system around San Antonio del Mar, and the large stabilized dune on the southwest side of the mesa.

The number of taxa documented for the region is large—435 in total, 383 native—but perhaps not surprising. Two comparable floras have been reported from the CFP of Baja California. One is that of Punta Banda near Ensenada (Mulroy et al. 1979), with 258 taxa—208 native—observed in a much smaller area of study. The other is for Greater San Quintin, 60 km south of our study area, with 429 taxa, of which 351 are native (Vanderplank 2010). The area of Greater San Quintin is less than 50% of the area studied here, and the degree of disturbance and urbanization is much higher. Collecting
Fig. 2. Vegetation map of Colonet Mesa. Vegetation areas were determined from aerial photographs of the region taken in 2004 and verified and updated by field observations in 2008. The large vernal pools and the extensive areas of maritime chaparral are apparent.
efforts for both these studies were more intense than for the results presented here. We feel sure that continued collection will reveal many more species in the vascular flora of the Colonet region.

This paper points out some of the possible impacts that development could have on the flora of the Colonet region. The two sub-areas of highest floristic biodiversity are the Buffer, followed by the Mesa, although the Mesa with its vernal pools has a larger number of CNPS inventory 1B plants and harbors all five of the local endemic taxa. Colony is at the center of an area of “high species richness and endemism,” which has also been identified by gap analysis as important for vascular plant conservation in the Baja California peninsula (Riemann and Ezcurra 2005, 2007). Given the high floral diversity found, and the large number of endemics and threatened taxa in this limited area, we recommend that Colonet Mesa (Punta Colonet) be declared a protected area.

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LITERATURE CITED


**PRELIMINARY FLORA OF COLONET**

Notes and symbols: * = non-native; vernal pool = vernal pool specialist; local endemic = known only within ca. 50 km from Colonet Mesa; peninsular endemic = known only from Baja California and Baja California Sur; near-state endemic = known only from Baja California and limited range in Southern California; A/P = NOM 059 Amenizada (threatened)/Protegida (protected); FC/FT/FE = U.S. Candidate/Threatened/Endangered; CaR/CaT/CaE = California Rare/Threatened/Endangered.

