

Old-growth Forest Changes After the 2003 Canoe Fire

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A special thanks to the volunteers who helped collect the data including Karen Underwood and Allan Wiegman

Introduction

The Canoe Fire burned 11,104 acres including over 5,000 acres of redwood and redwood/Douglas-fir in Humboldt Redwoods State Park during September and October of 2003. Although this is only a case study with two alluvial and two upland plots, the data collected appears to be representative of the fire effects observed during the Canoe Fire as a whole. Flame lengths were typically 6 to 12 inches on alluvial flats and a little higher on upland sites.

Canoe Fire on Alluvial Flat



Canoe Fire in Uplands

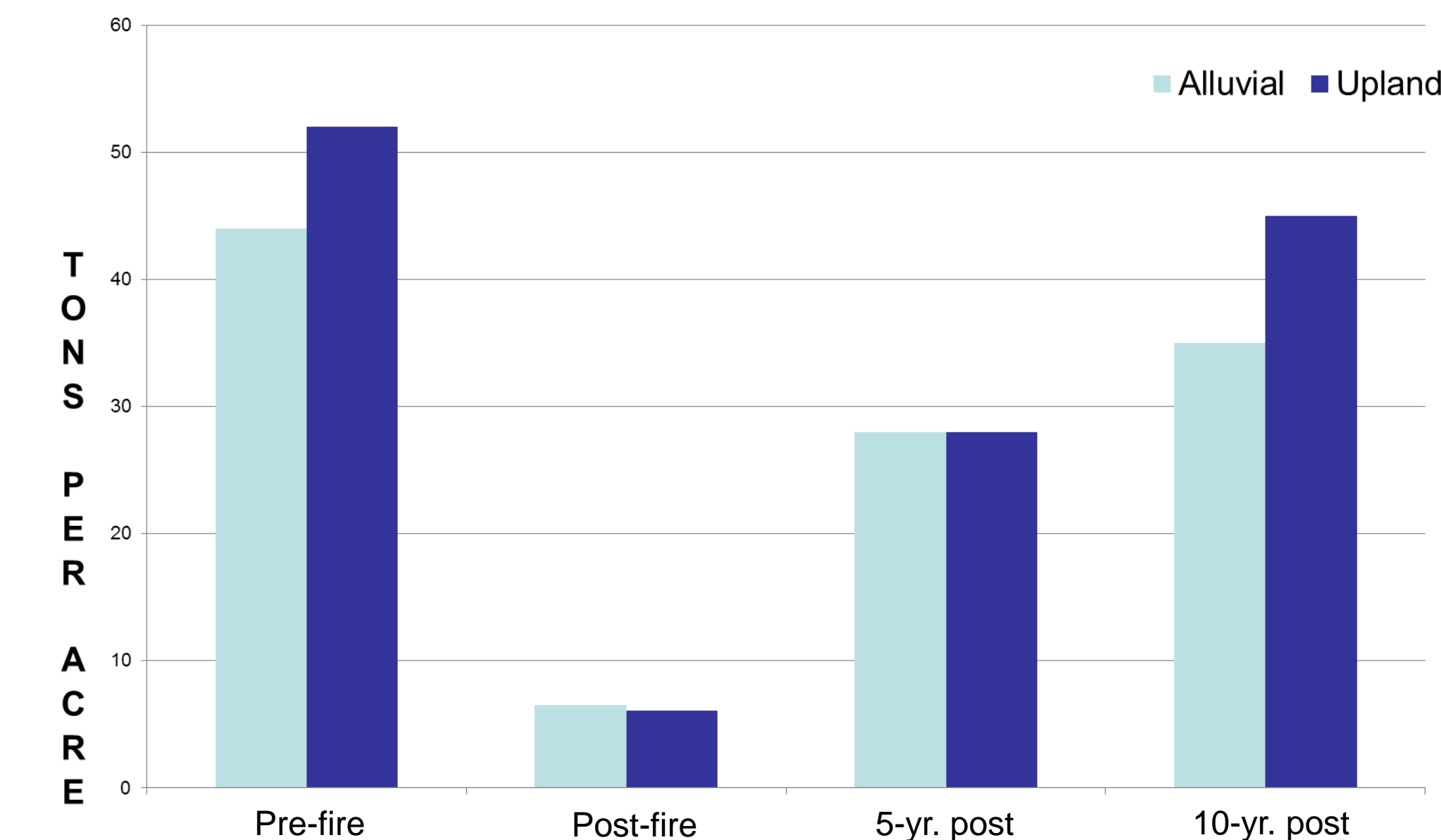


Methods

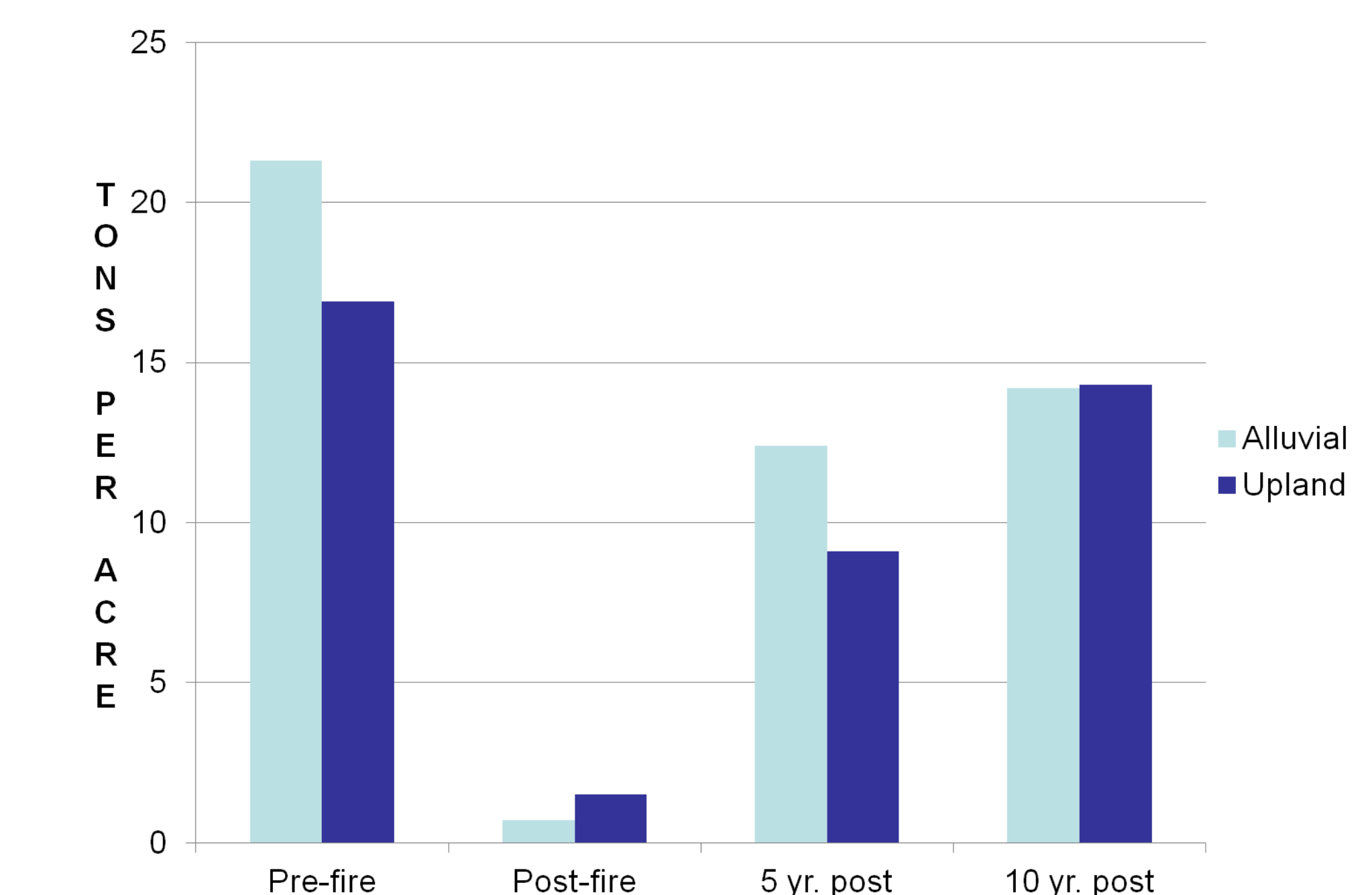
Four plots 120' by 300' were installed immediately prior to the fire's arrival, two on the alluvial flat (pure redwood) and two in upland (Redwood/Douglas-Fir). Fuel data, tree failures, distance to the bottom of the live crown, scorch height and basal area were measured for trees > 24" DBH (old-growth trees). Plots were revisited immediately after the wildfire, and again at five year intervals to assess **immediate and delayed fire mortality** and to understand **when there would there be enough fuel to burn again**.

