FLOWERING PLANTS OF NATIVIDAD ISLAND, BAJA CALIFORNIA, MEXICO

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ABSTRACT

Natividad Island, situated 7 km off Punta Eugenia, Baja California, Mexico has an area of 7.2 km^2. Maritime desert scrub vegetation, dominated by drought-resistant shrubs and cacti, covers most of the island. Spectacular displays of native annuals, like *Chaenactis lacera* and *Coreocarpus involutus*, can be seen in years with adequate rainfall. Disturbed areas on the south end of the island are periodically dominated by nonnative plant taxa like *Chenopodium murale*, *Malva parviflora*, and *Mesembryanthemum crystallinum*. A total of 77 native and naturalized vascular plant taxa have now been documented for the island, representing 31 families and 63 genera. The five largest plant families represented in the island's flora are Asteraceae, Brassicaceae, Cactaceae, Chenopodiaceae, and Fabaceae. Five plant taxa endemic to the California Islands have been found there, although one has presumably been introduced. At least one additional taxon known from the island (an *Astragalus*) may be a California Island endemic, but needs further study. Although the island is included in Mexico's Vizcaíno Biosphere Reserve, activities associated with a small town (e.g., off-road motor vehicle use and recent introductions of goats and sheep) represent serious threats to the terrestrial ecosystem. Significant terrestrial resources that need protection include nesting colonies of black-vented shearwaters and populations of endemic land snails and deer mice.

Keywords: Natividad Island, Isla Natívidad, California Islands, Baja California, Mexico, endemic plants, flora, vegetation, botanical exploration, feral animals.

INTRODUCTION

Natividad Island, a natural area that is part of Mexico's Vizcaíno Biosphere Reserve, is known for its rugged coastline, dramatic landscapes, nesting seabird populations, and endemic plants and animals. For at least 100 years, the biota on this island has been subjected to damage caused by feral animals, including cats, goats, and sheep. Sensitive terrestrial resources of Natividad Island include breeding populations of Brandt's and double-crested cormorants, brown pelicans, osprey, peregrine falcons, western gulls, and over 90% of the world population of black-vented shearwaters (Donlan et al. 1999, this volume). There is also an endemic subspecies of deer mouse (Huey 1964) and a land snail that is endemic to Natividad and Cedros islands (Smith et al. 1990). Human visitation and activity has increased dramatically during the last decade, raising the demand for information about the island's flora and the potential for nonnative plant introductions. We hope to promote further scientific investigations on this picturesque island by providing here 1) an introduction to its geography and vegetation, 2) a short history of botanical exploration, 3) a description of historical changes in the vegetation and flora, and 4) an annotated checklist of the flowering plants.

PHYSICAL ENVIRONMENT

Eight islands lie off the west coast of Baja California between the United States/Mexico border and Punta Eugenia, which is located about 575 km (357 mi) south of the international border. Ranging in size from 0.4 to 348 km^2 (0.2 to 134 mi^2), seven of the islands are on the continental shelf, and six of them lie within 23 km (14 mi) of the coastline. Situated near the edge of the continental shelf, the San Benito Islands are 66 km (41 mi) from the nearest point on the mainland but only 27 km (17 mi) from neighboring Cedros Island. Guadalupe is an oceanic island situated 252 km (157 mi) off the Baja California coast.

Natividad Island, with its center near latitude 27^o 53' N and longitude 115^o 11' W, is located about 556 km (345 mi) south of the border between the United States and Mexico. Situated between Cedros Island and the tip of Punta Eugenia, it is about 7 km (5 mi) from the adjacent mainland. The island's axis is oriented in a northwest-southeast direction (see Figure 1). It has a total area of 7.2 km^2 (2.8 mi^2) and is about 6.0 km (3.75 mi) long. Its width varies from about 0.8 km (0.5 mi) at its northwestern end to about 2.4 km (1.5 mi) near the southeastern end (Nelson 1921). A central spine with several rounded peaks reaches a maximum elevation of 149 m (490 ft). Several canyons are present, especially on the east side of the central ridge. Although the coastline is mostly rocky, there are sandy beaches on both sides of the island near its southeastern end.

Even though there are no natural sources of fresh water on the island, about 400 permanent residents live in a

Figure 1. Aerial view of Natividad Island, looking northwest along main axis (photo taken by S. Junak on 14 March 1995).

small town at the southern end of the island (Donlan et al. 1999, this volume). Most of the residents are fishermen who harvest abalone and lobster seasonally and belong to a cooperative (Buzos y Pescadores) based at Bahía Tortugas on the Vizcaíno peninsula. A desalination plant produces fresh water and generators supply electricity for the village. An unsurfaced airstrip is located just east of the village, where regular flights from Ensenada and Guerrero Negro provide rapid access by air. Small boats can land on a cobble beach at a small cove near the village. There are motorized vehicles on the island and a road system provides access to all but the northern reaches, including a lighthouse on the island's spine. A trail system provides access to the north end of the island. Natividad has become a popular destination for surfers from the United States. A southern California company offers fly-in trips to the island and accommodations in the village.

In recent years, human impacts on the island have increased dramatically. The majority of the island's roads were built in the early 1990s and off-road vehicle activity has damaged sensitive breeding populations of black-vented shearwaters and populations of native plants (S. Junak, pers. obs.).

Weather records are not available for Natividad Island, but the climate can be estimated from a station on neighboring Cedros Island and two stations on the adjacent mainland. Limited precipitation and temperature records, for 4 to 6 year spans, are available for Isla Cedros (latitude 28° 04' N, longitude 115° 14' W, elevation 500 m), Vizcaíno (27° 58' N, 114° 07' W, elevation n.a.), and Bahía Tortugas (27° 43' N, 114° 56' W, elevation 5 m) (Hastings 1964). All of these stations have an arid climate, with mean annual precipitation amounts ranging from 65.1 to 121.3 mm (2.6 to 4.8 in). About 95 to 96% of the precipitation at these three sites falls in the fall and winter, between the months of September and March. December, January, and February are usually the wettest months.

