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Source: *Madroño*, Vol. 21, No. 8 (OCTOBER 1972), pp. 499-504

Published by: [California Botanical Society](#)

Stable URL: <http://www.jstor.org/stable/41423847>

Accessed: 23-04-2015 22:48 UTC

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A FLORISTIC STUDY OF POINT ARENA,
MENDOCINO COUNTY, CALIFORNIA

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In 1967 the Pacific Gas and Electric Company (PG&E) decided that a botanical survey should be made of the site of their proposed generating plant on Point Arena, Mendocino Co., California. The primary purpose of the study was to determine whether any rare species were present. In 1967 three collecting trips were made to Point Arena and in 1968 five more trips. Most of our work was concentrated on PG&E's property, but a quick survey of the entire point demonstrated that PG&E property contained a nearly complete flora of the whole point except for the species of the brush-covered north-facing slopes on the north side of the peninsula. In addition a few common natives were found on the ungrazed lands near the lighthouse.

The PG&E property on Point Arena contains approximately 1000 acres. It is bounded on two sides by ocean bluffs and on the landward sides is surrounded by adjacent areas of the point where the terrain and flora are continuations of the terrain and flora of the study site. Aside from the spectacular rock formations of the ocean bluffs this is not, at first glance, a biologically prepossessing area. The main topographic features are two marine terraces, one with an altitude of 40–80 feet above sea level and the other with an altitude of 200 feet. These terraces are separated by a short steep slope with a few small outcroppings of siliceous shale of the Miocene Monterey Formation. On the lower terrace there are several vernal pools at the base of the steep slope, while the northeast end of the terrace has a large swampy area with a grove of dwarfed *Pinus muricata*. The upper terrace contains a large swampy vernal pool as well as several small swampy areas near the top of the slope separating the two marine terraces. Two small streams arise in the swamps of the upper terrace and flow towards the north while a third small stream rises in the swampy areas of the lower terrace and flows west into the ocean.

The presence in this small area with its relatively uniform topography of many microhabitats produced by streams, swamps, and vernal pools, as well as ocean bluffs, siliceous shale outcrops, and variations in the thickness of the soil on the marine terraces, results in the presence of an unexpectedly large number of taxa: 205 species and subspecies (or varieties) distributed in 145 genera and 63 families were collected on this site. Since there has been overgrazing by sheep as well as intermittent grazing by

MADROÑO, Vol. 21, No. 8, pp. 499–546. November 6, 1972.

horses and dairy cows, many of the species are uncommon and some were undoubtedly missed. It is anticipated that with removal of the sheep in 1970 these infrequent species will become more common. In addition the composition of the weedy element can be expected to change radically while the native species that occur in the ungrazed areas nearby can be expected gradually to invade the study area. The removal of the sheep will also result in the recovery of the severely pruned North Coastal Scrub Community whose remains are common on the upper marine terrace.

The abandoned farmyard, surrounded by windbreaks of *Cupressus macrocarpa*, naturalized cultigens, and barnyard weeds was not included in this study.

Eight plant communities are recognized on this site:

1. Coastal bluff. This floral element has been severely damaged by sheep and most of the individuals are restricted to inaccessible places. A few of the species were not collectible and could not be identified and hence do not appear on the plant list. Most of the bluff species are members of the widespread ocean bluff flora of northern California: *Erigeron glauca*, *Dudleya farinosa*, *Eriophyllum staechadifolium*, *Allium dichlomydeum*, and *Lupinus variicolor*.

2. The overgrazed grassland just back of the coastal bluffs was rich in depauperate individuals of species that are not, even under ideal circumstances, very tall: *Microseris bigelovii*, *Cicendia quadrangularis*, *Sagina occidentalis*, and *Eryngium armatum*.

3. The vernal pools and swampy areas of the lower marine terrace, except for the swamps of the pygmy forest, tend to be poor in species: *Ranunculus flammula* var. *ovalis*, *Chrysanthemum leucanthemum*, and *Eleocharis acicularis*.

4. The pygmy pine forest is rich in shrubby species and perennial herbs: *Ledum glandulosum* var. *columbianum*, *Vaccinium ovatum*, *Gaultheria shallon*, *Erigeron supplex*, *Aster chilensis*, *A. subspicatus*, *Iris douglasiana*, *Camassia quamash*, *Lilium maritimum*, *Gentiana sceptrum*, *Castilleja latifolia*, and many others.

5. The siliceous shale outcrops of the slope are distinguished by the presence of species not found elsewhere: *Clarkia* sp., *Brodiaea coronaria* var. *macropoda*, *B. laxa*, *B. peduncularis*, *Corethrogyne californica* var. *obovata*, and *Lupinus bicolor* ssp. *umbellatus*. *Clarkia* was never found while in bloom and the *Corethrogyne* was extremely prostrate, except for its erect peduncles.