FUELS

Changes in Total Fuel Load on Alluvial and Upland Plots Over Time

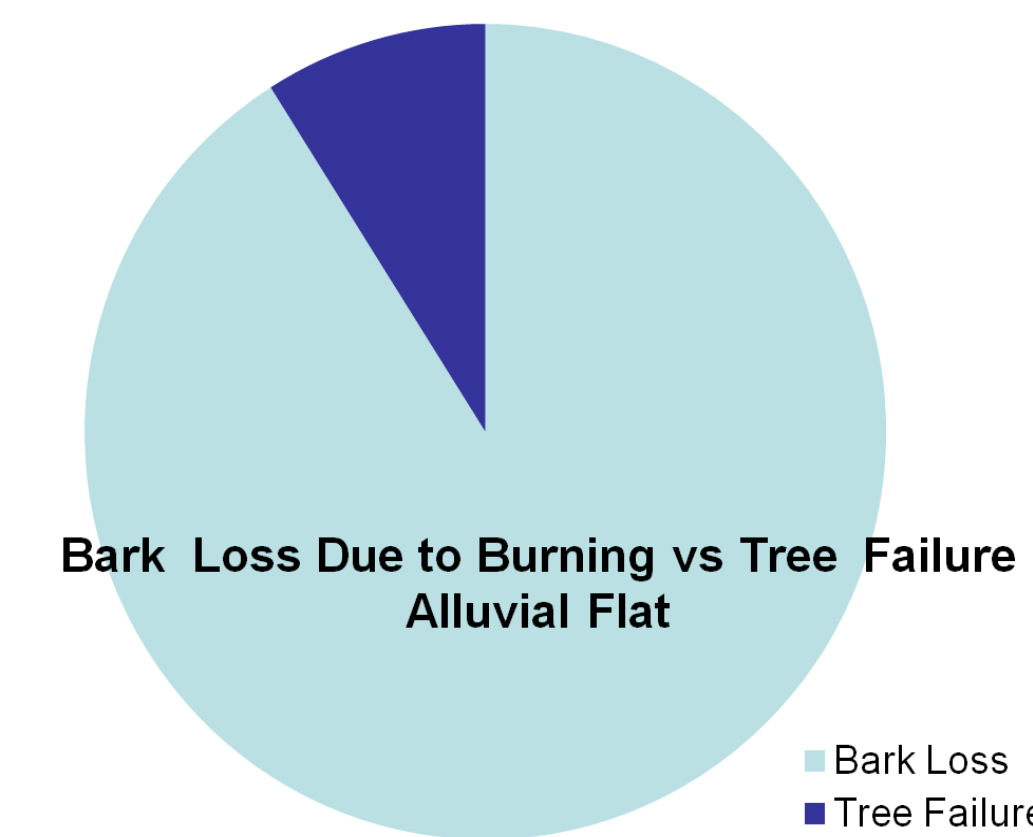


Changes in Total Fine Fuel Load on Alluvial and Upland Plots

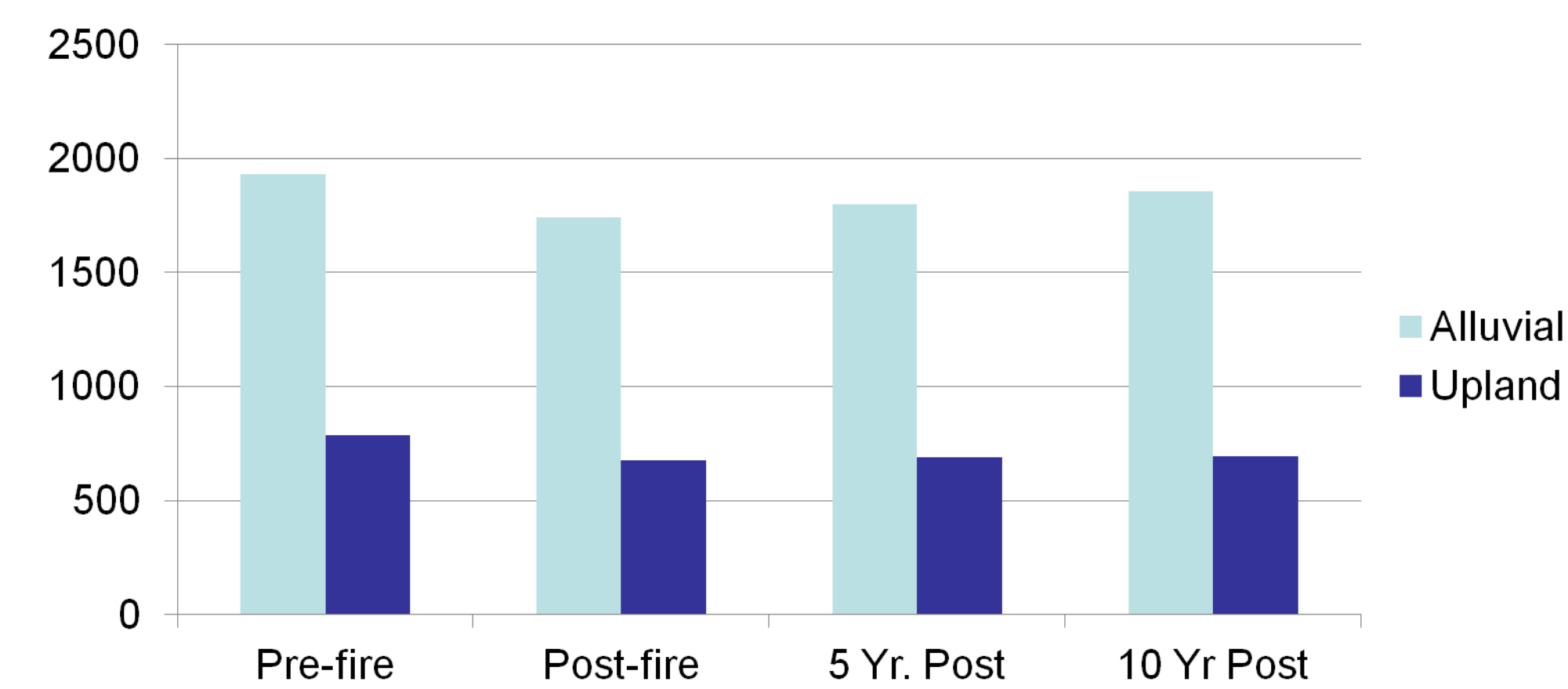


BASAL AREA

Redwood Alluvial Flat Only one out of 62 redwood trees (> 24" dbh) collapsed in the two alluvial plots during the fire or in the following 10 years. Basal area approached pre-fire levels ten years post fire. Loss of bark due to burning explained 91% of basal area reduction.



