Mendocino Pygmy Cypress Forest

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Introduction

The Mendocino Pygmy Cypress Forest (commonly referred to as "pygmy forest") is a rare and unique vegetation type that has long captivated botanists and soil scientists. The pygmy forest is very restricted in its distribution and was known from approximately 4,000 acres between Ten Mile River and Navarro River in Mendocino County (Sholars R. 1984). Due to permanent loss, recent estimates have been 2,600 acres (Davis et al. 1998). Unfortunately there continues to be unchecked clearing, dumping, and development in Mendocino Pygmy Cypress Forest. In light of this situation, it is crucial to protect the remaining Mendocino Pygmy Cypress Forest and heighten the understanding of this fragile and endangered ecosystem.

Status

Mendocino Pygmy Cypress Forest is designated by the state of California as a sensitive vegetation type with a global rank of G2, and state rank of S2.1 (ranks defined below). Within and adjacent to this sensitive vegetation type are three additional sensitive vegetation types, Sphagnum Bog, Ledum Swamp and Northern Bishop Pine Forest.

The Sphagnum Bog vegetation type is sporadically supported within low gradient portions of the Mendocino Pygmy Cypress Forest and has global rank of G3, and state rank of S1.1. One of the largest and deepest sphagnum bogs along the California coast, Robert E. Sholars Sphagnum Bog Preserve, is located within Mendocino Pygmy Cypress Forest. This bog has been visited for many decades by scientists. It was described by G. B. Rigg in 1933 in Science (77:535-536), and between 1950 and 1960 C.J. Heusser studied the pollen stratigraphy in this and other bogs along the Pacific Coast in order to reconstruct the late Pleistocene climates of the region (*Late Pleistocene Environments of North Pacific North America*, American Geographic Society Special Publication #35, 308 pages). Although the bog and immediate vicinity was acquired as a preserve by the College of the Redwoods Foundation, habitat degradation and development continue in the surrounding Mendocino Pygmy Cypress Forest and watershed affecting the hydrology and quality of this unique feature.

The Ledum Swamp vegetation type is commonly supported within low gradient portions of the Mendocino Pygmy Cypress Forest and has global rank of G2, and state rank of S2.1. This shrub dominated vegetation type is characterized by Labrador tea (*Ledum glandulosum*), and is a perennial wetland that is saturated to inundated for long periods during the year.

The Northern Bishop Pine Forest is often an adjacent vegetation type to Mendocino Pygmy Cypress Forest and has global rank of G2, and state rank of S2.2. Mistakenly this vegetation type has been locally

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referred to as "transitional" pygmy forest when in fact it is a separate vegetation type that intergrades with redwood forest and pygmy forest. The Northern Bishop Pine Forest is very limited in distribution, which is often poorly understood when within its range. Only in Humboldt and Mendocino counties does Bishop pine mix with other conifers, and elsewhere it forms distinct stands (Sawyer and Keeler-Wolf 1995). Interestingly for the genus *Pinus* that commonly hybridizes readily, certain populations of northern Bishop pines do not hybridize with the southern Bishop pines (biologically distinct), suggesting the populations have been isolated from each for a long time (Lanner 1999).

In addition to being a recognized rare vegetation type, Mendocino Pygmy Cypress Forest has many rare and uncommon species associated with it, which are presented in the two tables below.

Table 1: Rare Plant and Lichen Species

Scientific Name Common Name	Global Status	State Status	CNPS Status
Arctostaphylos mendocinoensis pygmy manzanita	G1	S1?	1B
Boschniakia hookeri small groundcone	G5	S1S2	2
Campanula californica swamp harebell	G3	S3.2	1B
Carex californica California sedge	G5	S2?	2
Cupressus goveniana ssp. pigmaea pygmy cypress	G2T2	S2.2	1B
Juncus supiniformis hair-leaved rush	G5	S2.2?	2
Lilium maritimum coast lily	G2	S2.1	1B
Pinus contorta ssp. *bolanderi* pygmy pine	G5T3	S3.2	1B
Rhynchospora alba white beaked-rush	G5	S3.2	2
Usnea longissima long-beard lichen	G4	S4.2	N/A

Table 2: Uncommon/Unique Regional Plant and Lichen Species

Scientific Name Common Name	Global Status	State Status	CNPS Status
Calamagrostis bolanderi Bolander's reed grass	G3	S3.2	4
Ceanothus gloriosus var. exaltatus glory brush	G3G4T3	S3.3	4
Cladina portentosa ssp. pacifica Pacific reindeer lichen	N/A	N/A	N/A
Cornus canadensis bunchberry	N/A	N/A	N/A
Sphagnum sp. peat moss	N/A	N/A	N/A
Veratrum fimbriatum corn lily	G3	S3.3	4

