Bark Beetle mortality priority treatment areas, layer and inventory methods

See graphs and charts that follow this narrative

Analysis Methods:
Southern California Bark Beetle Mortality: Priority Treatment Areas based on 2003 Aerial Survey Data:

Purpose:
Approximately one million acres of forest within and directly adjacent to the San Bernardino, Cleveland and Angeles National Forests have experienced severe tree mortality due to a drought-induced pine bark beetle epidemic. These forests are directly adjacent to major metropolitan areas in San Diego, Riverside and San Bernardino Counties. The risks from fire and falling trees pose a major threat to public safety, private property, and ecosystem health. This analysis supports State and Federal government decision making regarding treatment priorities and funding allocations to alleviate bark beetle mortality related hazards.

Estimating Treatment Areas:
Prioritizing Treatment areas: Since many of the high priority treatment areas are overlapping (i.e. transmission line buffers and road buffers are often overlapping), treatment areas were assigned to an asset class based on an assessment of the highest priority need for treatment, with an eye towards identifying the primary funding source. For example the primary funding source for treatment of transmission lines is from the electrical utility companies, while the primary funding source for treatment of roads is government. The following treatment areas are presented in priority order, with the highest priority areas listed first.

For this analysis Treatment areas are defined as:
1. Areas within 150 feet of electricity transmission lines
2. Areas within 150 feet of Primary Roads
3. Areas within 150 feet of Secondary Roads
4. Areas having a housing density of 1 house per 20 acres or greater
5. Areas outside of Federal lands, having a housing density of less than one house per 20 acres or greater and slopes less than or equal to 30%.

Final Mortality Layer Development: A single continuous layer depicting mortality within existing vegetation conditions was developed from several sources. This process combined mortality assessment layers from three different sources with a 2003 existing vegetation layer. The layers used to collectively define the analysis extent and magnitude of mortality were the 2004 aerial sketch mapping polygons of forest mortality, a 1997-2002 Landsat TM based change detection layer, and a 2002-2003 Landsat TM based mortality detection layer. The sketch mapping polygons primarily defined the analysis extent while the change detection layers provided information about the relative magnitude of mortality. These separate layers along with a 1997-2003 fire history layer were combined into a single mortality grid. The fire history data allowed for the discrimination of pest and drought associated mortality from fire related mortality.

The 2003 existing vegetation layer was used to provide information about vegetation type within mortality areas. This layer was also used as the spatial base for a final mortality map for forested types. The relatively fine scale delineations of vegetation composition and structure in the vegetation layer were used to create a larger stand based spatial definition of the change detection mortality pixels. This also had the effect of standardizing the spatial variability between the change detection pixels and the coarser sketch mapping polygons.

The process of labeling vegetation polygons with mortality labels, referred to as regionalization, was the result of a spatial overlay between vegetation layer polygons and a grid of the combined mortality layers. The change detection pixels originally classified mortality into little or no change, low, medium and high classes which were defined by ranges of canopy cover loss. Uncertainty about the thematic precision and spatial application of these classes resulted in assigning each change class a specific canopy loss value in the combined mortality layer. Mortality delineated by the sketch mapping polygons, but not classified in the change detection layers, was assumed to be very low mortality. The following table shows the canopy cover loss values assigned to each mortality class.

Mortality Class	**Canopy Loss Range**	**Mid-point value**
Very Low mortality	0-15%	8%
Low mortality	16-40%	28%
Medium mortality	41-70%	56%
High mortality	>70%	86%