**LYCOPHYTES [= LYCOPODS]**

SELAGINELLACEAE


**LEPTOSPORANGIATE FERNS**

MARSILEACEAE

**MARSILEA VESTITA** Hook. & Grev. Vernal pool. Mesa: 80 m, 4 May 1980, Moran 28429 (SD).

POLYPODIACEAE

**POLYPODIUM CALIFORNICUM** Kaulf. Buffer: 100 m, 25 Mar 1979, Moran 26822 (SD).

PTERIDACEAE

**ADIANIUM JORDANII** C.H.Mull. Buffer: 50 m, 23 Apr 1972, Moran 19091 (SD).

**ASPIDOIDS CALIFORNICA** (Hook.) Nutt. ex Copel. Buffer: 1 Jan 1925, Jones s.n. (SD).

NOTHOLAENA CALIFORNICA D.C.Eaton. Buffer: 17 Apr 1886, Orcutt 1461 (SD).
PHELLEA ANDROMEDIFOLIA (Kaufl.) Fée. Buffer: 100 m, 25 Mar 1979, Moran 26823 (SD).
PENTAGRAMMA TRIANGULARIS (Kaufl.) Yatsk., Windham & E.Wollenw. subsp. maxonit (Weath.) Yatsk., Windham & E.Wollenw. Buffer: 50 m, 4 Mar 1979, Moran 26586 (SD).
CONIFERS
CUPRESSACEAE
CALLITROPSIS FORBESII (Jeps.) D.P.Little. Near-state endemic; Pr; CNPS list 1B.1. Synonyms: Cupressus forbesii, Cupressus guadalupensis subsp. forbesii. Buffer: 30 m, 15 Jun 1976, Moran 22359 (SD).
ANGIOSPERMS: MAGNOLIIDS—PIPERALES
SAURURACEAE
ANGIOSPERMS: MONOCOTS
AGAVACEAE
ALLIACEAE
ALLIUM PRAECOX Brandegee. Mesa & Buffer: 80 m, 25 Mar 1979, Moran 26811 (SD).
CYPERACEAE
CAREX TRICURTA Boott. Buffer: 225 m, 12 May 1978, Moran 25999 (UCR).
CYPERUS LAVIGATUS L. Buffer: 50 m, 21 Sep 1983, Thorne 57354 (SD).
ELEOCHARDIS ACICULARIS (L.) Roem. & Schult. Vernal pool. Mesa: 75 m, 4 May 1980, Moran 28447 (SD).
ELEOCHARDIS MACROSTACHYA Britton. Vernal pool. Mesa & Buffer: 25 m, 3 Jun 1979, Moran 27563 (SD).
ELEOCHARDIS PARISHI Britton. Buffer: 50 m, 21 Sep 1983, Thorne 57360 (SD).
SCHONOPOLECTUS ACUTUS (Muhl. ex Bigelow) Á.Löve & D.Löve var. OCCIDENTALIS (S.Watson) S.G.Sm. Synonym: Scirpus acutus var. occidentalis. Buffer: 50 m, 21 Sep 1983, Thorne 57358 (SD).
HYACINTHACEAE
JUNCACEAE
JUNCUS ACUTUS L. subsp. LEOPOLDI (Parl.) Snogerup. CNPS list 4.2. Buffer: 50 m, 21 Sep 1983, Thorne 57362 (SD).
JUNCUS BUFONEUS L. Mesa: 50–70 m, 1 Apr 1985, Thorne 58827 (RSA).
JUNCUS DUBUS Engelm. Buffer: 30 m, 15 Jun 1976, Moran 23554 (SD).
JUNCUS PATENS E.Mey. Buffer: 100 m, 6 May 1979, Moran 27180 (SD).
JUNCAGINACEAE
LILIACEAE
CALOCHORTUS SPLENDENS Douglas ex Benth. Mesa: 80 m, 4 May 1980, Moran 28435 (SD).
MELANTHACEAE
ORCHIDACEAE
POACEAE
ACHINATHERUM DIEGOENSE (Swallen) Barkworth. CNPS list 4.2. Buffer: 4 May 1939, Gander 7363 (SD).
*BROMUS HORDEACEUS L. Buffer: 225 m, 12 May 1978, Moran 25898 (SD).
DECHAMPSIA DANTHONIOIDES (Trin.) Munro. Vernal pool. Mesa: 80 m, 1 Apr 1985, Thorne 58861 (RSA).
*ERAGROSIS CILIARIS (Bellardi) Vignolo ex Janch. Buffer: 75 m, 10 May 1978, Moran 25844 (SD).
*GASTRIUM PHLEOIDES (Nees & Meyen) C.E.Hubb. Synonyms: Gastridi um ventricosum; Gastridi um ventricosum subsp. phleoides. Buffer: 80 m, 10 May 1979, Moran 25811 (SD).
LEYMIS CONDENSATUS (J.Presl) A.Löve. Synonym: Elymus condensatus. Buffer: 35 m, 10 Jun 1979, Moran 27622 (SD).
LEYMIS TRITICEOIDES (Buckley) Pilg. Synonym: Elymus triticoides. Mesa & Buffer: 40 m, 3 Jun 1979, Moran 27571 (SD).
Trin. Buffer: 10 m, 4 Mar 1979, Moran 26602 (SD).

Muhlenbergia microsperma (DC.) Kunth. Buffer: 107 m, 15 Feb 1988, Sanders 7672 (SD).

Muhlenbergia rigens (Benth.) Hitchc. Buffer: 80 m, 12 Oct 1977, Moran 25084 (SD).


Orcuttia californica Vasey. Vernal pool; CNPS list 1B.1; FE; CaE.

Panicum capillare L. Buffer: 50 m, 21 Sep 1983, Thorne 57361 (BCMEX).


*Phalaris paradoxa* L. Mesa: 80 m, 4 May 1980, Moran 28444 (SD).

Poligonum secunda J.Presl. Footprint: 40 m, 25 Mar 1979, Moran 26833 (SD).

*Poxygonomonspelennsis* (L.) Desf. Mesa: 10-30 m, 5 Jun 1988, Boyd 2283 (RSA).

*Sesuvium barbatum* (L.) Thell. Buffer: 5 m, 4 Mar 1979, Moran 26580 (SD).

*Sorghum bicolor* (L.) Moench. Footprint: 70 m, 12 Aug 1977, Moran 24508 (SD).


*Vulpia myuros* (L.) C.C.Gmel. var. hirsuta Hack. Buffer: 80 m, 10 May 1978, Moran 25812 (SD).