Abbreviations and Codes:
S-rank: reflection of overall condition of an element throughout its California range
G-rank: reflection of overall condition of an element throughout its Global range

T-rank: attached to the global rank, reflects the global situation of a subspecies or variety (G-rank will reflect the entire species)
S/G-rank H: all sites historical
S/G-rank Q: element very rare but there are taxonomic questions
S/G-rank X: all sites are extirpated (XC extinct in wild but exists in cultivation)
S1/G1: extremely endangered, less than 6 element occurrences (EOs) or less than 1,000 individuals or less than 2,000 acres
- **S1.1**: very threatened
- **S1.2**: threatened
- **S1.3**: no current threats known

S2/G2: endangered, 6-20 EOs or 1,000-3,000 individuals or 2,000-10,000 acres
- **S2.1**: very threatened
- **S2.2**: threatened
- **S2.3**: no current threats known

S3/G3: restricted range, 21-80 EO's or 3,000-10,000 individuals or 10,000-50,000 acres
- **S3.1**: very threatened
- **S3.2**: threatened
- **S3.3**: no current threats known

S4/G4: apparently secure; this rank clearly lower than 3 but factors exist to cause some concerns such as some threat or somewhat narrow habitat (no threat rank)
CNPS List 1A, plants presumed extinct in California.
CNPS List 1B, plants rare, threatened, or endangered in California, and elsewhere.
CNPS List 2, plants rare, threatened, or endangered in California, but more common elsewhere.
CNPS List 3, plants about which we need more information.
CNPS List 4, plants of limited distribution, a watch list.

Description

The Mendocino Pygmy Cypress Forest is a stunted, lichen-encrusted forest with two defining species, pygmy cypress (*Cupressus goveniana ssp. pigmaea*) and Bolander's pine (*Pinus contorta* ssp. *bolanderi*), that only occur together within this vegetation type. The pygmy forest has an exceptional coverage of terrestrial and epiphytic lichens with over 50 species recorded (Sholars T. 1997), and a distinct Ericaceous flora. The diminutive forest structure and water-saturated soils provides limited habitat for large and soil dwelling mammals, but provides wetland habitat for amphibians and scrub habitat for birds with 22 species of birds recorded (Sholars T.1997). The soils provide a habitat on which the regionally dominant redwood and Douglas-fir forests cannot survive, but that the pygmy forest's flora can tolerate. Interestingly, the flora and soils have co-evolved, with each component influencing the development of the other (Sposito 1992). The flora responds to the soil niche as well as modifies that niche (acid producing vegetation is thought to affect iron migration and development of the iron hardpan in the soil), which in turn reacts on the flora (Jenny et al. 1969). The Mendocino Pygmy Cypress Forest is generally characterized by the following species growing in association with each other:

Arctostaphylos nummularia	glossyleaf manzanita
Carex californica	California sedge
Cladina portentosa ssp. pacifica	Pacific reindeer lichen
Cupressus goveniana ssp. pigmaea	pygmy cypress
Gaultheria shallon	salal
Ledum glandulosum	Labrador tea
Pinus contorta ssp. *bolanderi*	Bolander's pine
Pinus muricata	Bishop pine
Rhododendron macrophyllum	rhododendron
Vaccinium ovatum	evergreen huckleberry
Xerophyllum tenax	bear grass

It should be noted that the pygmy cypress is not a genetic dwarf but demonstrates genetic plasticity with heights that can range from less than 1 meter to greater than 50 meters depending on fertility and depth of

soil (Lanner 1999). Bolander's pine similarly is not a genetic dwarf, and is unique among the pines (even other lodgepole pines) in that it lacks resin ducts, so that when a needle is crushed between your fingers no sticky resin is released (McMillan 1956, Lanner 1999).