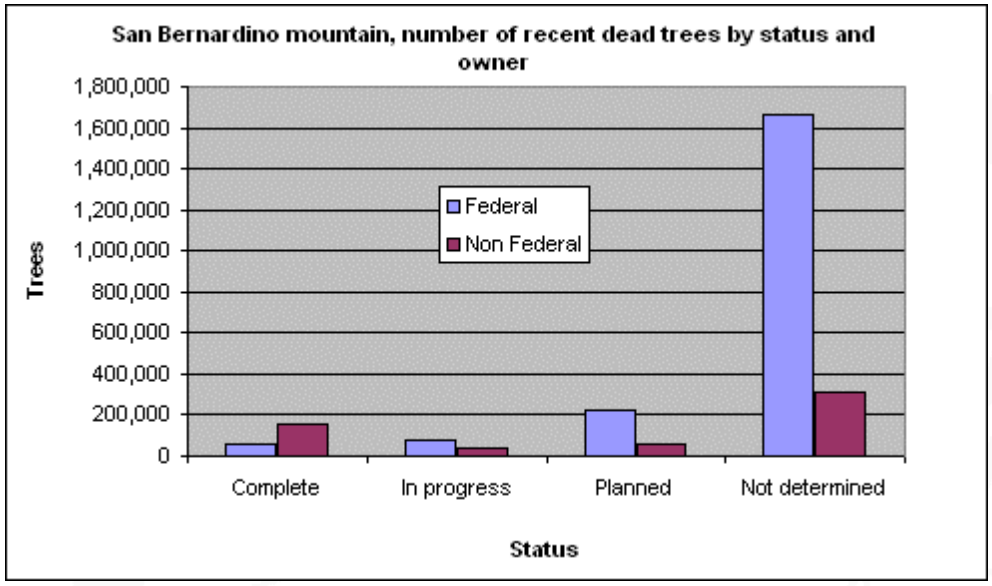
Inventory Data: The estimates of mortality were mostly derived from National Forest inventory data. The majority of the inventory plots were established on the Angeles, San Bernardino and Cleveland National Forests in 1995-1996 with some additions in 2000. The 1993-1994 periodic inventory plots were available on lands outside National Forests. Thus, the established inventory data gave estimates of numbers of trees and volume by species and diameter class in the mapped area *prior* to the mortality event. Forestland plots that fell in non-mortality inclusions or in wildfire areas that occurred between 1997 and 2003 fires were excluded from the analysis for the mapped project area.

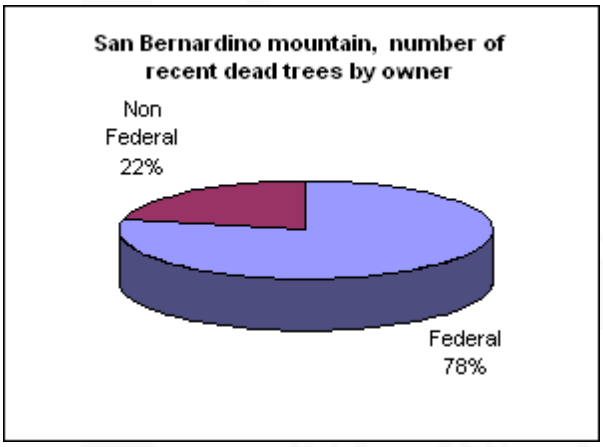
The 124 sample plots within the mapped area were reviewed for mortality on 1:15,840 scale color aerial photography flown on Sept. 5-6, 2003. If any tree mortality was observed on the photography for a plot location, the plot was subsequently visited on the ground by field crews in spring of 2004. Each tree over 5 inches in DBH that had been tallied live at the previous inventory was checked to see if it died. There were 92 sample plots measured in the field (88 on National Forest lands and 4 on lands outside National Forests). The 32 additional sample plots (30 National Forest and 2 outside National Forests) where no mortality had occurred, as determined on the aerial photography, were also included in the sample. The inventory sample of 124 plots allowed investigators to derive estimates of the number of trees, biomass and volume by species and diameter class within the mapped area that had recently died, as well as determine the remaining live trees.

