

## **Purpose of and Need for Action**

The purpose of the North 49 Project is to begin restoring fire-adapted forest ecosystems by creating an all-age, multistoried, more fire-resilient forest that approximates pre-settlement conditions. For this document, pre-settlement refers to the time prior to the suppression of fire in 1905. The desired conditions include:

1. Open forested areas that act as fuel breaks characterized by fire-resilient tree species and reduced surface fuel loads and ladder fuels, where periodic low-intensity surface fires can be safely reintroduced and wildfires can be safely fought;
2. Sustainable forested areas dominated by fire-resilient tree species with reduced surface fuel loads and supportable tree densities that decrease the risk of mortality from insects, drought and disease, establishing healthy multistory forests that provide habitat for late seral species such as California spotted owls, American marten and northern goshawks.

### **Need to Improve Fire-Resiliency**

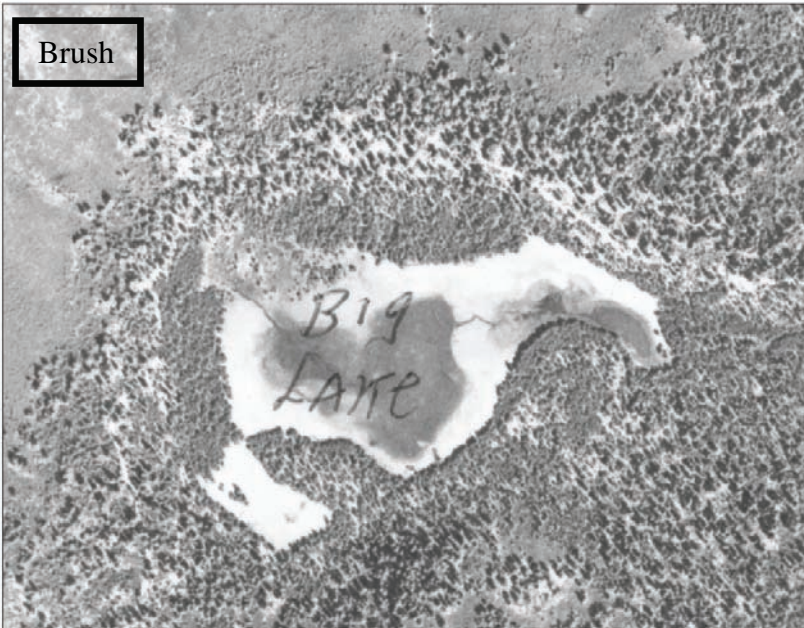
The reduction of fire-resilient pine species and the build-up of fuels have staged the North 49 project area for a potentially landscape-scale forest-replacing fire. Fire history studies in Lassen Volcanic National Park and Thousand Lakes Wilderness show different fire return interval and fire severity. The study in Lassen Volcanic National Park suggests that mixed conifer forests had a pre-settlement return interval of 8-16 years. On average these fires were of low to moderate intensity depending on vegetation and location. The Thousand Lakes Wilderness Fire History study shows fire return intervals were from 4-37 years depending on vegetation, elevation and aspect. The severity of these fires was mostly moderate to high. These fires all occurred before the start of fire suppression. The North 49 Project area is on the southern boundary of the Thousand Lakes Wilderness. This proximity establishes the expectation that some of the North 49 Project area would burn with the same moderate to high severity that the wilderness area did historically.

Management practices in the North 49 Project area have disrupted the historic fire return interval and contributed to the increase of both surface and ladder fuels. Considering the increase in fuels and the historic severity of fires in the surrounding area, there is a moderate to high chance that an escaped wildfire would be a large high severity fire that would put the safety of suppression personnel, the public, resources, and property at risk.

### **Need to Improve Forest Health**

The North 49 Project has an abnormally high density of trees within the area as well as high mortality due to competition, disease and insects. These factors are all indications of an unhealthy forest. Information gathered from surveyors' notes working for the General Land Offices (GLO) from 1881 - 1883 describes a different landscape. Using the GLO surveyors' notes and equations modified from Manies et al. (2001), it is estimated there were approximately 79 trees, six inches or greater, per acre in the pre-settlement

period. Current estimates indicate approximately 400 trees, six inches or greater, per acre within the North 49 Project area (Table 1). The number of trees per acre in the North 49 Project area has increased to more than five fold since 1883. High tree densities increase inter-tree competition for essential resources such as water, nutrients and light; causing stress and increased mortality. When trees become stressed they are vulnerable to insects, disease and drought.



Big Lake, CA 1941 (North 49 Project Area)



Big Lake, CA 2005 (North 49 Project Area)

Comparison of aerial photographs from 1941 with those from 2005 clearly demonstrates significant encroachment of conifers into meadows, aspen stands, brushfields and riparian areas. Without the continued check by fire, conifers (specifically white fir) have become prolific and established themselves in numbers and in areas historically unseen.

The current condition of the North 49 Project area is not a sustainable forest. Competition among trees will continue to cause mortality, increasing the amount of surface fuels and increasing the risk for a stand replacing fire. Trees will continue to be stressed making them vulnerable to death from insects, disease and drought. With the continued build-up of fuels and densely packed trees very little vegetation such as grasses, forbs and shrubs will be able to grow beneath the canopy reducing the habitat suitability of the area for small prey species (i.e. mice, voles and small birds) and their predator species such as California spotted owl, northern goshawk and American marten. Meadows, aspen stands and riparian vegetation would continue to be encroached upon by conifers diminishing open habitats used for nesting and forage. Brushfields, in some areas would be replaced by white fir, decreasing habitat for deer, nesting neo-tropical birds and other brush-utilizing species.

