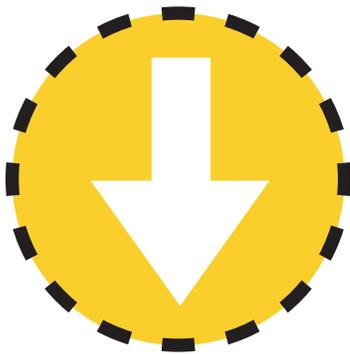


Measuring the Health of the Mountain: A Report on  
Mount Tamalpais' Natural Resources (2016)

(Chapter 9 excerpts)

ONE  
TAM

# SERPENTINE BARREN COMMUNITY ENDEMIC



**Condition:**  
**Caution**

**Trend: Declining**

**Confidence:**  
**Moderate**



## WHY IS THIS RESOURCE INCLUDED?

Serpentinite, California's state rock, creates serpentine soils, which are characterized by low amounts of calcium, high amounts of magnesium, relatively heavy concentrations of nickel, chromium, and other heavy metals, and low levels of nitrogen. Only certain plant species are able to survive in these soils. Serpentine is a rare soil type statewide, further limiting the distribution of plants that are specifically adapted to its harsh characteristics.

Serpentine barrens are characterized by open, rocky soil and support mostly scattered annuals such as jewel flowers, rosinweed (*Calycadenia multiglandulosa*), navarretias, and a few perennial plants such as lomatiums and buckwheats. Many rare, locally rare, and Mt. Tam endemic plants may also be found within these areas.

## OVERALL CONDITION

There are 96 patches of various rare taxa on 30 acres of serpentine barrens in the One Tam area of focus, constituting approximately 0.2% of the open space in the One Tam area of focus.

## DESIRED CONDITIONS

Although not calculated yet, some level of historic occupancy for the two suites of species identified in Metrics 1 and 2 below is desirable.

## STRESSORS

**Non-native Species Encroachment:** The unusual soils of these habitats make them largely resistant to invasion, but barbed goatgrass (*Aegilops triuncialis*) and purple false brome (*Brachypodium distachyon*) are encroaching upon them, and lack of fire may allow native shrubs or grasses to overtake open areas.

**Trampling:** The open landscapes of serpentine barrens make them attractive to recreationists, and vulnerable to trampling.

**Climate Change:** The relative rarity of serpentine soils limits where serpentine-adapted species could migrate if needed

in response to shifting temperature and precipitation patterns predicted under different climate change scenarios.

**Atmospheric Nitrogen Deposition:** Air pollution contains reactive nitrogen compounds like NO<sub>x</sub>, ammonia, and nitric acid that deposit on surfaces and act as nitrogen fertilizer. Impacts of N-deposition are well documented across California, and include increased annual grass and weed growth in serpentine soils. Mt. Tam spans a N-deposition gradient from quite clean coastal air on the west slopes (<2 lbs-N ac<sup>-1</sup> year<sup>-1</sup>) to local hotspots (~10 lbs-N ac<sup>-1</sup> year<sup>-1</sup>) on the eastern flanks close to urban areas. Serpentine barrens may be particularly sensitive. Effects on serpentine grasslands are observed at ~6 lbs-N ac<sup>-1</sup> year<sup>-1</sup>. Increased annual grass growth in serpentine barrens reduces open ground and crowds out the diminutive annual forbs restricted to open areas.

## METRICS AND GOALS

Metric	Condition Goal(s)	Status
<b>Metric 1</b> Number or percent of patches occupied by “common” rare plant species	Undefined	
<b>Metric 2</b> Number or percent of patches occupied by “rare” rare plant species	Undefined	
<b>Metric 3</b> Recovery goals met for marin dwarf flax and tamalpais lessingia	As stated in Recovery Plan for Serpentine Soils of the San Francisco Bay Area: <ul style="list-style-type: none"> <li>• Seven Marin dwarf flax populations from Carson Ridge north, mostly outside area of focus</li> <li>• Two Marin dwarf flax populations south of Carson Ridge to San Francisco</li> <li>• Six Tamalpais lessingia populations in its entire historic range</li> <li>• The seeds of both species are in two seedbanks</li> <li>• Populations are defined as 2,000+ plants and populations must be stable or increasing for 20 years</li> </ul>	

## INFORMATION GAPS

**Patch-related Data:** We do not know if “barren” patch size influences rare species composition or occupancy resilience, or if patches be subsampled or rotationally sampled to determine health of the whole system.

**Potential Population Enhancement areas:** We need to identify suitable areas for augmentation.