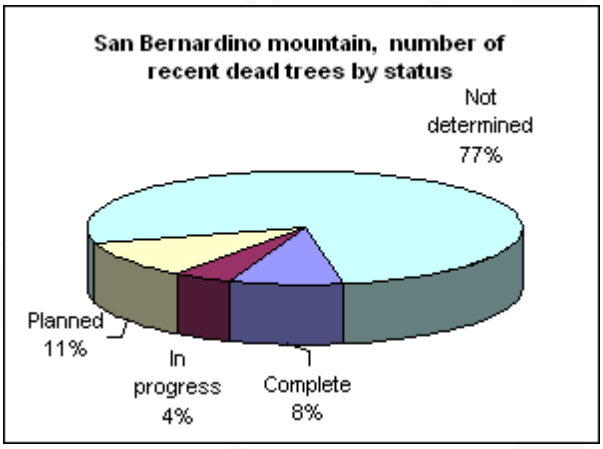
San Bernardino mountain number of recent dead trees by status and owner

Appen.#6a

Owner	Complete	In progress	Planned	Not determined	Grand Total
Federal	59,287	78,104	222,194	1,664,443	2,024,028
Non Federal	156,544	37,556	54,048	313,267	561,415
Grand Total	215,831	115,660	276,241	1,977,710	2,585,443







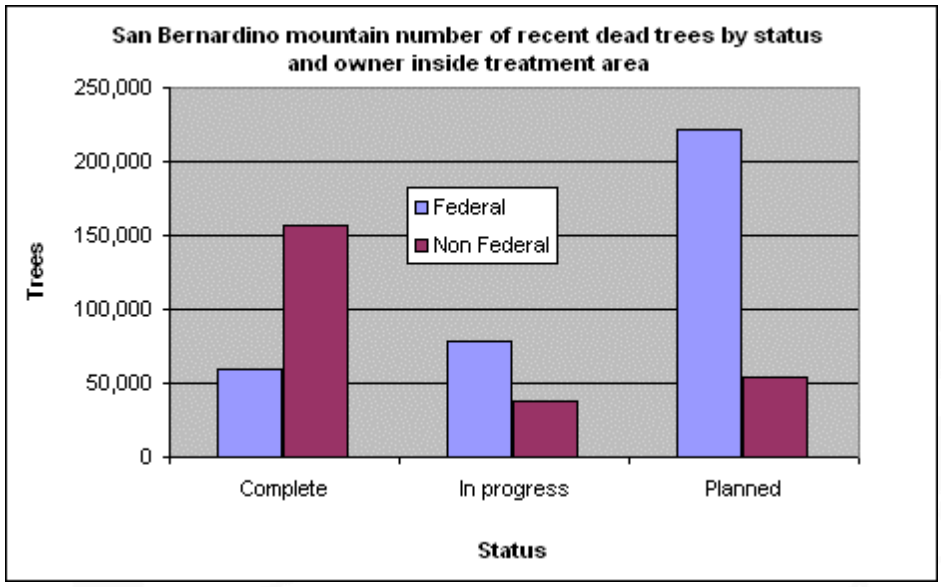
Status data: May 2005
Inventory data: Spring 2004
Vegetation Strata data: Fall 2003

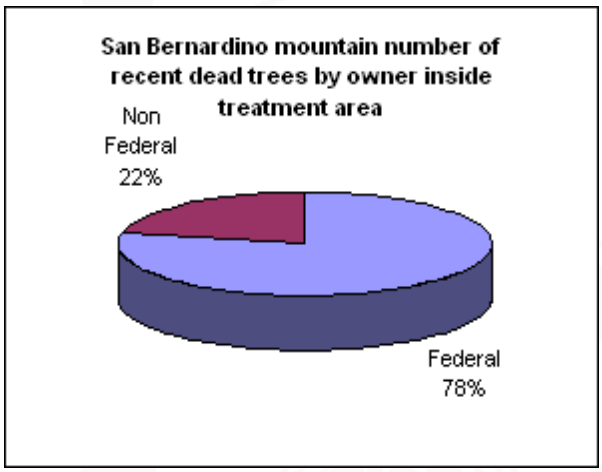
Estimates of the number of recent dead trees removed by agency are based on Statistical estimates derived from 117 FIA plots re-measured in the field, and converted to per-acre estimates. Per acre estimates are then multiplied by the number of acres completed, in progress or planned. These estimates are not derived from project reports of dead trees removed, since not all agencies report this information.