Rainfall on Natividad and on neighboring Cedros Island is generally very sporadic and long periods of drought are the norm. Between 1 January 1945 and 31 December 1947, personnel at the weather station on Cedros Island recorded precipitation on only 20 days (5 rainy days in 1945, 6 in 1946, and 9 in 1947) (Osorio Tafall 1948). Although the winter months are usually the wettest, no rain at all fell on Cedros Island between 6 June 1945 and 12 August 1946! Heavy rainstorms associated with tropical cyclones can drop significant amounts of moisture in the late summer or early fall. Such a storm dropped 36.5 mm (1.4 in) of rain on 28 September 1946 (Osorio Tafall 1948).

Mean annual temperatures at the three weather station sites listed above range from 19.0 to 20.6°C (66.2 to 69.1°F). Typically, the coolest months are January and February, with mean monthly temperatures at the three stations ranging from 15.3 to 17.6°C (59.5 to 63.7°F) for January and from 16.4 to 17.3°C (61.5 to 63.1°F) for February. August and September are typically the warmest months, with mean monthly temperatures ranging from 23.2 to 25.1°C (73.8 to 77.2°F) for August and from 22.8 to 25.5°C (73.0 to 77.9°F) for September.

HISTORY OF BOTANICAL EXPLORATION

Although botanists visited neighboring Cedros Island as early as 1859 (Nelson 1921) and the San Benito Islands in 1875 (Junak and Philbrick 1999, this volume), the first botanical collections on Natividad Island were not made until 1897. In the spring of that year, field biologist and ornithologist Alfred W. Anthony and a number of other scientists visited most of the islands off the west coast of Baja California on Anthony's schooner *Wahlberg* (Brandegee 1900; Moran 1952). Anthony and Townshend S. Brandegee of the University of California at Berkeley both collected plants on Natividad Island on 10 April 1897. Brandegee (1900) reported 36 native and three nonnative plant taxa for the island.

During the first quarter of the twentieth century, two expeditions sponsored by the California Academy of Sciences stopped at Natividad, but only a few botanical specimens have been preserved. The first of these trips was in the spring of 1903, when the Academy organized a journey aboard the schooner *Mary Sachs*. F. E. Barkelew reportedly collected botanical specimens, but they were apparently destroyed by the San Francisco fire in April 1906 (Nelson 1921).

The schooner *Academy* stopped at Natividad in mid-July 1905, while en route to the Galapagos Islands on another expedition sponsored by the California Academy of Sciences (Slevin 1931). The botanist on this voyage, Alban Stewart, collected a few specimens from the island on July 19th.

A 43-year lull in botanical collecting activities on Natividad was broken in 1948, when Reid Moran and George Lindsay collected a few specimens there on April 28th of that year (Moran and Lindsay 1949). Moran later became curator of botany at the San Diego Museum of Natural History. Lindsay became director of the San Diego Museum of Natural History and then the California Academy of Sciences (Mitich 1989). Moran returned to the island on 21 April 1963, while on an expedition aboard the yacht *Gringa.*

He landed there again on 24 June 1968, while on an expedition aboard the *Stella Polaris* sponsored by the Smithsonian Institution.

During the 1970s, '80s, and '90s, only a few trips were made to the island. Michael Benedict of the Santa Barbara Botanic Garden collected there on 7 March 1971. R. Mitchel Beauchamp of San Diego made collections there on 10 April 1971. Ralph Philbrick and Michael Benedict explored most of the island and collected plants on 23-25 March 1974. Philbrick returned to the island on 12-13 July 1983, accompanied by Marla Daily and Steve Junak. Daily and Junak collected there again on 31 March 1987, and Junak returned on 14-17 March 1995, during a very wet season.

In summary, we know of only 11 botanists who have collected specimens on Natividad Island, during 11 separate trips. Undoubtedly additional botanists, especially from Mexico, have also visited the island but we have not seen their collections. To our knowledge, the island has not been systematically surveyed and collections have only been made during the months of March (3 trips), April (5 trips), June (1 trip), and July (2 trips). Additional exploration is needed to completely document the flora.

HISTORICAL CHANGES IN THE VEGETATION AND FLORA

The island's vegetation has been disturbed by a century or more of human activities and by introduced animals. The first botanist to visit Natividad, T. S. Brandegee, noted the effects of introduced goats on succulent plants (especially *Dudleya*) and reported three nonnative plant taxa (*Chenopodium murale*, *Mesembryanthemum crystallinum*, and *Sonchus tenerrimus*). He described the situation on the island (Brandegee 1900):

> "There is no fresh water upon it, so that a resident band of goats must often satisfy their thirst by eating succulent plants, and have already nearly exterminated the Cotyledons [live-forever or *Dudleya*]. There are no trees, but a few small bushes of *Veatchia* [elephant tree or *Pachycormus*] are found and a dozen specimens of *Cereus pringlei* [cardon or *Pachycereus*], ten to fifteen feet high, are scattered about. The vegetation is scant and the general appearance of the island is barren. Most of the plants grow also upon Cedros, and these, with a few belonging to San Bartolome Bay, constitute its entire flora, for there is not an endemic species. The rainfall of the season had been even less than that of the southern end of Cedros, consequently the annuals were small and few in number, and the collection not as large as it would have been at a more favorable time."

Since subsequent visitors in the early 1900s (e.g., Thayer and Bangs 1907; Nelson 1921; Hanna 1925) did not mention goats in their accounts of the island, it is possible that the band of goats described by Brandegee did not persist. At least one of the nonnative plants reported by Brandegee was soon common on the island. Nelson (1921) commented that: "The ice plant (*Mesembryanthemum*) is the most abundant plant and carpets much of the island." Howell (1932) noted that there was a "Japanese abalone camp" at the south end of the island in August 1932 but did not go ashore to collect plants.