*Vulpia myuros* (L.) C.C.Gmel. var. myuros. Buffer: 80 m, 25 Mar 1979, Moran 26803 (SD).

Vulpia octoflora (Walter) Rydb. var. hirtella (Piper) Henard. Buffer: 180 m, 5 Apr 1958, Raven 12216 (CAS).


**Potamogetonaceae**


Rupertia maritima L. Buffer: 50 m, 25 Apr 1984, Thorne 58133 (RSA).

**TYPHACEAE**


**ZANNICHELLIACEAE**

Zannichellia palustris L. Buffer: 50 m, 25 Apr 1984, Thorne 58136 (SD).

**ANGIOSPERMS: EUDICOTS**

**ADIXACEAE**

Sambucus nigra L. subsp. caerulea (Raf.) Bolli. Synonym: Sambucus nigra subsp. canadensis; *S. mexicana*. Buffer: 35 m, 10 Jun 1979, Moran 27631 (SD).

**AZOACEAE**

*Carpobrotus chilensis* (Molina) N.E.Br. Mesa & Buffer: 5 m, 1 Jun 1980, Moran 26854 (SD).


*Mesembryanthemum nodiflorum* L. Mesa: 5 m, 16 Jul 1967, Moran 14062 (SD).

**AMARANTHACEAE**


Arthrocemenium subterminale (Parish) Standl. Synonym: Salsicornia subterminalis. All areas: 5 m, 1 Jun 1980, Moran 28658 (SD).

*Atriplex californica* Moq. Buffer: 60 m, 4 Apr 1982, Moran 30236 (SD).


*Atriplex lindeyi* Moq. Footprint: 80 m, 5 Sep 1978, Moran 26284 (SD).

*Atriplex pacifica* A.Nelson. CNPS list 1B.2. Mesa: 30 m, 5 Jun 1984, Dice 456 (SD).

*Atriplex rosea* L. Buffer: 70 m, 5 Sep 1978, Moran 26264 (SD).

*Atriplex semibaccata* R.Br. Buffer: 70 m, 5 Sep 1978, Moran 26279 (SD).

*Atriplex serinana* A.Nelson ex Abrams. Buffer: 70 m, 5 Sep 1978, Moran 26268 (SD).

*Atriplex subrecta* I.Verdc. Footprint: 80 m, 5 Sep 1978, Moran 26283 (SD).

*Atriplex watsonii* A.Nelson. Footprint & Mesa: 5 m, 1 Jun 1980, Moran 26850 (SD).


*Beta vulgaris* L. Mesa: 80 m, 1 Apr 1985, Thorne 58889 (RSA).


*Salsola tragus* L. Buffer: 70 m, 5 Sep 1978, Moran 26260 (SD).


*Suaeda nigra* (Raf.) J.F.Macbr. Buffer: 70 m, 5 Sep 1978, Moran 26263 (SD).

*Suaeda taxifolia* (Standl.) Standl. CNPS list 4.2. Synonyms: Suaeda californica var. taxifolia; Suaeda californica var. pubescens; Suaeda pubescens. Footprint & Buffer: 3 Mar 1979, Moran 26557 (SD).

**ANCARHIDACEAE**


**APIACEAE**

*Apastrum angustifolium* Nutt. Mesa & Buffer: 225 m, 12 May 1978, Moran 25995 (SD).

*Apium graveolens* L. Buffer: 70 m, 5 Sep 1978, Moran 26276 (SD).

*Bowlesia incana* Ruiz & Pav. Buffer: 60 m, 4 Apr 1982, Moran 30220 (SD).

*Daucus pusillus* Michx. Buffer: 80 m, 10 May 1978, Moran 25817 (SD).
ERYNGIUM ARISTATUM var. parishii (J.M.Coult. & Rose) Mathias & Constance. Vernal pool; CNPS list 1A.1; FE, CaE. Footprint & Mesa: 80 m, 4 May 1980, Moran 28431 (SD).

YASEA MICROCARPA (Hook. & Arn.) Kosopol. Buffer: 60 m, 4 Apr 1982, Moran 30212 (SD).

**APOCYNACEAE**

ASCLEPIAS SUBULATA Decene. Buffer: 150 m, 31 May 1977, Moran 24216 (SD).