6. The vernal pools on the upper terrace near Highway 1 were rich in typical vernal pool species: *Isoetes howellii*, which was rare, *Lythrum hyssopifolia*, *Eryngium armatum*, *Oenanthe sarmentosa*, *Allocarya bracteata*, *A. reticulata* var. *rossianorum*, *Galium trifidum* ssp. *subbiflorum*, *Centunculus minimus*, *Veronica scutellata*, and *V. americana*.

7. The swamps bordering the two north-flowing streams, especially the one originating in the vernal pools of the upper terrace, also possess

many species. The latter has a dense shrub and low tree growth as well as many ferns and herbaceous perennials. Many of the species are represented by only a few individuals: *Lysichiton americanum*, *Habenaria dilatata*, *Botrychium multifidum* ssp. *silaiifolium*, *Blechnum spicant*, *Athyrium filix-femina* vars., *Sidalcea calycosa*, *Myrica californica*, *Ledum glandulosum*, and *Marah oreganus*, while *Lilium maritimum*, *Camassia quamash*, *Gentiana sceptrum*, *Spiranthes romanzoffiana*, and *Iris douglasiana* are common in the grassland on the margins of the swamps.

8. Coastal scrub. *Gaultheria shallon*, *Vaccinium ovatum*, *Ceanothus griseus*, *Rosa gymnocarpa*, *R. nu'kana*, *Rubus vitifolius*, and *Iris douglasiana*. Except for the *Iris* these species have been severely damaged by the sheep and this community is not, at present, a prominent feature of the study area.

Although no narrow endemics were found on Point Arena, either because there never have been any or because the sheep have eliminated them, the swamp communities to which many of the species belong do not appear to be common on the North Coastal Plain. According to Hans Leschke at least one of the swamp species, *Carex phyllomanica*, is rare in California. It is useful, therefore, to have a record of the species that occur here, at the end of a long period of land abuse from overgrazing, in an area from which nearly all the original tree and shrub communities had been removed, though vestiges still exist elsewhere on Point Arena to indicate what the original state probably was.

The authors wish to thank John Tomas Howell and Hans Leschke for their assistance in identifying difficult taxa. Vouchers for all the taxa have been deposited in the herbarium of the California Academy of Sciences. Excerpts from this botanical study constitute one of the appendices to the environmental statement on Point Arena being prepared by PG&E.

ISOETACEAE. *Isoetes howellii* Engelm.

EQUISETACEAE. *Equisetum telmateia* Ehrh.

OPHIOGLOSSACEAE. *Botrychium multifidum* (Gmel.) Rupr. ssp. *silaiifolium* (Presl.) Clausen.

ASPIDIACEAE. *Athyrium filix-femina* (L.) Roth. var. *sitchense* Rupr., and f. *strictum* (Gilbert) Butters, *Polypodium scouleri* H. & S., *Polystichum munitum* (Kaulf.) Presl.

BLECHNACEAE. *Blechnum spicant* (L.) Smith.

PINACEAE. *Pinus muricata* D. Don.

LILAEACEAE. *Lilaea scilloides* (Poir.) Haum.

POACEAE. Festuceae. *Briza minor* L., *Bromus marginatus* Nees, *B. mollis* L., *B. sterilis* L., *Cynosurus echinatus* L., *Dactylis glomerata* L., *Festuca dertonensis*. (All.) A. & G., *Glyceria pauciflora* Presl, *Poa annua* L., *P. compressa* L., *P. pratensis* L., *P. unilateralis* Scribn.

Hordeae. *Hordeum brachyantherum* Nevski, *H. hystrix* Roth, *H. leporinum* Link, *Lolium perenne* L.

Aveneae. *Aira caryophylla* L., *A. praecox* L., *Avena sativa* L., *Danthonia californica* Bol., *Deschampsia caespitosa* (L.) Beauv. ssp. *holciformis* (Presl) Lawr., *Holcus lanatus* L., *Trisetum cernuum* Trin. var. *canescens* (Buckl.) Beal.

Agrostideae. *Agrostis alba* L., *A. pallens* Trin., *A. palustris* Huds., *Alopecurus geniculatus* L., *Calamagrostis nutkaensis* (Presl) Steud., *Polypogon monspeliensis* (L.) Desf., *Stipa pulchra* Hitchc.

Phalarideae. *Anthoxanthum odoratum* L.

Paniceae. *Panicum pacificum* Hitchc. & Chase.