Additional nonnative plants were not reported for the island until the 1960s, when two additional taxa (*Mesembryathemum nodiflorum* and *Portulaca oleracea*) were found. Most of the nonnative plants now known from the island were not seen there until after 1970 (see Table 1).

Nonnative animals seen on the island in March 1974 included feral cats, a burro, tame pigeons, and a caged rabbit (R. Philbrick, pers. obs.). In March 1987, a small band of about 10 goats was seen near the northwestern end of the island (S. Junak, pers. obs.). In March 1995, two dogs were seen near the village and about 10 goats and three sheep were seen near the summit on the island (S. Junak, pers. obs.). By 1997, about 40 goats and 15 sheep were present on the island, along with an introduced antelope squirrel and feral cats (Donlan et al. 1999, this volume).

Through the cooperative efforts of the Island Conservation and Ecology Group and the Vizcaíno Biosphere Reserve, all of the goats and sheep were removed to a farm near Ensenada in 1997 (Donlan et al.1999, this volume). Feral cat removal was begun in 1998; only a few apparently remain on the island at present. The antelope squirrels also remain on the island.

Table 1. Dates of first known records of nonnative plants on Natividad Island.

Plant	Date of first known record*
Chenopodium murale	1897
Mesembryanthemum crystallinum	1897
Sonchus tenerrimus	1897
Mesembryanthemum nodiflorum	1963
Portulaca oleracea	1968
Zea mays	1974
Cakile maritima	1987
Malva parviflora	1987
Sisymbrium irio	1987
Sonchus oleraceus	1987
Eragrostis pectinacea	1995
Malva pacifica	1995
Pelargonium hortorum	1995
Phalaris minor	1995

*See text and appendix for additional information.

Most of the plants seen by Brandegee in 1897 are still present on the island. California mustard (*Guillenia lasiophylla*) has not been seen in recent years. Coulter's saltscale (*Atriplex coulteri*) was reported by Brandegee but no voucher specimen has been found. Brandegee may have actually seen one of the other annual *Atriplex* species known from the island.

For decades, crystalline iceplant (*Mesembryanthemum crystallinum*) has been the most abundant of the nonnative plants on the island. In 1995, it was the dominant species on coastal flats around the perimeter of the island. In that year, the small-flowered iceplant (*Mesembryanthemum nodiflorum*) was also widespread around the island's perimeter. Nettle-leaf goosefoot (*Chenopodium murale*) was abundant and widespread in disturbed areas throughout the island. Slender sow-thistle (*Sonchus tenerrimus*) was common throughout the island. Cheeseweed (*Malva parviflora*) was occasional but widespread. The other plant taxa that have been introduced to the island occur in scattered populations and do not dominate large areas.

In summary, nonnative plants and animals have had significant effects on the terrestrial ecosystem of Natividad Island for decades. Thanks to the recent efforts of the Island Conservation and Ecology Group, officials of the Vizcaíno Biosphere Reserve, leaders of the fishing cooperative, and the island's residents have begun the process of removing nonnative animals. The native plants of Natividad Island will undoubtedly benefit from these efforts. However, the problems caused by nonnative plants remain and will probably intensify if more areas of the island are disturbed by human activities.

VEGETATION

The terrestrial vegetation on Natividad Island is generally characterized by low-growing, drought-resistant shrubs and stem succulents with open spaces between them. In years with adequate rainfall, annual plants occupy many of these open spaces for a month or more. In some areas, however, dense stands of chollas (*Opuntia* spp.) form almost impenetrable thickets.

The dominant plant community is maritime desert scrub. This vegetation type consists almost entirely of low perennials, with no trees and few shrubs taller than one meter. The tallest plants on the islands are cardón (*Pachycereus pringlei*) and coastal agave (*Agave sebastiana*). Dominant perennial species in the maritime desert scrub include the shrubs and suffrutescent perennials *Atriplex julacea*, *Encelia palmeri*, *Euphorbia misera, Frankenia palmeri, Lycium* spp., *Suaeda moquinii, Viguiera lanata,* and the cacti *Echinocereus maritimus*, *Ferocactus fordii* var. *grandiflorus*, *Mammillaria hutchinsoniana* and an undescribed *Opuntia* species. *Pachycereus pringlei* occurs as scattered individuals that tower above the surrounding vegetation. *Opuntia cholla* forms dense thickets in the central highlands. The succulent *Dudleya albiflora* also occurs in dense populations in the central highlands. The cover of the perennial species is not continuous, and short-lived or ephemeral taxa dominate some areas. Large numbers of winter annuals, including *Chaenactis lacera*, *Coreocarpus involutus, Eschscholzia ramosa,* and *Plantago ovata* occur in some of the open sites between the larger plants after adequate rainfall.

Rocky canyon walls in the northern and central portions of the island support a rich mixture of native plants, including the dominants listed above and other shrubs like *Pachycormus discolor* var. *veatchiana*, *Pithecellobium confine*, and *Simmondsia chinensis*. The shrubs *Bebbia juncea* and *Sphaeralcea fulva* are common in some canyon bottoms. Native annuals like *Aphanisma blitoides, Eschscholzia ramosa*, and *Perityle emoryi* can be abundant in canyon bottoms in wet years.

Beaches and other sandy areas near the eastern shore support patches of coastal strand vegetation. Dominant species here include *Astragalus magdalenae* var. *magdalenae*, *Atriplex leucophylla, Cakile maritima, Frankenia palmeri,* and *Suaeda moquinii*. In rocky intertidal and subtidal habitats around the margin of the island, *Phyllospadix scouleri* occurs in a surf-grass community.

Introduced annuals are common along trails, roads, and in areas that have been disturbed by seabird activity. *Mesembryanthemum crystallinum* and *M. nodiflorum* cover large areas around the island's perimeter, as does *Chenopodium murale. Malva parviflora* occurs in scattered patches throughout the island.