**ASTERACEAE**


AMBROSIA CHAMISOIDES (Less.) Greene. Mesa & Buffer: 5 m, 1 Jun 1980, Moran 28652 (SD).

AMBROSIA CHERNOPODISIFOLIA (Benth.) W.W.Payne. CNPS list 2.1. All areas: 24 Apr 1993, Howe 523 (SD).

AMBROSIA CONFERTIFLORA DC. Buffer: 35 m, 10 Jun 1979, Moran 27630 (SD).

AMBROSIA PUMILA (Nutt.) A.Gray. Near-state endemic; CNPS list 1B.1; FE. Mesa: 80 m, 9 Jun 1979, Moran 27615 (SD).

ARTEMISIA CALIFORNICA Less. Mesa: 100 m, 29 May 1965, Moran 12146 (SD).

ARTEMISIA DRACUNCULUS L. Buffer: 80 m, 12 Oct 1977, Moran 25089 (SD).

ARTEMISIA TRIDENTATA Nutt. Buffer: 70 m, 5 Sep 1978, Moran 26274 (SD).


BACCARIS SAROTHROIDES A.Gray. Mesa & Buffer: 80 m, 12 Oct 1977, Moran 25088 (SD).


*CENTAUREA MELITENIS* L. Footprint & Mesa: 15–30 m, 5 Jun 1988, Boyd 2394 (RSA).


CHENACTS ARTEMISIFOLIA (Harv. & A.Gray) A.Gray. Buffer: 175 m, 21 Apr 1973, Moran 20596 (SD).

CHENACTS GLABRIUSCULA DC. var. glabriuscula. Mesa: 15 Apr 1925, Jones s.n. (POM).

CONYZA CANADENSIS (L.) Cronquist. Buffer: 70 m, 5 Sep 1978, Moran 26270 (SD).


COREOPSIS MARITIMA (Nutt.) Hook. & Arn. Footprint list 2.2. Synonym: Leptosyne maritima. Mesa & Buffer: 60 m, 4 Apr 1982, Moran 30231 (SD).

*COTULA CORONOPHIOLELA* L. 7 Apr 1944, Rebman 2513 (SD).


ENCelia CALIFORNICA Nutt. All areas: 200 m, 20 Mar 2003, Vinton s.n. (SD).


GNAPEHIALUM PALUSTRE Nutt. All areas: 80 m, 3 Jun 1979, Moran 27596 (SD).


HAWARDIA FERRISAE (S.F.Blake) W.D.Clark. Local endemic. Synonym: Haplopappus ferrisae. All areas: 40 m, 6 Mar 1982, Bannul 822 (HNT).

HAWARDIA FERRISAE × BERBERIDIS. Buffer: 50 m, 16 Jul 1967, Moran 14070 (SD).

HAWARDIA ORCUTTII (A.Gray) Greene. Near-state endemic; CNPS list 1B.1; FE; CaT. Footprint & Buffer: 19 Jun 1895, Thorne 60770 (RSA).

HAWARDIA ORCUTTII × FERRISAE. Buffer: 50 m, 16 Jul 1967, Moran 14067 (SD).


HAWARDIA VERNOSA (Brandeegee) W.D.Clark. Peninsula endemic. Buffer: 150 m, 22 Jul 1968, Moran 15545 (SD).


HELLANTHUS NIVEUS (Benth.) Brandeegee s.n. Mesa: 5 m, 3 Jun 1979, Moran 27587 (SD).

HETEROTHECA GRANDIFLORA Nutt. Footprint & Buffer: 70 m, 12 Aug 1977, Moran 24507 (SD).

*HYPochaeris GLABRA L. Mesa: 7 Apr 1944, Rebman 2510 (RSA).


IVA HAYESIANA A.Gray. CNPS list 2.2. All areas: 21 Jun 2008, Vanderplank CO25 (RSA).


LATHESIA CORONARIA (Nutt.) Ornduff. Mesa & Buffer: 60 m, 4 Apr 1982, Moran 30219 (SD).


MALACOTHERIX SIMILIS W.S.Devis & P.H.Raven. Near-state endemic; CNPS list 1A. Buffer: 225 m, 12 May 1978, Moran 26062 (SD).


PHLECHAEA SIRECEA (Nutt.) Coville. All areas: 15 m, 12 Aug 1977, Moran 24504 (SD).
Porophyllum gracile Bentham. Buffer: 4 May 1939, Gander 7362 (SD).


