

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

(Chapter 17 excerpts)

ONE
TAM

NORTHERN SPOTTED OWL

Strix occidentalis caurina



Condition: Good

Trend: No Change

Confidence: High



WHY IS THIS RESOURCE INCLUDED?

Iconic and charismatic Northern Spotted Owls are good indicators of Marin County's forest health, as their success depends on the presence of diverse, robust evergreen forest ecosystems in this area. Northern Spotted Owls are important upper-level predators that feed on a variety of rodents, especially dusky-footed woodrats (*Neotoma fuscipes*).

One Tam land management agencies have a wealth of inventory and long-term monitoring data on this species covering most of Marin County. Data on long-term trends in Northern Spotted Owl territory occupancy, reproductive success, and nesting habitat preferences help managers track population trends, avoid nesting season disturbances, and evaluate the impacts of potential threats including encroaching Barred Owls (*S. varia*), Sudden Oak Death (SOD), and climate change.

OVERALL CONDITION

The Northern Spotted Owl was listed as federally threatened in 1990 under the Endangered Species Act and also as threatened under the California Endangered Species Act in 2016. Northern Spotted Owl numbers appear to be dramatically decreasing across their range, which extends from southern British Columbia to Marin County, California. In contrast, Marin's Northern Spotted Owl population appears stable.

California Northern Spotted Owl demographic monitoring sites, Green Diamond Resource Company, Hoopa Tribe Reservation, and Northwest California, are all located in the northwest coastal portion of the state. In general, these sites show patterns of declining territory occupancy, with probability of occupancy dropping from around 0.8–0.9 in the mid-1990s–2000 to closer to 0.6 in 2016. Estimated mean rates of population change were all below 1.0, indicating declines, except for the Green Diamond Reserve site where Barred Owl removal was occurring. Barred Owls were shown to have a dramatic effect on territory extinction rates across all demographic monitoring sites.

Mendocino Redwood Company (MRC) manages 229,000 acres of forests mainly in Mendocino County, with a small acreage in Sonoma County, encompassing approximately 160 Northern Spotted Owl territories. Territory occupancy has ranged from 0.54–0.85 and averaged 0.68 from 2000–2015. Occupancy in 2015 was the lowest during this period at 0.54. However, low territory occupancy was also recorded in 2003 at 0.58 and 2009 at 0.56. Fecundity has been

variable, but ranged from about 0.05—0.5 from 1989—2015. There appears to be a slight decline in fecundity over this time period, with the absence of high fecundity years after 2009. Of significant note has been a sharp increase in the number of Northern Spotted Owl territories with Barred Owl detections, which jumped from four sites in 2009 to 22 in 2010 and peaked at 47 in 2013. This does provide evidence of a marked increase in Barred Owl detections in forests only about 120 kilometers north of Mt. Tam.

Marin County's Northern Spotted Owls are unique in their isolation from these Northern Spotted Owl populations to the north and by their relatively high density and fecundity. Genetic work indicates that they have some unique haplotypes and that there is more gene flow out of the population than coming in. They have also only recently been impacted by Barred Owls. On Mt. Tam, Northern Spotted Owls occur at high densities in native evergreen forests, most with some conifer component.

Annual monitoring of Northern Spotted Owls in Marin County has been conducted since 1999, with the National Park Service (NPS) covering federal and California State Parks (State Parks) lands and Point Blue Conservation Science (Point Blue) monitoring on Marin Municipal Water District (MMWD) and Marin County Park (MCP) property and adjacent land. Long-term NPS monitoring is designed to cover a series of randomly selected sites, 36 of which are currently monitored, with additional management sites added as necessary.

Similarly, Point Blue annually monitors a set of historically occupied territories on behalf of MMWD and MCP, with the episodic addition of other suitable habitat that may be affected by management actions in the foreseeable future. Thirty such sites were monitored in 2015. Both NPS and Point Blue follow standard U.S. Fish and Wildlife Service (USFWS) protocols for determining nesting status. The pooled monitoring of Marin County Northern Spotted Owls represents a sample that is not completely randomly determined. However, in some years it covers close to two-thirds of the known Marin County population and we do not see clear differences in the NPS compared to Point Blue data sets, indicating that these pooled data are a good representation of the range of Northern Spotted Owl habitat and landscape conditions for the Mt. Tam area of focus. These current monitoring efforts on and around the mountain indicate that Northern Spotted Owl territory occupancy is high and relatively steady, and that their fecundity is variable.

DESIRED CONDITIONS

A healthy population of Northern Spotted Owls on Mt. Tam would remain stable or increase over time. Additionally, existing high levels of pair occupancy and fecundity are maintained within the observed normal range of variability, or above long-term average values based on monitoring data. Lastly, the threat from Barred Owls would remain low.

STRESSORS

Barred Owls: This eastern American species has expanded its range westward into the Pacific Northwest, and more recently southward into California, including Muir Woods in 2002. Researchers have found that Barred Owls negatively impact Northern Spotted Owl reproduction and survival, as they are slightly larger, are more aggressive and eat a wider range of prey. Although ongoing monitoring has not resulted in any Barred Owl detections in Marin County since 2015, managers will continue to check for their presence.