FLORA

The documented flora of Natividad Island includes 77 vascular plant taxa representing 31 families and 63 genera (see Appendix). Two additional plant taxa (*Abutilon californicum* and *Atriplex coulteri*) have been reported in the literature but no voucher specimens have been found to date, so they are not included in the statistics given here. The largest families are the Asteraceae (10 taxa), Chenopodiaceae (8 taxa), Cactaceae (7 taxa), Fabaceae (6 taxa), Brassicaceae (5 taxa), Malvaceae (4 taxa), and Solanaceae (4 taxa). The largest genus is *Atriplex*, which is represented on Natividad by five native species. Genera represented by two taxa include *Astragalus, Chamaesyce, Lepidium, Lycium, Mesembryanthemum, Opuntia, Phacelia,* and *Sonchus.* The fact that Natividad has a substantially larger flora than the San Benito Islands is probably correlated with its closer proximity to other land masses, its larger size, and greater diversity of habitats.

Native and Endemic Plant Taxa

A total of 63 plant taxa presumed to be native have been documented for Natividad Island to date. Plant families with the highest number of native taxa include Asteraceae (8 taxa), Cactaceae (7 taxa), Chenopodiaceae (7 taxa), Fabaceae (6 taxa), and Solanaceae (4 taxa). With five native species on the island, *Atriplex* is the largest genus.

Astragalus, Chamaesyce, Lepidium, Lycium, Opuntia, and *Phacelia* are each represented by two native taxa.

About 40% of the native plant taxa found on Natividad are endemic to Baja California, including six of the island's seven cacti. Many taxa found on the island are restricted to the Vizcaíno Desert region or nearly so. At least five of the island's plant taxa are restricted to the California Islands or offshore rocks and are not found on the adjacent mainland. Three taxa (*Cochemia pondii*, *Mentzelia hirsutissima* var. *nesiotes*, and an undescribed species of *Opuntia*) are found only on Natividad and neighboring islands. Another insular endemic (*Eschscholzia ramosa*) is more widespread but has not been found on the mainland. One additional taxon (*Astragalus* aff.*gambelianus*) may also be endemic to Cedros and Natividad islands, but its relationship with other taxa on the mainland needs further study.

Over 50% of the native plant taxa known from Natividad Island have not been found on the San Benito Islands. This may be partially attributed to the latter's geographic isolation and limited topographic diversity. On the other hand, the San Benitos have certainly been more thoroughly collected than has Natividad Island.

Nonnative Plant Taxa

At least 14 plant taxa in eight families and 11 genera have been introduced to Natividad, primarily since the 1960s (see Table 1). These introductions represent about 18% of the island's total flora. By comparison, known percentages of nonnative plants on the other islands off the west coast of Baja California range from about 17% on the San Benito Islands to about 50% on San Geronimo Island. Eight of the island's nonnative plants originated in Europe, one originated as a domestic plant in eastern Mexico (i.e., *Zea mays*), three are native to South Africa, one is native to North America (i.e., *Eragrostis pectinacea*), and one is native to several Baja California islands but has apparently been introduced by humans on Natividad (i.e., *Malva pacifica*). Three plant families (Aizoaceae, Geraniaceae, and Poaceae) are represented on Natividad solely by nonnative taxa. Several families (Aizoaceae, Asteraceae, Brassicaceae, and Malvaceae) are each represented by two nonnative taxa. Genera represented by two nonnative taxa include *Mesembryanthemum* and *Sonchus*. On Natividad, 12 of the introduced plant taxa are herbaceous annuals, one is a subshrub, and one is a shrub.

At least two additional plants may have been introduced to Natividad. *Plantago ovata*, presumed at this point to be native to Natividad, is also known from all of the California Channel Islands and from Guadalupe, San Benito, and Cedros islands. Although it was among the first plants reported for Natividad (as *Plantago patagonica*), this *Plantago* may be a very early introduction from the Mediterranean area of Europe (Dempster 1993). *Datura discolor* is presently presumed to be native to Natividad, but may have been introduced by human activites.

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APPENDIX

ANNOTATED CATALOG OF THE FLOWERING PLANTS OF NATIVIDAD ISLAND

Plants listed in this table are arranged alphabetically by family within two major plant groups (dicotyledonous and monocotyledonous flowering plants). Taxa presumed to be introduced to Baja California and/or Natividad Island by human activities are preceded by an asterisk (*). The list does not include plant taxa that have been planted at the village unless they are surviving without cultivation in other parts of the island. Unsubstantiated reports (reports for which no voucher specimen has been found) are enclosed in braces (i.e., { }).

For most taxa, nomenclature follows Wiggins (1980) or Hickman (1993). Abbreviations of author names have been mostly standardized according to Brummitt and Powell (1992). Selected synonyms are shown in brackets (i.e., [ ]). Common names are mostly according to Abrams (1923-1960) and Hickman (1993), with a few additions from Beauchamp (1986), Coyle and Roberts (1975), and Martínez (1979).

Abundance ratings (rare, scarce, occasional, common, and abundant) and distribution descriptions are based on observations of the authors during years with average rainfall. Many of the annuals will not even be present during dry years. Dates of first known collection or report from the island are included for nonnative taxa.

Up to three voucher specimens are cited for each taxon. These are arranged chronologically by date of collection. T. S. Brandegee's collections are listed with the date shown on the original labels (i.e., 10 Mar 1897, 10 Apr 1897, or 10 Apr 1889), but he apparently was only on Natividad Island on 9-10 April 1897 (Moran 1952). Specimens without date of collection are cited as "n.d."; those collections without collector's number are listed as "s.n.". Specimens are deposited at the Santa Barbara Botanic Garden (SBBG) unless otherwise noted. Abbreviations for herbaria are those used in Holmgren et al. (1990). Herbarium accession numbers are cited only if there is no collector number.