Pseudognaphalium stramineum (Kunth) Synonyms: Gnaphalium stramineum; Gnaphalium chilense. Mesa: 80 m, 3 Jun 1979, Moran 27598 (SD).

Psilocarpus brevissimus Nutt. Vernal pool. Footprint & Mesa: 50–70 m, 1 Apr 1985, Thorne 58823 (RSA).

Psilocarpius tenellus Nutt. Vernal pool. All areas: 80 m, 1 Apr 1985, Thorne 58870 (RSA).

Rafinesquia californica Nutt. Buffer: 60 m, 4 Apr 1982, Moran 30229 (SD).


Senecio lyoni A.Gray. Buffer: 5 m, 4 Mar 1979, Moran 26561 (SD).


Stephanomeria pauciflora (Torr.) A.Nelson. Buffer: 10 m, 4 Mar 1979, Moran 26592 (SD).

Stylocline gnaphalioides Nutt. Buffer: 60 m, 4 Apr 1982, Moran 30244 (SD).


Verbena disatis A.Gray. CNPS list 1B.1; FT; CaT. Buffer: 35 m, 10 Jun 1979, Moran 27627 (SD).


Xanthium strumarium L. Mesa & Buffer: 25 m, 3 Jun 1979, Moran 27564 (SD).

BERBERIDACEAE


BRASSICACEAE

Brassica napus L. Buffer: 140 m, 3 Apr 1982, Moran 30205 (SD).


Capsella bursa-pastoris (L.) Medik. Mesa & Buffer: 60 m, 4 Apr 1982, Moran 30225 (SD).

Cardamine californica (Nutt.) Greene var. integrifolia (Nutt.) Rollins. Synonym: Dentaria californica var. integrifolia. Buffer: 30 m, 21 Mar 1982, Moran 30054 (SD).


Guillenia lasiophylla (Hook. & Arn.) Greene. Buffer: 60 m, 4 Apr 1982, Moran 30225 (SD).


Hutchinsia procumbens (L.) Desv. Buffer: 75 m, 10 May 1978, Moran 25842 (SD).

Lepidium lasiocarpum Nutt. var. lasiocarpum. Mesa: 80 m, 3 Jun 1979, Moran 27597 (SD).

Lepidium lasiocarpum Nutt. var. latifolium C.L.Hitchc. Buffer: 5 m, 4 Mar 1979, Moran 26562 (SD).

Lepidium nitidum Nutt. Mesa & Buffer: 80 m, 1 Apr 1985, Thorne 58878 (RSA).

Lepidium virginicum L. var. purpureum (Greene) Thell. Buffer: 75 m, 10 May 1978, Moran 25841 (SD).

*Sisymbrium orientale* L. Footprint & Buffer: 350 m, 15 Feb 1988, Sanders 7664 (SD).

Tropidocarpum gracile Hook. Buffer: 60 m, 4 Apr 1982, Moran 30223 (SD).

CARYOPHYLLACEAE

Caryophylla maritima Rydb. var. maritima. Mesa: 80 m, 1 Apr 1985, Moran 20284 (SD).

Corydalis linearis (Ruiz & Pav.) DC. subsp. ferruginea (I.M.Johnst.) Thorne. Mesa & Buffer: 150 m, 4 Apr 1982, Moran 30249 (SD).


Plagiobothrys acanthocarpus (Piper) I.M.Johnst. Vernal pool. Mesa: 50–70 m, 1 Apr 1985, Moran 58825 (RSA).

Plagiobothrys bracteatus (Howell) I.M.Johnst. Vernal pool. Mesa: 50–70 m, 1 Apr 1985, Thorne 58824 (RSA).

Plagiobothrys collinus (Phil.) I.M.Johnst. var. gracilis (I.M.Johnst.) Higgins. Buffer: 60 m, 4 Apr 1982, Moran 30238 (SD).

Plagiobothrys leptoedus (Greene) I.M.Johnst. Vernal pool. Mesa: 75 m, 24 May 1980, Moran 28635 (SD).

Lepidium lasiocarpum var. lasiocarpum. Mesa: 80 m, 3 Jun 1979, Moran 27597 (SD).

Lepidium lasiocarpum var. latifolium C.L.Hitchc. Buffer: 5 m, 4 Mar 1979, Moran 26562 (SD).