CYPERACEAE. *Carex gynodynamis* Olney, *C. obnupta* Bailey, *C. phyllomanica* Boott, *C. salinaeformis* Mkze., *C. subbracteata* Mkze., *Eleocharis acicularis* (L.) R. & S., *Scirpus cernuus* Vahl var. *californicus* (Torr.) Beetle, *S. koilolepis* (Steud.) Gleason, *S. microcarpus* Presl, *S. setaceus* L.

ARACEAE. *Lysichiton americanum* Hult. & St. John.

LEMNACEAE. *Lemna minor* L.

JUNCACEAE. *Juncus bolanderi* Engelm., *J. bufonius* L., *J. effusus* L., *J. lesuerii* Bol., *J. patens* Mey., *J. phaeocephalus* Engelm., *J. tenuis* Willd. var. *congestus* Engelm., *Luzula subsessilis* (Wats.) Buch.

LILIACEAE. *Camassia quamash* (Pursh) Greene, *Lilium maritimum* Kell., *Maianthemum dilatatum* (Wood) N. & M., *Zigadenus fremontii* Torr.

AMARYLLIDACEAE. *Allium dichlamydeum* Greene, *Brodiaea coronaria* (Salisb.) Engl. var. *macropoda* (Torr.) Hoover, *B. laxa* (Benth.) Wats., *B. peduncularis* (Lindl.) Wats.

IRIDACEAE. *Iris douglasiana* Herb., *Sisyrinchium bellum* Wats., *S. californicum* (Ker.) Dryand.

ORCHIDACEAE. *Habenaria dilatata* (Pursh) Hook., *Spiranthes romanoffiana* C. & S.

SALICACEAE. *Salix lasiolepis* Benth., *S. sitchensis* Sanson.

MYRICACEAE. *Myrica californica* C. & S.

BETULACEAE. *Alnus oregona* Nutt.

URTICACEAE. *Urtica urens* L.

POLYGONACEAE. *Eriogonum latifolium* Sm., *Polygonum aviculare* L., *Rumex acetosella* L., *R. conglomeratus* Murr.

AIZOACEAE. *Mesembryanthemum chilense* Mol.

PORTULACACEAE. *Montia perfoliata* (Donn) Howell, *M. sibirica* (L.) Howell.

CARYOPHYLLACEAE. *Cerastium viscosum* L., *Sagina crassicaulis* Wats., *S. occidentalis* Wats., *Silene gallica* L., *Spergula arvensis* L., *Spergularia rubra* (L.) J. & C. Presl, *Stellaria media* (L.) Cyrill., *S. sitchana* Steud. var. *bongardiana* (Fern.) Hult.

RANUNCULACEAE. *Ranunculus californicus* Benth. var. *cuneatus* Greene, *R. flammula* L. var. *ovalis* (Bigel.) Benson, *R. uncinatus* D. Don.

PAPAVERACEAE. *Eschscholzia californica* Cham.

BRASSICACEAE. *Brassica campestris* L., *Cardamine oligosperma* Nutt., *Dentaria californica* Nutt., *Nasturtium officinale* R. Br.

CRASSULACEAE. *Dudleya farinosa* (Lindl.) Britt. & Rose, *Tillaea aquatica* L.

SAXIFRAGACEAE. *Ribes sanguineum* Pursh var. *glutinatum* (Benth.) Loud.

ROSACEAE. *Alchemilla occidentalis* Nutt., *Fragaria chiloensis* (L.) Duchn., *Potentilla egedii* Wormsk. var. *grandis* (Rydb.) Howell, *Rosa gymnocarpa* Nutt., *R. nutkana* Presl, *Rubus parviflorus* Nutt., *R. vitifolius* C. & S.

FABACEAE. *Lathyrus vestitus* Nutt., *Lotus aboriginum* Jeps., *L. corniculatus* L., *L. formosissimus* Greene, *L. micranthus* Benth., *L. purshianus* (Benth.) Clem. & Clem., *L. subpinnatus* Lag., *Lupinus bicolor* Lindl. ssp. *umbellatus* (Greene) Dunn, *L. nanus* Dougl., *L. variicolor* Steud., *Medicago hispida* L., *M. lupulina* L., *Trifolium appendiculatum* Loja, *T. barbigerum* Torr., *T. macraei* H. & A., *T. wormskioldii* Lehm., *Vicia americana* Muhl. ssp. *oregana* (Nutt.) Abrams, *V. angustifolia* Reichard.

GERANIACEAE. *Erodium cicutarium* (L.) L'Her., *Geranium dissectum* L., *G. molle* L.

OXALIDACEAE. *Oxalis pilosa* Nutt.

LINACEAE. *Linum angustifolium* Huds.

POLYGALACEAE. *Polygala californica* Nutt.

CALLITRICHACEAE. *Callitriche verna* L.

LIMNANTHACEAE. *Limnanthes douglasii* R. Br.