Dicotyledonous Flowering Plants

Aizoaceae (Iceplant Family)

**Mesembryanthemum crystallinum* L. CRYSTALLINE ICEPLANT Abundant; disturbed flats and slopes throughout island, but especially in central and southern portions. First noted on the island in 1897 (Brandegee 1900).
7 Mar 1971, *Benedict s.n.* (SBBG 43818); 23 Mar 1974, *Philbrick & Benedict B74-49*.

**Mesembryanthemum nodiflorum* L. SMALL-FLOWERED ICEPLANT Occasional; disturbed flats around perimeter. First collected in 1963, but already well established at that time.
21 Apr 1963, *Moran 10789* (SD); 7 Mar 1971, *Benedict s.n.* (SBBG 43873); 26 Mar 1974, *Philbrick B74-101*.

Anacardiaceae (Sumac Family)

Pachycormus discolor var. *veatchiana* (Kellogg) Gentry [*Veatchia cedrosensis* A.Gray, *V. discolor* var. *v.* I.M.Johnst.] ELEPHANT TREE or TOROTE Rare; canyons in central portion of island. Endemic to Baja California.
25 Mar 1974, *Philbrick & Benedict B74-80*; 25 Mar 1974, *Philbrick & Benedict B74-81*; 31 Mar 1987, *Junak 3284*.

Asteraceae (Sunflower Family)

Amblyopappus pusillus Hook. & Arn. PINEAPPLE WEED Common; slopes and flats, mostly around perimeter.
23 Mar 1974, *Philbrick & Benedict B74-4*.

Ambrosia chenopodifolia (Benth.) W.W.Payne [*Franseria c.* Benth.] SAN DIEGO BUR-SAGE Occasional; flats at upper elevations.
24 Mar 1974, *Philbrick & Benedict B74-56*; 13 Jul 1983, *Junak 1891*; 15 Mar 1995, *Junak 5888*.

Bebbia juncea (Benth.) Greene var. *juncea* SWEETBUSH Scarce; both sides of island, primarily in arroyos.
10 Apr 1897, *Brandegee s.n.* (UC 91015); 21 Apr 1963, *Moran 10802* (DS,SD,UC); 15 Mar 1995, *Junak 5887*.

Chaenactis lacera Greene CUTLEAF PINCUSHION Common; scattered locations throughout island, especially in arroyos and on coastal flats. Endemic to Baja California.
10 Apr 1897, *Brandegee s.n.* (DS 228009); 31 Mar 1987, *Junak 3276*.

Coreocarpus involutus Greene [*Leptosyne i.* Greene] Abundant; open sites throughout island. Endemic to Baja California.
10 Mar 1897, *Brandegee s.n.* (UC 89271); 21 Apr 1963, *Moran 10791* (SD,UC); 14 Mar 1995, *Junak 5868*.

Encelia palmeri Vasey & Rose PALMER'S BUSH SUNFLOWER Common; northern and central portions of island, especially on west side of ridge. Endemic to Baja California.
24 Jun 1968, *Moran 15134* (SD,UC); 31 Mar 1987, *Junak 3270*.

Perityle emoryi Torr. [*P.grayi* Rose] EMORY'S ROCK DAISY Occasional; flats and arroyos throughout island.
10 Mar 1897, *Brandegee s.n.* (UC 90622); 23 Mar 1974, *Philbrick & Benedict B74-1*; 14 Mar 1995, *Junak 5861*.

**Sonchus oleraceus* L. COMMON SOW-THISTLE Scarce; along road near lighthouse and community dumpsite. First noted at village in 1987.
16 Mar 1995, *Junak 5921*.

**Sonchus tenerrimus* L. SLENDER SOW-THISTLE Common; slopes, flats, and arroyos throughout island. First collected in 1897.
10 Apr 1897, *Brandegee s.n.* (UC 92392); 25 Mar 1974, *Philbrick & Benedict B74-88*; 14 Mar 1995, *Junak 5862*.

Viguiera lanata (Kellogg) A.Gray VIZCAINO SUNFLOWER Common; slopes throughout island. Endemic to Baja California.
10 Apr 1897, *Brandegee s.n.* (UC 89798); 24 Jun 1968, *Moran 15138* (UC).

Boraginaceae (Borage Family)

Cryptantha maritima (Greene) Greene var. *maritima* [*Krynitzkia m.* Greene] GUADALUPE ISLAND CRYPTANTHA Occasional; open sites throughout island.
10 Apr 1897, *Brandegee s.n.* (UC 78553); 31 Mar 1987, *Junak 3260*; 16 Mar 1995, *Junak 5917*.

Brassicaceae (Mustard Family)

**Cakile maritima* Scop. SEA ROCKET Occasional; beaches and coastal flats at southeastern end of island. First collected on the island in 1987.
30 Mar 1987, *Junak 3253*; 14 Mar 1995, *Junak 5859*.

Guillenia lasiophylla (Hook. & Arn.) Greene [*Caulanthus l.* (Hook. & Arn.) Payson] CALIFORNIA MUSTARD Rare; not seen recently.
10 Apr 1897, *Brandegee s.n.* (UC 117304).

Lepidium lasiocarpum var. *latifolium* C.L.Hitchc. Common; flats and arroyos in scattered locations throughout island.
14 Mar 1995, *Junak 5864* (RSA,SBBG).

Lepidium oblongum var. *insulare* C.L.Hitchc. LENTEJILLA Occasional; flats and arroyos in northern portion of island.
10 Apr 1897, *Brandegee s.n.* (UC 117601); 15 Mar 1995, *Junak 5902*.

**Sisymbrium irio* L. LONDON ROCKET Occasional; open sites in scattered locations throughout island. First noted at the village in 1987.
15 Mar 1995, *Junak 5890*; 15 Mar 1995, *Junak 5907*.