Lepidium nitidum Nutt. Mesa & Buffer: 80 m, 1 Apr 1985, Thorne 58878 (RSA).

Lepidium virginicum L. var. purpureum (Greene) Thell. Buffer: 75 m, 10 May 1978, Moran 25841 (SD).

*Sisymbrium orientale* L. Footprint & Buffer: 350 m, 15 Feb 1988, Sanders 7664 (SD).

Tropidocarpum gracile Hook. Buffer: 60 m, 4 Apr 1982, Moran 30223 (SD).

CACTACEAE


Echinocereus maritimus (M.E.Jones) K.Schum. var. maritimus. Peninsula endemic. Mesa & Buffer: 80 m, 1 Apr 1985, Thorne 58851 (RSA).

Ferocactus virensensis (Torr. & A.Gray) Britton & Rose var. virensensis. Near-state endemic; A; CNPS list 2.1. Mesa: 60 m, 24 May 1980, Moran 28636 (SD).


*Opuntia ficus-indica* (L.) Mill. Buffer: 120 m, 10 Jun 1998, Rehman 5355 (SD).
Opuntia littoralis (Engelm.) Cockerell. Mesa & Buffer: 150 m, 4 Jun 1998, Rehman 5527 (SD).
Opuntia oricola Philbrick. Buffer: 120 m, 10 Jun 1998, Rehman 5536 (SD).


CAMPANULACEAE

Triodanis biflora (Ruiz & Pav.) Greene. Buffer: 60 m, 4 Apr 1982, Moran 30202 (SD).

CAPRACEAE

Peritoma arborea (Nutt.) H.H.Illis var. angustata (Parish) H.H.Illis. Synonyms: Isomeris arborea subsp. angustata; Cleome isomeris. Mesa: 3 May 1939, Gander 7346 (SD).

CARYOPHYLLACEAE

Polycarporn depressum Nutt. Buffer: 10 m, 4 Mar 1979, Moran 26599 (SD).

Silene antirrhina L. Buffer: 60 m, 4 Apr 1982, Moran 30242 (SD).
*Silene gallica* L. Mesa & Buffer: 80 m, 10 May 1978, Moran 25814 (SD).
Silene laciniana Cav. subsp. laciniana. Buffer: 35 m, 10 Jun 1979, Moran 27620 (SD).

Spergularia macrotheca (Hornem. ex Cham. & Schlldl.) Heynh. var. macrotheca. Mesa & Buffer: 60 m, 4 Apr 1982, Moran 50232 (SD).
*Spergularia platensis* (Cambess.) Fenzl var. platensis. Mesa: 80 m, 24 May 1980, Moran 28653 (SD).


CISTACEAE


CONVOLVULACEAE

Calystegia macrostegia (Greene) Brummitt subsp. tenuifolia (Abrams) Brummitt. Buffer: 35 m, 10 Jun 1979, Moran 27623 (SD).
Cuscuta californica Hook. & Ath. var. californica. Footprint: 75 m, 29 May 1976, Moran 23289 (SD).
Dichondra occidentalis House. CNPS list 4.2. Mesa & Buffer: 80 m, 31 May 1980, Moran 26846 (SD).

CRASSULACEAE

Crassula aquatica (L.) Schönland. Vernal pool. Mesa: 80 m, 1 Apr 1985, Thorne 58883 (RSA).
Dudleya cultrata Rose. Peninsula endemic. Mesa: 100 m, 9 Jun 1985, Faulkner s.n. (SD).
Dudleya engens Rose. Peninsula endemic. All areas: 5 m, 6 May 1979, Moran 27173 (SD).

CUCURBITACEAE


ELATINACEAE

Bergia texana (Hook.) Seub. ex Walp. Vernal pool. Mesa: 80 m, 12 Aug 1979, Moran 27989 (SD).
Elatine brachysperma A.Gray. Vernal pool. Mesa: 80 m, 1 Apr 1985, Thorne 58882 (RSA).

ERICACEAE

Xylococcus bicolor Nutt. Mesa & Buffer: 50 m, 10 Jun 1979, Moran 27636 (SD).

EUPHORBIAEACE

Chamaesyce polycarpa (Benth.) Millsp. Footprint & Buffer: 75 m, 29 May 1976, Moran 23290 (SD).
Euphorbia miserx Benth. CNPS list 2.2. All areas: 19 Mar 1992, Rehman 1333 (RSA).
Euphorbia spathulata Lam. Buffer: 110 m, 25 Mar 1979, Moran 26825 (SD).