Not typical of geological coastal terrace processes in western North America, the terraces in Mendocino County from Ten Mile River to Navarro River have been up lifted without significant warping or faulting and hence the development of five distinct and flat terraces (Sholars R. 1982). Mendocino Pygmy Cypress Forest occurs extensively on the third, fourth, and fifth terraces at elevations around 300, 425, and 650 feet respectively (Jenny et al. 1969). The weathered soils of the upper marine terraces with pygmy forest are ancient and have been estimated at several 100,000 years old to potentially over a half of a million years on the fifth terrace (Sholars T. 1997, Merritts, Chadwick and Hendricks 1991). The pygmy forest soils are nutrient-poor, sandy, and extremely acid with a pH not far from that of vinegar (2.8 to 3.9). These soils also have aluminum toxicity, and are underlain by an iron-cemented hardpan that inhibits root penetration and creates a perched water table. Also contrary to the dry, chaparral-like appearance of the pygmy forest, its soils are not arid, but are actually between saturation and field capacity moisture in summer, and saturated in winter when ponding commonly occurs. (Sholars R. 1982).

The soils associated with Mendocino Pygmy Cypress Forest are classified under two soil orders, Blacklock spodosol or Aborgine ultisol. These soil types are rare in California with the only other similar soils at approximately 10,000 feet in the high Sierra Nevada (Howard 1992). Brief descriptions of the soil types are presented below and are derived from the Natural Resources Conservation Service (NRCS) *Soil Survey of Mendocino County, California, Western Part* (1998):

- Blacklock are shallow soils with surface layer of gray loamy sand about 7 inches in depth, a subsurface layer of white and brown sandy loam about 7 inches in depth, and a weakly to strongly cemented hard pan about 47 inches in thickness. Very poorly drained soils with very slow water permeability, and available water capacity very low. Long soil saturation following episodic heavy rains December through April from surface to top of hardpan.
- Aborigine are very deep soils with surface layer of light gray and white sandy loam about 6 inches in depth, subsurface layer of very pale brown loam with brownish yellow mottles about 7 inches in depth, and a light gray subsoil with white to gray clay and sandy clay with red and brownish yellow mottles to depth of 61 inches or more. Very poorly drained soils with very slow permeability and available water capacity high. Long soil saturation following episodic heavy rains extending from surface to 12 inches to a depth of more than 60 inches.

Wetlands

Mendocino Pygmy Cypress Forest commonly support wetlands based on local hydrology, soils that perch water, and predominance of wetland plants (hydrophytes). The prevalence of hydrophytes (greater then 50%) is a strong wetland indicator that is widely utilized to classify a wetland. A standardized identification of hydrophytes has been developed by USFWS and is based on the correlation of vascular plant species with a wetland or upland indicator status. The USFWS has identified an indicator status for numerous plant species commonly associated with wetland areas on the national and regional level in *National List of Plant Species that Occur in Wetlands* (Reed 1988). The indicators reflect the probability of a species occurring in wetlands and are as follows:

OBL, obligate wetland plants with >99% occurrence in wetlands
FACW, facultative wetland plants with 67-99% occurrence in wetlands
FAC, facultative plants with 34-66% occurrence in wetlands
FACU, facultative upland plants with 1-33% occurrence in wetlands
UPL, obligate upland plants with <1% occurrence in wetlands
NI, no indicator (insufficient information) for the region (rated neutral)
NL, not listed (rated upland)
plus sign (+), frequency toward higher end of a category

minus sign (-), frequency toward lower end of a category
asterisk (*), indicates tentative assignment based on limited information.

A species indicator of OBL, FACW and FAC determines a hydrophyte. Although in the north coast region where fog and rainfall create overall moist conditions, obligate and facultative wetland plants have more significance in the determination of a wetland. Hydrophytes that commonly occur in the pygmy forest are cited below with regional indicator (Region 0):

Blechnum spicant deer fern	FAC+
Calamagrostis bolanderi Bolander's reed grass	FACW
Campanula californica swamp harebell	OBL
Carex californica California sedge	FAC*
Drosera rotundifolia round-leaf sundew	OBL
Gentiana sceptrum scepter Gentian	OBL
Helenium bolanderi coast sneezeweed	OBL
Hypericum anagalloides tinker's-penny	OBL
Juncus bufonius common toad rush	FACW*
Juncus supiniformis hair-leaved rush	OBL
Ledum glandulosum western Labrador tea	OBL
Lilium maritimum coast lily	FACW
Myrica californica wax myrtle	FAC+
Rhynchospora alba white beaked-rush	OBL
Tofieldia occidentalis ssp. *occidentalis* western tofieldia	OBL
Veratrum fimbriatum fringed false hellebore	OBL

Environmental Concerns

Mendocino Pygmy Cypress Forest occurs in a coastal area that has and continues to experience intense development pressures and high real estate values, and has been considered an insignificant forest type with little agricultural and forestry value, which has resulted in concentrated clearing, dumping, and development activities in the pygmy forest. These activities are serious threats to Mendocino Pygmy Cypress Forest and its associated wetlands and rare species, and its preservation has become a crucial concern. Pygmy forest soils have additional environmental concerns such as seasonally saturated soils with increased surface drainage, susceptibility to erosion, very poor permeability resulting in septic tank absorption failure, and low strength to support loads.