Cactaceae (Cactus Family)

Cochemia pondii (Greene) Walton [*Mammillaria p.* Greene] BIZNAGITA Occasional; open sites scattered at upper elevations. Endemic to Cedros and Natividad islands.
23 Mar 1974, *Philbrick & Benedict B74-31*.

Echinocereus maritimus (M.E.Jones) K.Schum. COASTAL MOUND CACTUS Common; slopes and flats in scattered locations at upper elevations. Endemic to Baja California.
23 Mar 1974, *Philbrick & Benedict B74-32*; 15 Mar 1995, *Junak 5884*.

Ferocactus fordii (Orcutt) Britton & Rose var. *grandiflorus* G.E.Linds. VIZCAINO BARREL CACTUS Common; slopes and flats in scattered locations at upper elevations. Endemic to Baja California.
23 Mar 1974, *Philbrick & Benedict B74-9*; 15 Mar 1995, *Junak 5886*.

Mammillaria hutchinsoniana (Gates) Boed. VIEJITA Occasional; open sites in scattered locations throughout island. Endemic to Baja California.
28 Apr 1948, *Lindsay 572* (CAS); 24 Jun 1968, *Moran 15131* (SD); 23 Mar 1974, *Philbrick & Benedict B74-8*.

Opuntia sp. nova CEDROS ISLAND CHOLLA Common; rocky slopes and flats throughout island. Endemic to San Benito, Cedros, and Natividad islands.
23 Mar 1974, *Philbrick & Benedict B74-33*.

Opuntia cholla Weber CHOLLA PELONA Common; rocky slopes and flats at upper elevations in central portion of island. Endemic to Baja California.
23 Mar 1974, *Philbrick & Benedict B74-34*.

Pachycereus pringlei (S.Watson) Britton & Rose [*Cereus p*. S.Watson] CARDON or CARDON PELON Occasional; scattered locations at upper elevations, mostly on west side of ridge.
23 Mar 1974, *Philbrick & Benedict B74-21*.

Chenopodiaceae (Goosefoot Family)

Aphanisma blitoides Moq. APHANISMA Common; flats and arroyos in scattered locations throughout island.
10 Apr 1897, *Brandegee s.n.* (UC 116498); 21Apr 1963, *Moran 10799* (SD); 23 Mar 1974, *Philbrick & Benedict B74-25*.

Atriplex barclayana (Benth.) D.Dietr. SALADILLO Scarce; coastal flats on northeast side of island.
24 Jun 1968, *Moran 15130* (RSA).

{*Atriplex coulteri* (Moq.) D.Dietr. Reported for the island by Brandegee (1900); no specimen has been found.}

Atriplex aff. *davidsonii* Standl. DAVIDSON'S SALTSCALE Occasional; scattered locations at upper elevations.
31 Mar 1987, *Junak 3272*; 15 Mar 1995, *Junak 5906*.

Atriplex julacea S.Watson Abundant; throughout island. Endemic to Baja California.
Mar-Jun 1897, *Anthony 365* (DS,UC); 21 Apr 1963, *Moran 10786* (SD); 10 Apr 1971, *Beauchamp 2176* (SD).

Atriplex leucophylla (Moq.) D.Dietr. SEA SCALE Rare; beach at southeast end of island.
26 Mar 1974, *Philbrick & Benedict B74-102*; 16 Mar 1995, *Junak 5928*.

Atriplex pacifica A.Nelson SOUTH COAST SALTSCALE Occasional; disturbed sites in scattered locations at upper elevations.
7 Mar 1971, *Benedict s.n.* (SBBG 43876); 31 Mar 1987, *Junak 3255*; 31 Mar 1987, *Junak 3256*.

**Chenopodium murale* L. NETTLE-LEAF GOOSEFOOT Abundant; disturbed sites throughout island. First noted on the island in 1897 (Brandegee 1900).
24 Jun 1968, *Moran 15129* (SD); 23 Mar 1974, *Philbrick & Benedict B74-48*.

Suaeda moquinii (Torr.) Greene BUSH SEEPWEED Common; flats throughout island.
21 Apr 1963, *Moran 10784* (SD); 7 Mar 1971, *Benedict s.n.* (SBBG 43874); 23 Mar 1974, *Philbrick & Benedict B74-15*.

Crassulaceae (Stonecrop Family)

Dudleya albiflora Rose LIVE-FOREVER or SIEMPREVIVA Common; slopes and flats at upper elevations. Endemic to Baja California.
21 Apr 1963, *Moran 10794* (SD); 12 Jul 1983, *Junak 1878*.

Cucurbitaceae (Gourd Family)

Echinopepon minimus (Kellogg) S.Watson Occasional; canyon bottoms, slopes, and flats in northern and central portions of island. Endemic to Baja California.
24 Mar 1974, *Philbrick & Benedict B74-69*; 25 Mar 1974, *Philbrick & Benedict B74-91*; 31 Mar 1987*, Junak 3275*.

Cuscutaceae (Dodder Family)

Cuscuta californica Hook. & Arn. DODDER or WITCH'S HAIR Scarce; saddle on north side of summit. Parasitic on annual species of *Astragalus* and *Lotus* on Natividad Island.
15 Mar 1995, *Junak 5914*.

Euphorbiaceae (Spurge Family)

Chamaesyce bartolomaei Millsp. [*Euphorbia b*. Greene] GOLONDRINA Occasional; mostly on flats in central portion of island. Endemic to Baja California.
21 Apr 1963, *Moran 10795* (SD,UC); 10 Apr 1971, *Beauchamp 2181* (SD).

Chamaesyce polycarpa Millsp. var. *polycarpa* [*Euphorbia p.* Benth. var. *p*.] GOLONDRINA Scarce; flats in central portion of island.
21 Apr 1963, *Moran 10795 1/2* (SD); 24 Mar 1974, *Philbrick & Benedict B74-52*.