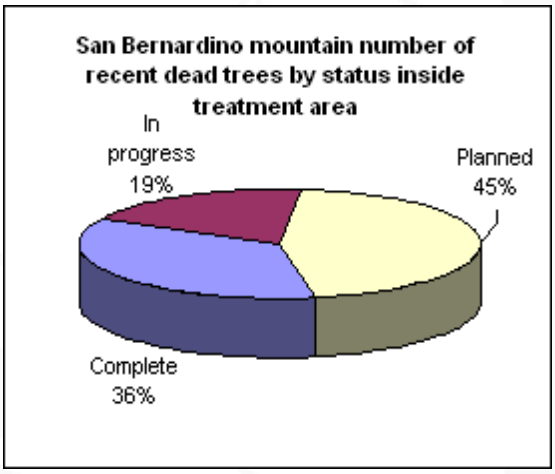
San Bernardino mountain, number of recent dead trees by status and owner inside treatment area

Appen.#6b

Owner	Complete	In progress	Planned	Grand Total
Federal	59,287	78,104	222,194	359,585
Non Federal	156,544	37,556	54,048	248,148
Grand Total	215,831	115,660	276,241	607,733







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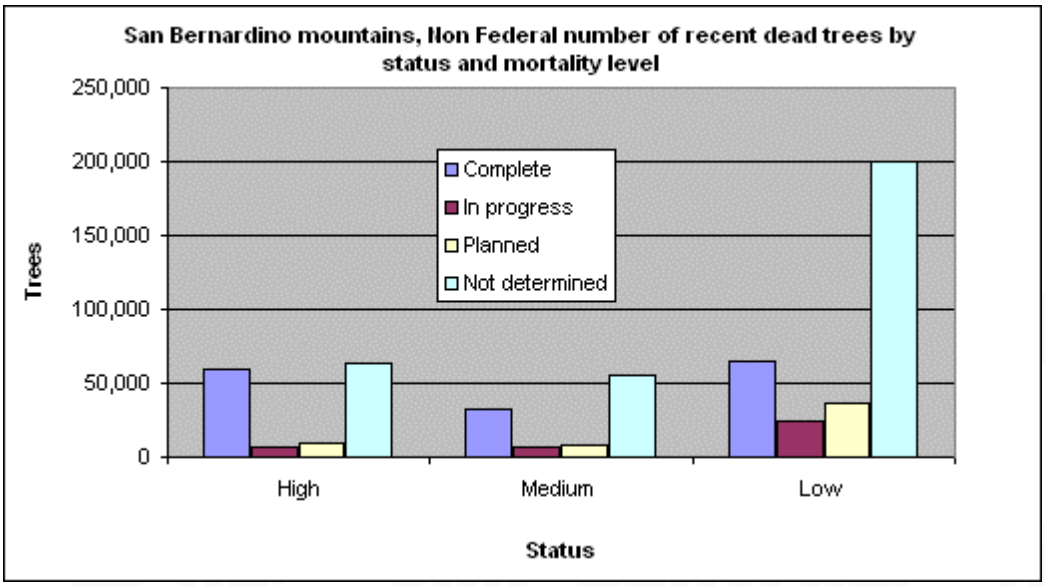