The majority of the Mendocino Pygmy Cypress Forest is located in unincorporated portions of Mendocino County, and outside the Coastal Zone. Unfortunately the County has no grading ordinance and building permits are ministerial, which do not require environmental oversight such as surveys for sensitive species and wetlands. Generally subdivisions of parcels are discretionary permits but building/grading can be ministerial permits, though more and more of these ministerial permits are being challenged in the courts. The two categories of permits are defined below.

- **Discretionary permits** are under California Environmental Quality Act (CEQA) jurisdiction and require the exercise of judgment or deliberation when a project decision is made (CEQA Guidelines 15357), if a project contains both ministerial and discretionary elements it is not exempt [CEQA Guidelines 15268 (d)].
- **Ministerial permits** are statutory exemption from CEQA's jurisdiction (not a categorical exemption under CEQA) and describe a decision applying fixed, objective standards with little or no judgment required as to the wisdom or manner of carrying out the project [Pub. Res. Code sec 21080 (b) (1) and CEQA Guidelines §§15268 and 15369]

Many counties have been challenged and lost on their interpretation of what qualifies for a ministerial permit (such as grading with Napa vs. Sierra Club). The following is an excerpt from the *CEQA Deskbook* (Bass, Herson, and Bogdan, 1999) discussing this issue:

> *"Building, grading, and demolition permits, although often ministerial, are considered discretionary if the particular permit ordinance allows the exercise of at least some discretion that can be used to reduce environmental impacts. Generally, courts have interpreted the scope of the ministerial project exemption narrowly, and it should be therefore be applied with caution."*

Lastly without environmental review, necessary permits from the Army Corps of Engineers (ACOE) for wetland impacts from development become the responsibility of the property owner, and the County is potentially amiss in allowing ministerial type of permitting that has the foreseeable consequence of putting the buyer at risk of fines and restorative mitigation measures with ACOE.

Conservation

Conservation concerns for Mendocino Pygmy Cypress Forest began in the mid 1900's with the dedicated efforts of Hans and Jean Jenny. Hans Jenny was a renowned soil scientist and professor of pedology (science of soil development) at University of California at Berkeley, and Jean was his wife. Hans Jenny's conservation campaign was galvanized by a University of California field trip in the 1950s to Jackson State Demonstration Forest (JSDF), which included consideration of a plan to convert acres of pygmy forest to a eucalyptus plantation on these public lands (Howard 1992). It should be noted that later in the 1960s JSDF began to set aside for protection its tracts of pygmy forest. In the mid 1970s Robert Sholars and his wife Teresa came to Mendocino County to research this unique ecosystem for Robert's doctoral work and Teresa's master's work. Robert's doctoral dissertation from the University of California at Davis became the basis for his publication of the small volume, *The Pygmy Forest and Associated Plant Communities of Coastal Mendocino ,California – Genesis, Vegetation, Soils*. His studies, like those of Hans Jenny, led to a deep appreciation and conservation concern for the pygmy forest. He and Jean Jenny promoted the 1988 Sierra Club lawsuit that resulted in the pygmy forest qualifying as an Environmentally Sensitive Habitat Area (ESHA) under California Coastal Act and being identified as such in Coastal Element of the General Plan of Mendocino County. Unfortunately, the ESHA designation applies only to the Coastal Zone and much of the acreage of the pygmy forest is outside the Coastal Zone, and remains to this day unprotected on private lands. Their work and conservation efforts are memorialized with the Hans Jenny Pygmy Forest Reserve in the Van Damme State Park, and the Robert E. Sholars bog outside of the town of Fort Bragg. The efforts these scientists coupled with other individuals and organizations such as the Sierra Club, Nature Conservancy, California Institute of Man in Nature, Save-the-Redwoods League, California State Parks, and California Native Plant Society have championed for the preservation and preserved tracts of pygmy forest from development and conversion. Other helpful legislation has been the California Environmental Quality Act (CEQA) of 1970 and California Coastal Act (CCA) of 1976.

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