Euphorbia misera Benth. CLIFF SPURGE Common; rocky slopes and flats throughout island, especially at higher elevations.
23 Mar 1974, *Philbrick & Benedict B74-41*.

Fabaceae (Pea Family)

Astragalus aff. *gambelianus* E.Sheld. GAMBEL'S DWARF LOCOWEED Occasional; open sites at higher elevations in central portion of island. Specimens from Natividad and Cedros islands appear to represent an undescribed form; they need further study.
25 Mar 1974, *Philbrick & Benedict B74-75*; 15 Mar 1995*, Junak 5913*.

Astragalus magdalenae Greene var. *magdalenae* Occasional; sandy sites near the coast, especially in southern portion of island.
21 Apr 1963, *Moran 10787* (SD); 10 Apr 1971, *Beauchamp 2186* (SD).

Astragalus nuttallianus var. *cedrosensis* M.E.Jones Occasional; open sites at higher elevations in central portion of island.
15 Mar 1995, *Junak 5911*; 15 Mar 1995, *Junak 5919*.

Lotus salsuginosus subsp. *brevivexillus* Ottley [*Hosackia maritima* Nutt.] COASTAL LOTUS Occasional; open sites at higher elevations, primarily in central portion of island.
15 Mar 1995*, Junak 5910*; 16 Mar 1995*, Junak 5922*.

Phaseolus filiformis Benth. Scarce; slopes on west side of main ridge.
25 Mar 1974, *Philbrick & Benedict B74-77*; 13 Jul 1983, *Junak 1892*; 16 Mar 1995*, Junak 5925*.

Pithecellobium confine Standl. PALO FIERRO or EJOTON Rare; upper elevations in central portion of island. Endemic to Baja California.
24 Jun 1968, *Moran 15141* (SD); 25 Mar 1974, *Philbrick & Benedict B74-79*.

Frankeniaceae (Frankenia Family)

Frankenia palmeri (Molina) I.M.Johnst. PALMER'S FRANKENIA or YERBA REUMA Occasional; flats at upper elevations and on coastal flats at northeast end of island.
7 Mar 1971, *Benedict s.n.* (SBBG 43875); 23 Mar 1974, *Philbrick & Benedict B74-40*; 15 Mar 1995*, Junak 5899*.

Geraniaceae (Geranium Family)

**Pelargonium* x *hortorum* L.H.Bailey GARDEN GERANIUM Rare; disturbed coastal flats on east side of island. First collected in 1995.
15 Mar 1995, *Junak 5892*.

Hydrophyllaceae (Waterleaf Family)

Phacelia cedrosensis Rose CEDROS ISLAND PHACELIA Occasional; scattered locations in central portion of island. Endemic to Baja California.
10 Apr 1897, *Brandegee s.n*. (UC 107529); 25 Mar 1974, *Philbrick & Benedict B74-85*; 15 Mar 1995, *Junak 5880*.

Phacelia ixodes Kellogg COSTA BAJA PHACELIA or ISLAND MISERY Scarce; northern and central portions of island. Endemic to Baja California. This plant should be avoided as it can cause severe contact dermatitis in humans.
24 Jun 1968, *Moran 15139* (SD,UC); 24 Mar 1974, *Philbrick & Benedict B74-63*; 31 Mar 1987, *Junak 3280*.

Pholistoma racemosum (Nutt.) Constance Rare; central portion of island.
24 Mar 1974, *Philbrick & Benedict B74-64*.

Loasaceae (Stick-leaf Family)

Mentzelia hirsutissima var. *nesiotes* I.M.Johnst. NATIVIDAD ISLAND BLAZING STAR Occasional; arroyos, rocky slopes, and flats in central portion of island. Endemic to San Benito, Cedros, and Natividad islands.
10 Apr 1899, *Brandegee s.n.* (UC 205872); 13 Jul 1983, *Junak 1893*; 14 Mar 1995, *Junak 5874*.

Malvaceae (Mallow Family)

{*Abutilon californicum* Benth. Reported for the island (as *A. lemmonii* S.Watson) by Hale (1941); no specimen has been found.}

Eremalche exilis (A.Gray) Greene [*Malvastrum e*. A.Gray] Occasional; open flats and disturbed sites in scattered locations throughout island; locally abundant in hills at north end of island.
Apr 1897, *Brandegee s.n.* (UC 174768); 25 Mar 1974, *Philbrick & Benedict B74-90*; 15 Mar 1995, *Junak 5889*.

**Malva pacifica* M.F.Ray [*Lavatera venosa* S.Watson] SAN BENITO ISLAND BUSH MALLOW Rare; southeast end of island, in small swale at southeast end of airstrip. Native populations are endemic to San Gerónimo Island, the San Benito Islands, and an islet at the mouth of Bahía Tortugas; probably introduced on Natividad, Cedros, and Asunción islands. First collected on Natividad Island in 1995.
16 Mar 1995, *Junak 5915*.

**Malva parviflora* L. CHEESEWEED Occasional; disturbed sites throughout island. First noted in the village in 1987.
17 Mar 1995, *Junak 5933*.

Sphaeralcea fulva Greene DESERT MALLOW Common; canyons in northern portion of the island, on both sides of the main ridge. Endemic to Baja California.
24 Jun 1968, *Moran 15136* (SD); 24 Mar 1974, *Philbrick & Benedict B74-65*; 15 Mar 1995, *Junak 5898*.

Nyctaginaceae (Four-O'Clock Family)

Abronia maritima S.Watson STICKY SAND-VERBENA Scarce; sandy sites at southern end of island.
23 Mar 1974, *Philbrick & Benedict B74-13*; 16 Mar 1995, *Junak 5916*.

Mirabilis californica A.Gray WISHBONE BUSH Common; slopes in scattered locations.
23 Mar 1974, *Philbrick & Benedict B74-6*; 24 Mar 1974, *Philbrick & Benedict B74-58*; 31 Mar 1987, *Junak 3281*.