Habitat Loss: In Marin County, Northern Spotted Owls live in a mix of forest types, including Douglas-fir (*Pseudotsuga menziesii*), coast redwood (*Sequoia sempervirens*), bishop pine (*Pinus muricata*), and even hardwoods like California bay (*Umbellularia californica*) and oaks. Though much of their habitat here is on protected lands, Northern Spotted Owls will nest in areas of relatively high recreational use and residential areas, and habitat protections have been important in maintaining habitat quality. Because some Northern Spotted Owl pairs nest adjacent to residential areas, development of private lots can also be a concern.

Sudden Oak Death (SOD): This disease, caused by the water mold *Phytophthora ramorum*, affects many species of native trees in the One Tam area of focus. Widespread die-off of oak trees and understory species such as tan oak as a result of SOD is dramatically changing the structure of forests where Northern Spotted Owls live, which could have positive or negative impacts on the birds. Research conducted in Marin County demonstrated a decrease in dusky-footed woodrat abundance with increasing SOD disturbance, likely because the woodrats use oaks for food and shelter. On the other hand, the opening up of the forest understory may make it easier for Northern Spotted Owls to hunt.

Climate Change: Results from climate change models are mixed for Northern Spotted Owls. Bird distribution models developed by Point Blue show an increase in potential Northern Spotted Owl distribution in the future. In addition, they were not identified as an at-risk species in a vulnerability assessment of California birds. However, Glenn et al. (2011) found that warmer, wetter winters and hotter, drier summers—as some models predict for this area—negatively affect

Northern Spotted Owl survival at six study areas in Oregon and Washington. Northern Spotted Owl habitat in Marin County is different than the habitat farther north, and the primary prey species, the dusky-footed woodrat, is different than the prey in Oregon and Washington. Other potential climate impacts to Northern Spotted Owls in Marin County include drought, catastrophic fire, or more frequent large storms.

Noise and Disturbance: Disturbance from recreational use, trail construction and maintenance projects, and other human activities can detrimentally affect Northern Spotted Owls during their February–July breeding season. Ongoing Northern Spotted Owl monitoring tracks nest locations to help managers avoid disruptive activities near nests on public lands. However, public knowledge of Northern Spotted Owl noise regulations in residential areas is sporadic, so owls in these areas are particularly at risk to disturbance.

Rodenticides: Northern Spotted Owls are at risk of potentially deadly rodenticide exposure, especially where they live adjacent to residential areas.

METRICS AND GOALS

Metric	Condition Goal(s)	Status
Metric 1 Pair territory occupancy	<ul style="list-style-type: none"> • Pair territory occupancy remains high • Pair territory occupancy within the range of variability of the long-term average • Pair territory occupancy in the “Good” range 	
Metric 1 Fecundity	<ul style="list-style-type: none"> • Fecundity remains high • Fecundity within range of long-term average variability • Fecundity in the “Good” range 	
Metric 1 Barred owl presence	No Barred Owls present, which is the historic condition for Marin County	

INFORMATION GAPS

Sudden Oak Death: While this disease has impacted forest habitats where Northern Spotted Owls breed, it is unclear how observed changes in breeding habitat as a result of SOD may affect Northern Spotted Owl foraging or its primary food resource, the dusky-footed woodrat.

Climate Change: It is unknown how climate change may affect Northern Spotted Owl fecundity, survivorship, or their habitat.

Factors Affecting Fecundity: Weather and climate, landscape and habitat factors, and the presence of Barred Owls affect Northern Spotted Owl fecundity across their entire range, but their effects have not been studied specifically in Marin County or Mt. Tam area of focus.

Dispersal: It is not known how juveniles disperse and where they travel to while waiting for opportunities to occupy breeding territories.

Habitat: Habitat was identified as an important metric, but it needs to be further analyzed to be used to assess how it affects the Northern Spotted Owl population. Agencies currently have data on the size of nest trees, information about the area immediately surrounding them, and GIS data on landscape features. Landscape analysis around nest trees has revealed some of the features associated with Northern Spotted Owl habitat.

Dusky-footed Woodrats: Dusky-footed woodrats were considered a potential metric to assess Northern Spotted Owl populations, as they are their primary food resource. However, we do not currently have good data on woodrat

abundance across Northern Spotted Owl sites. This metric is being developed as an indicator under mammals, with photo data from the Marin Wildlife Picture Index Project.

Survivorship: Survivorship, or the probability that an owl survives and stays in the study area from one year to the next, is measured by banding and re-sighting Northern Spotted Owls during annual monitoring. Mark-recapture analyses are then used to calculate survivorship estimates. In addition, having marked individuals provides information on territory turnover and shifts in the locations of territories over time. Survivorship is an important metric in assessing Northern Spotted Owls, but is unlikely to be adopted, unless part of a research based project. Due to limited resources, NPS and Point Blue stopped banding Northern Spotted Owls in 2003 after initiating a banding program in 1998, and focused their efforts on continuing to collect territory occupancy and fecundity data. Incorporating monitoring survivorship would allow us to participate in the periodic demographic reviews of status and trend that are conducted for the Northern Spotted Owl demographic monitoring areas.