FABACEAE

*Acacia farnesiana* (L.) Wild. Synonyms: *Acacia farnesiana* subsp. minuta; *Acacia minuta*. Buffer: 60 m, 1 Jul 1972, Moran 19167 (SD).
Astragalus didymocarpus Hook. & Arn. var. didymocarpus. Footprint: 50 m, 10 May 1978, Moran 25850 (RSA).

Astragalus gambelianus E.Sheld. Mesa: 80 m, 1 Apr 1985, Thorne 58876 (RSA).


Dalea bicolor Humb. & Bonpl. ex Willd. var. occidentana Barneby. Peninsula endemic. Buffer: 90 m, 1 Jun 1980, Moran 20663 (SD).


Lupinus concinnus L. Agardh. Synonyms: Lupinus pallidus; Lupinus concinnus var. pallidus. Mesa: 5 m, 1 Jun 1980, Moran 26648 (SD).

Lupinus hispidissimus Benth. Buffer: 185 m, 30 Mar 1985, Sanders 5610 (UCR).

Lupinus sparsiflorus Benth. Buffer: 185 m, 30 Mar 1985, Sanders 5605 (UCR).


Lupinus truncatus Nutt. ex Hook. & Arn. All areas: 350 m, 15 Feb 1988, Sanders 7663 (SD).

*Medicago polymorpha* L. Buffer: 5 m, 4 Mar 1979, Moran 26574 (SD).


*Mellilotus indicus* (L.) All. Buffer: 80 m, 10 May 1978, Moran 25815 (RSA).

Parkinsonia aculeata L. Buffer: 17 Dec 1953, Harbison s.n. (SD).

Trifolium amplexctens Torr. & A.Gray. Synonyms: Trifolium depauperatum var. amplexctens. Mesa: 80 m, 1 Apr 1985, Thorne 58813 (RSA).

*Trifolium gracilentum* Torr. & A.Gray. Buffer: 80 m, 10 May 1978, Moran 25828 (SD).

*Vicia hasei* S.Watson. Mesa & Buffer: 60 m, 4 Apr 1982, Moran 30221 (SD).

*Vicia ludoviciana* Nutt. ex Torr. & A.Gray. Buffer: 120 m, 6 May 1979, Moran 27184 (SD).

Fagaceae

*Quercus dumosa* Nutt. CNPS list 1B.1. Mesa: 150 m, 16 Jun 1967, Moran 14051 (SD).

Frankeniaceae


Frankenia salina (Molina) L.M.Johnst. Synonyms: Frankenia grandifolia; Frankenia grandifolia var. campestris. All areas: 5 m, 1 Jun 1980, Moran 28660 (SD).

Gentianaceae


Geraniaceae


Grosulariaceae

*Ribes speciosum* Pursh. Buffer: 60 m, 4 Apr 1982, Moran 30210 (SD).


*Ribes viburnifolium* A.Gray. CNPS list 1B.2. Footprint & Buffer: 40 m, 25 Mar 1979, Moran 26829 (SD).

Heliotropaceae


Hydrophyllaceae

*Emmenanthe penduliflora* Benth. var. penduliflora. Buffer: 175 m, 21 Apr 1973, Moran 20595 (SD).

Eriodictyon sessilifolium Greene. Peninsula endemic. Buffer: 100 m, 14 May 1960, Moran 8263 (SD).

Eucrypta chrysanthemifolia (Benth.) Greene var. chrysanthemifolia. Buffer: 225 m, 12 May 1978, Moran 25592 (SD).

Nama stenocarpum A.Gray. CNPS list 2.2. Mesa: 80 m, 19 Jun 1985, Thorne 60786 (RSA).


Phacelia distans Benth. Mesa & Buffer: 5 m, 6 May 1979, Moran 27174 (RSA).


Prolistoma auritum (Lindl.) Lilja ex Lindbl. Buffer: 110 m, 25 Mar 1979, Moran 26824 (SD).

Prolistoma racemosum (Nutt. ex A.Gray) Constance. Buffer: 60 m, 4 Apr 1982, Moran 30222 (SD).