Onagraceae (Evening Primrose Family)

Camissonia crassifolia (Greene) Raven Scarce; sandy sites on west side of island. Endemic to Baja California.
24 Mar 1974, *Philbrick & Benedict B74-50*; 26 Mar 1974, *Philbrick & Benedict B74-96*; 17 Mar 1995, *Junak 5929*.

Papaveraceae (Poppy Family)

Eschscholzia ramosa Greene ISLAND POPPY Common; arroyos and flats in scattered locations. Endemic to Santa Rosa, Santa Cruz, Santa Barbara, San Nicolas, Santa Catalina, San Clemente, Los Coronados, Todos Santos, San MartÍn, Guadalupe, San Benito, Cedros, and Natividad islands.
10 Apr 1897, *Brandegee s.n.* (UC 142900); 23 Mar 1974, *Philbrick & Benedict B74-24*; 14 Mar 1995, *Junak 5865*.

Plantaginaceae (Plantain Family)

Plantago ovata Forssk. [*P. insularis* Eastw.] Common; open sites in scattered locations throughout island. May not be native to the island.
10 Apr 1897, *Brandegee s.n.* (UC 102770); 31 Mar 1987, *Junak 3262*.

Polygonaceae (Buckwheat Family)

Eriogonum pondii Greene var. *pondii* POND'S BUCKWHEAT Occasional; rocky slopes on west side of main ridge, in central portion of island. Endemic to Baja California.
21 Apr 1963, *Moran 10803* (GH,SBBG,SD,US); 24 Mar 1974, *Philbrick & Benedict B74-59*; 16 Mar 1995, *Junak 5923*.

Portulacaceae (Purslane Family)

Calandrinia maritima Nutt. SEA KISSES or SEASIDE CALANDRINIA Occasional; rocky slopes in central and southern portions of island.
23 Mar 1974, *Philbrick & Benedict B74-43*; 13 Jul 1983, *Junak 1889*; 17 Mar 1995, *Junak 5930*.

**Portulaca oleracea* L. PURSLANE Scarce; rocky slopes on west side of main ridge, in central portion of island. First collected in 1968.
24 Jun 1968, *Moran 15143* (SD).

Resedaceae (Mignonette Family)

Oligomeris linifolia Vahl [*O. subulata* Webb] OLIGOMERIS Occasional; rocky slopes in central portion of island.
21 Apr 1963, *Moran 10790* (SD,UC); 31 Mar 1987, *Junak 3257*; 14 Mar 1995, *Junak 5858*.

Scrophulariaceae (Figwort Family)

Antirrhinum watsonii Vasey & Rose [*A. kingii* var. *w.* (Vasey & Rose) Munz, *Sairocarpus w.* Vasey & Rose) D.A. Sutton] WATSON'S SNAPDRAGON Scarce; arroyos and flats, primarily on east side of main ridge.
13 Jul 1983, *Junak 1895*; 15 Mar 1995, *Junak 5879*; 15 Mar 1995, *Junak 5896*.

Simmondsiaceae (Jojoba Family)

Simmondsia chinensis (Link) C.Schneider JOJOBA or GOAT-NUT Rare; rock face in canyon in northeastern portion of island.
31 Mar 1987, *Junak 3282*.

Solanaceae (Nightshade Family)

Datura discolor Bernh. JIMSON WEED Scarce; scattered locations in northern and central portions of island. May not be native to the island; first collected in 1963.
21 Apr 1963, *Moran 10800* (SD); 10 Apr 1971, *Beauchamp 2184* (SD).

Lycium brevipes Benth. var. *brevipes* FRUTILLA Common; scattered locations throughout island.
17 Mar 1995, *Junak 5932*.

Lycium californicum Nutt. CALIFORNIA BOXTHORN Occasional; hilltop near north end of island.
24 Jun 1968, *Moran 15135* (SD,UC).

Nicotiana clevelandii A.Gray CLEVELAND'S TOBACCO Common; scattered locations throughout island.
10 Apr 1897, *Brandegee s.n.* (UC 103919); 21 Apr 1963, *Moran 10792* (SD); 31 Mar 1987, *Junak 3274*.

Zygophyllaceae (Caltrop Family)

Fagonia laevis Standl. FAGONIA Occasional; open sites on ridgetops near lighthouse.
23 Mar 1974, *Philbrick B74-38*; 14 Mar 1995, *Junak 5873*.

Monocotyledonous Flowering Plants

Agavaceae (Agave Family)

Agave sebastiana Greene [*A. shawii* var. *sebastiana* (Greene) Gentry] COASTAL AGAVE or MESCAL Occasional; scattered locations throughout island. Endemic to Baja California.
24 Jun 1968, *Moran 15142* (SD); 25 Mar 1974, *Philbrick & Benedict B74-74*; 13 Jul 1983, *Junak 1899*.

Poaceae (Grass Family)

**Eragrostis pectinacea* (Michx.) Nees LOVEGRASS Rare; along trail at top of coastal bluffs on west central side of island. Probably not native on the island; first collected in 1995.
16 Mar 1995, *Junak 5927*.

**Phalaris minor* Retz. MEDITERRANEAN CANARY GRASS Rare; disturbed flats on ridgetop north of lighthouse. First collected in 1995.
16 Mar 1995, *Junak 5920*.

**Zea mays* L. CORN Rare; along trail just south of lighthouse. Probably will not persist or become naturalized. Known from a single collection of volunteer seedlings in 1974.
24 Mar 1974, *Philbrick & Benedict B74-72*.

Zosteraceae (Eel-Grass Family)

Phyllospadix scouleri Hook. SURF-GRASS Occasional; rocky intertidal and subtidal habitats around perimeter of island.
21 Apr 1963, *Moran 10783* (SD).