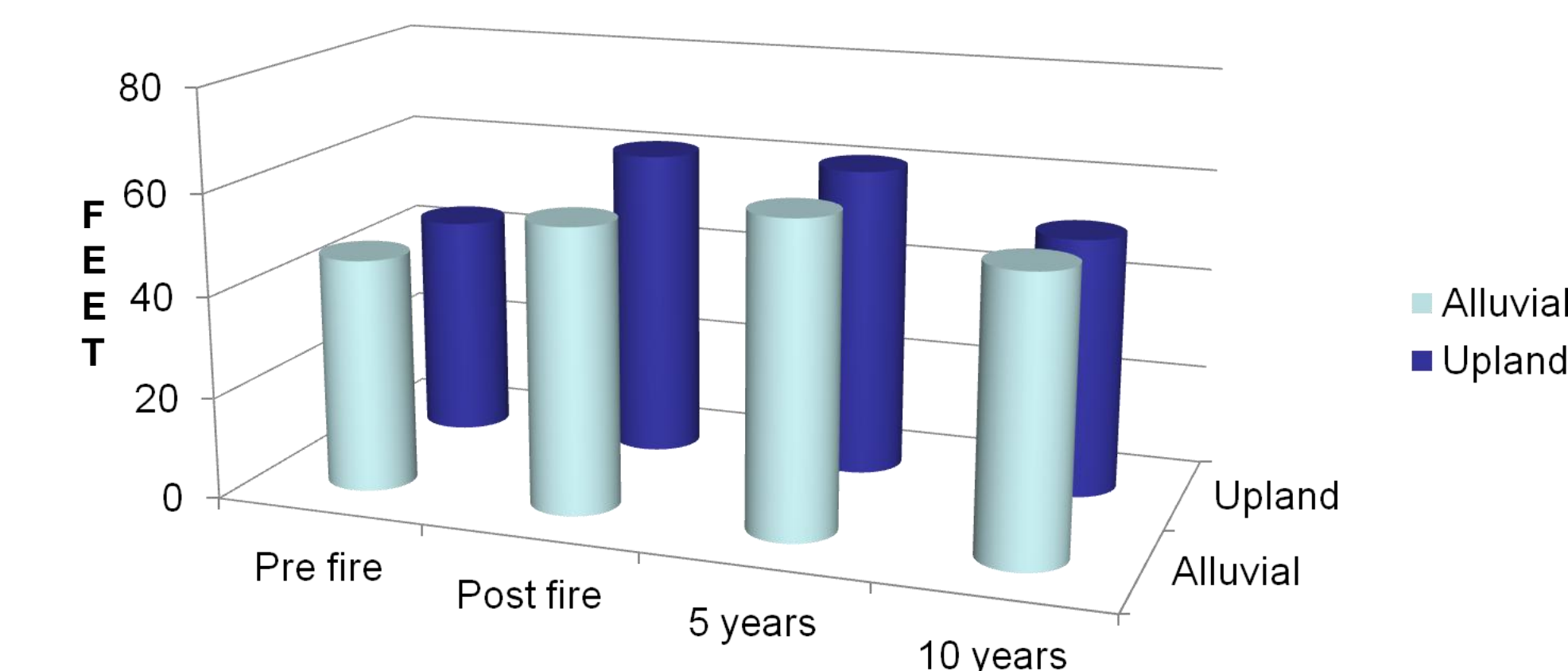
Upland Basal Area Loss In contrast to the alluvial flats, two Tan Oak (100% of population), one madrone (33%), two Douglas-fir (11%) & two redwoods (4%) failed before 10 years.



Basal area loss in **uplands** was 12% at 10 years and 4% on **alluvial** Flats.

HEIGHT TO LIVE CROWN

Distance to the bottom of the live crown increased on **alluvial** flats from 46' to 56'. In **uplands** the distance increased from 44' to 51'. **This may decrease crown fire potential.**



Discussion

Fire Intensity The data and observations suggest that the potential for a high intensity ground or crown fire was reduced during the 10 years following the Canoe Fire because:

- Total ground fuels were reduced by 14% on alluvial flat plots and 13% on upland plots 10 years after the fire.
- Fine fuel and litter fuel loadings were reduced by 33% on alluvial flats and 15% in uplands.
- Distance to the bottom of the live crown, which reduces the chance of a crown fire and crown scorch, increased from 46 feet to 55 feet (18%) on alluvial flats after 10 years and from 44 feet to 51 feet (17%) in the upland forest.

Basal Area Retention and Tree Failures Basal area appears to have approached pre-fire levels 10 years after the fire on **alluvial** flats. It appears likely that if trees entering the 24" or larger dbh category were accounted for, the basal area would have likely exceeded pre-fire levels. Only one of 69 old-growth redwood tree failed.

Basal area of trees 24" or larger on **upland** sites declined by 12% in the 10 years after the fire. Tree mortality of trees over 24" or larger was: 100% of tan oaks; 11% of Douglas-fir and 4% of redwoods. These basal area losses would likely have been less if trees entering the 24" dbh were included.

Fire history research at this site suggests that pre-suppression fire return intervals were in the low teens in this forest, which is consistent with evidence of fuel recovery. Restoration of the historical frequent low intensity fires might help limit wildfire spread, prevent crown fire by maintaining distance to the bottom of the crown and sustain basal area. To minimize old-growth redwood failure during prescribed burns, it may be prudent to reduce fuels next to trees and in cat faces. Thanks to Save The Redwoods League for funding.