Lamiaceae

*Acanthominthia ilicifolia* A.Gray. CNPS list 1B.1; FT; CaE. Buffer: 100 m, 18 May 1979, Moran 21979 (SD).

Mentha × piperita L. Synonym: Mentha citrata. Footprint: 25 m, 1972, Forsberg 17 (SD).


Salvia brandegeei × munzii. Buffer: 25 m, 4 Mar 1979, Moran 26596 (SD).

Salvia clevelandii (A.Gray) Greene. Buffer: 30 m, 15 Jun 1976, Moran 23542 (SD).

Salvia columbariae Benth. Buffer: 175 m, 21 Apr 1973, Moran 20598 (SD).

Salvia munzii Epling. CNPS list 2.2. All areas: 21 Jun 2008, Vanderplank C07 (RSA).


Lennoaceae


Lythraceae

*Lythrum hyssopifolium* L. Mesa: 80 m, 1 Apr 1985, Thorne 58879 (RSA).
MALVACEAE
Fremontodendron mexicanum Davidson. Near-state endemic; CNPS list 1B.1; FE; CaR. Buffer: 5 Apr 1931, Wiggins 5184 (POM).
Sphaeralcea fulva Greene. Peninsula endemic. Footprint & Mesa: 5 m, 1 Jun 1980, Moran 28657 (RSA).
MYRTACEAE
NYCTAGINACEAE
Abronia maritima S.Watson var. maritima. CNPS list 4.2. Mesa: 5 m, 3 Jun 1979, Moran 27598 (SD).
Abronia umbellata Lam. var. umbellata. Mesa: 27 Jul 1955, Chambers 703 (SD).
OLEACEAE
ONAGRACEAE
Camissonia lewissii P.H.Raven. CNPS list 3. All areas: 1 m, 27 Mar 1988, Pitzer 720 (SD).
Ephedra canum (Greene) P.H.Raven. Buffer: 30 m, 15 Jun 1976, Moran 23553 (SD).
Orobanchaceae
Castilleja exserta (A.Heller) T.L.Chuang & Heckard subsp. exserta. Buffer: 60 m, 4 Apr 1982, Moran 30246 (SD).
Corydantianthus maritimus Benth. subsp. maritimus. CNPS list 1B.2; FE; CaE. Footprint: 4 Jun 1973, Johnston IV24 (SD).
Corydantianthus orcuttianus A.Gray. CNPS list 2.1. All areas: 21 Jun 2008, Vanderplank C9 (RSA).
Orobanchecalifornia Cham. & Schldlf. Buffer: 70 m, 5 Sep 1978, Moran 26253 (SD).
Orobanche parisi (Jeps.) Heckard subsp. brachyloba Heckard. CNPS list 4.2. Buffer: 50 m, 5 May 1979, Moran 27165 (SD).
Oxalidaceae
PAPAVERACEAE
Stylomecon heterophylla (Benth.) G.Taylor. Synonyms: Meconopsis heterophylla, Papaver heterophyllum. Buffer: 60 m, 4 Apr 1982, Moran 30227 (SD).
PHYMACEAE
Mimulus aubriancus Curtis var. puncicus (Nutt.) D.M.Thomps. Synonym: Mimulus puncicus. Buffer: 35 m, 10 Jun 1979, Moran 27628 (SD).
Mimulus brevipes Benth. Buffer: 225 m, 12 May 1978, Moran 26005 (SD).
Mimulus pilius (Benth.) S.Watson. Footprint & Mesa: 25 m, 3 Jun 1979, Moran 27560 (SD).
PLANTAGINACEAE
Linaria canadensis (L.) Chaix Footprint & Mesa: 100 m, 6 Apr 1991, Boyd 6020 (RSA).
Plantago ovata Forsk. Buffer: 5 m, 4 Mar 1979, Moran 26563 (SD).
PLUMBAGINACEAE
Limonium californicum (Boiss.) A.Heller. Buffer: 50 m, 25 Apr 1984, Thorne 58132 (RSA).

Solanaceae

Nicotiana attenuata Steud. Buffer: 70 m, 5 Sep 1978, Moran 26257 (SD).


Urticaceae

Hesperocnide tenella Torr. Buffer: 60 m, 4 Apr 1982, Moran 30214 (SD).

Verbenaceae

Verbena menthifolia Benth. Mesa & Buffer: 50–70 m, 1 Apr 1985, Thorne 58841 (RSA).

Viscaceae