RHAMNACEAE. *Ceanothus griseus* (Trel.) McMinn, *Rhamnus californica* Esch.

MALVACEAE. *Malva parviflora* L., *Sidalcea calycosa* Jones.

HYPERICACEAE. *Hypericum anagalloides* C. & S.

VIOLACEAE. *Viola adunca* Sm.

LYTHRACEAE. *Lythrum hyssopifolia* L.

ONAGRACEAE. *Camissonia ovata* (Nutt.) Raven, *Epilobium watsonii* Barb. var. *franciscanum* (Barb.) Jeps.

APIACEAE. *Eryngium armatum* (Wats.) Coult. & Rose, *Heracleum lanatum* Michx., *Oenanthe sarmentosa* Presl, *Perideridia gairdneri* (H. & A.) Math.

ERICACEAE. *Gaultheria shallon* Pursh, *Ledum glandulosum* Nutt. var. *columbianum* (Piper) Hitchc., *Vaccinium ovatum* Pursh.

PRIMULACEAE. *Anagallis arvensis* L., *Centunculus minimus* L.

PLUMBAGINACEAE. *Armeria maritima* (Mill.) Willd. var. *californica* (Boiss.) Lawr.

GENTIANACEAE. *Cicendia quadrangularis* (Lam.) Griseb., *Gentiana sceptrum* Griseb.

POLEMONIACEAE. *Navarretia mellita* Greene.

HYDROPHYLLACEAE. *Nemophila menziesii* H. & A.

BORAGINACEAE. *Allocarya bracteata* (Howell) Jtn., *A. reticulata* (Piper) Jtn. var. *rossianorum* Jtn., *Myosotis versicolor* (Pers.) Sm.

LAMIACEAE. *Pogogyne serpylloides* (Torr.) Gray ssp. *intermedia* Howell, *P. zizyphoroides* Benth., *Prunella vulgaris* L., *Satureja douglasii* (Benth.) Briq., *Stachys chamissonis* Benth., *S. emersonii* Piper, *S. rigida* Nutt. ssp. *quercetorum* (Heller) Epl.

SOLANACEAE. *Solanum nodiflorum* Jacq.

SCROPHULARIACEAE. *Castilleja latifolia* H. & A. ssp. *mendocinensis* Eastw., *Gratiola ebracteata* Benth., *Mimulus guttatus* Fisch., *Orthocarpus castillejoides* Benth., *O. erianthus* Benth., *O. pusillus* Benth., *Veronica americana* (Raf.) Schw., *V. scutellata* L.

PLANTAGINACEAE. *Plantago bigelovii* Gray, *P. hookeriana* F. & M. var. *californica* (Greene) Poe, *P. lanceolata* L., *P. major* L., *P. juncoides* Lamk. var. *californica* Fern.

RUBIACEAE. *Galium trifidum* L. var. *subbiflorum* Weig., *Sherardia arvensis* L.

CAPRIFOLIACEAE. *Lonicera involucrata* (Richards.) Banks.

CUCURBITACEAE. *Marah oreganus* (T. & G.) Howell.

CAMPANULACEAE. *Campanula californica* (Kell.) Heller.

ASTERACEAE. Heliantheae. *Wyethia angustifolia* (DC.) Nutt.

Madiinae. *Madia anomala* Greene.

Helenieae. *Eriophyllum staechadifolium* Lag., *Helenium bolanderi* Gray, *Lasthenia macrantha* (Gray) Greene var. *pauciaristata* Gray.

Astereae. *Aster chilensis* Nees, *A. subspicatus* Nees, *Baccharis pilularis* DC. ssp. *consanguineus* (DC.) Wolfe, *Bellis perennis* L., *Corethrogyne californica* DC. var. *obovata* (Benth.) Kuntze, *Erigeron glaucus* Ker-Gawl, *E. supplex* Gray, *Solidago spathulata* DC.

Anthemideae. *Achillea borealis* Bong., *Chrysanthemum leucanthemum* L., *Cotula coronopifolia* L., *Soliva sessilis* R. & P.

Senecioneae. *Erechtites prenanthoides* (Rich.) DC., *Petasites palmatus* (Ait.) Gray.

Inuleae. *Anaphalis margaritacea* (L.) B. & H., *Evax sparsiflora* (Gray) Jeps., *Gnaphalium luteo-album* L., *G. purpureum* L.

Cynareae. *Cirsium breweri* (Gray) Jeps., *C. quercetorum* (Gray) Jeps., *C. vulgare* (Savi) Ten.

Cichorieae. *Hypochoeris radicata* L., *Leontodon leysseri* (Wallr.) Beck, *Microseris bigelovii* (Gray) Sch.-Bip., *M. paludosa* (Greene) Howell, *Sonchus asper* L., *S. oleraceus* L.