## **Improve Forest Diversity**

Species diversity within the North 49 Project area has substantially diminished over the last 125 years. The GLO surveys indicate that white fir has increased more than ten fold while sugar pine and ponderosa pine have decreased. The increased ingrowth of white fir and the loss of the pine have changed the composition of the North 49 Project area from the pre-settlement period. Historically, white fir accounted for approximately 31 percent of the species composition. Today, white fir makes up approximately 68 percent of the species composition. Even more significant is the loss of the pine component. Historically, sugar pine comprised approximately 22 percent of the species composition and yellow pine (a reference to ponderosa and Jeffrey pine) comprised approximately 17 percent, based on the GLO surveyors' notes. Today, sugar pine comprises approximately 3 percent and yellow pine comprises approximately 11 percent of the forest composition. This loss of species diversity dramatically influences the sustainability of the forest by reducing resiliency to fire, drought, insect and disease.

Diversity of tree species within a forest helps prevent the loss of forest components to insects, disease or drought. Many insects and diseases are species specific, dependent on a single tree species (i.e. Jeffrey pine). Thus, if there is an insect or disease outbreak chances are that only one species would be affected and not the entire forest. Some tree species respond more effectively to drought than others and can withstand below normal precipitation. A diverse forest ensures that some trees could survive extreme environmental events such as fire, insects, disease or drought.

Ponderosa and Jeffrey pines are fire-resilient species possessing thick bark at a relatively small diameter which insulates them from the heat of a moderately intense fire. In contrast, white fir does not usually obtain a similar bark thickness until it is much older and larger. Therefore, heat from low intensity fires can kill small to mid-sized diameter white fir and heat from a moderately intense fire may kill white fir of mid to large-sized diameters.

Table 1. Average trees per acre by species in North 49 Project area years 2002 and 1883.

Species	2002		1883	
	Avg TPA	% TPA	Avg TPA	% TPA
White Fir	270.80	68.00	24.79	31.00
Red Fir	25.70	7.00	9.01	11.00
Ponderosa/ Jeffrey Pine	46.00	11.00	13.07	17.00
Sugar Pine	11.50	3.00	17.35	22.00
Cedar	13.00	3.00	4.28	5.00
Lodgepole Pine	30.10	7.00	8.34	11.00
Doug Fir	2.50	0.62	0.00	0.00
White Pine	0.07	0.02	0.00	0.00
Aspen	0.00	0.00	0.45	0.60
Black Oak	0.00	0.00	0.45	0.60
Mahogany	0.00	0.00	1.35	2.00
<b>Total</b>	<b>399.70</b>		<b>9.10</b>	

A multi-age, multi-storied forest provides a diverse age range and structural diversity that ensures the sustainability of the forest. A newer generation of vegetation would be established to replace the older generation. This also provides habitat for a large variety of wildlife species, including species associated with both early seral and late seral ecosystems.

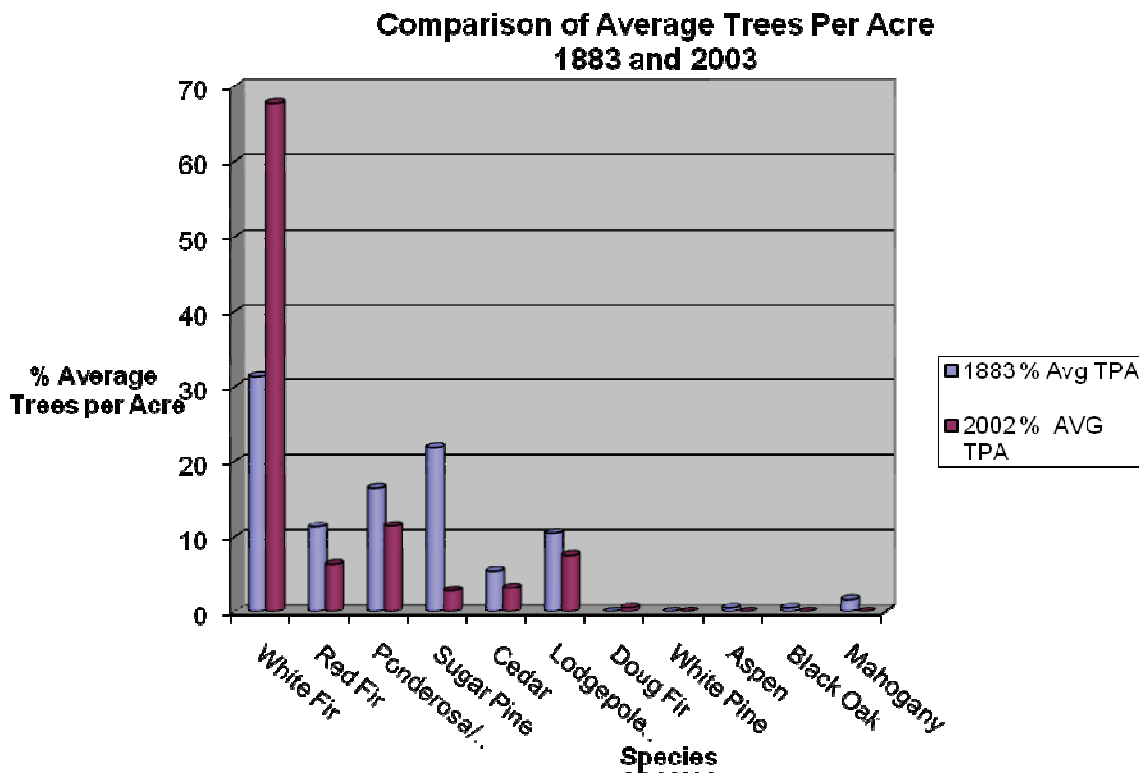


Figure 2. Historic and existing species composition of the North 49 Project area