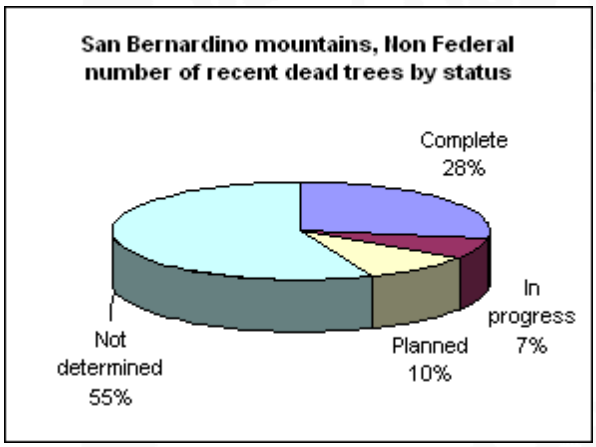

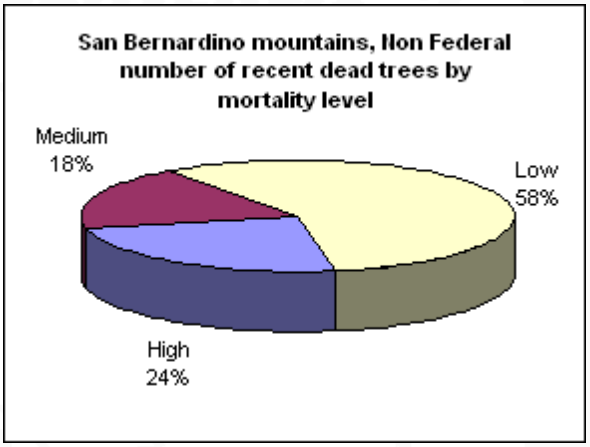

Status data: May 2005
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Vegetation Strata data: Fall 2003

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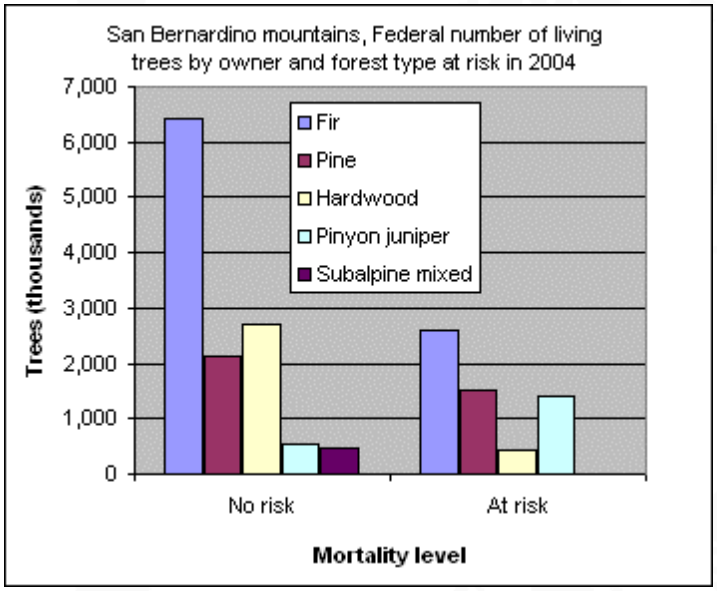
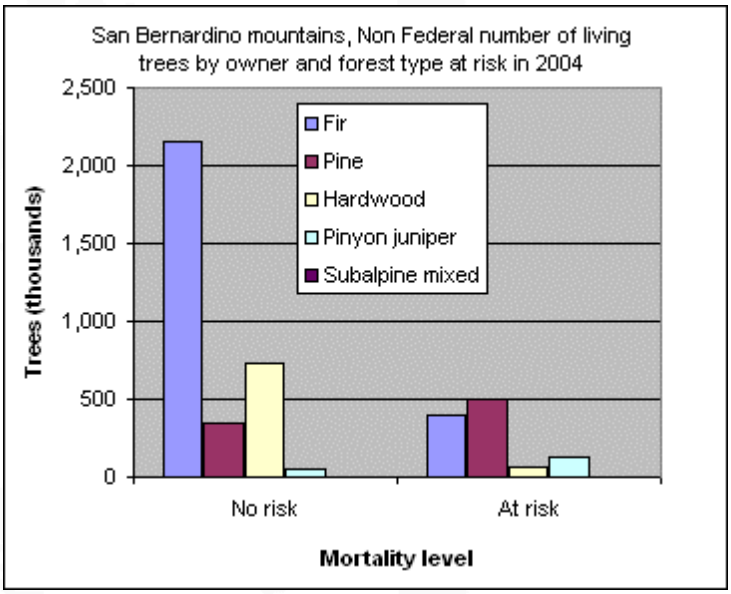
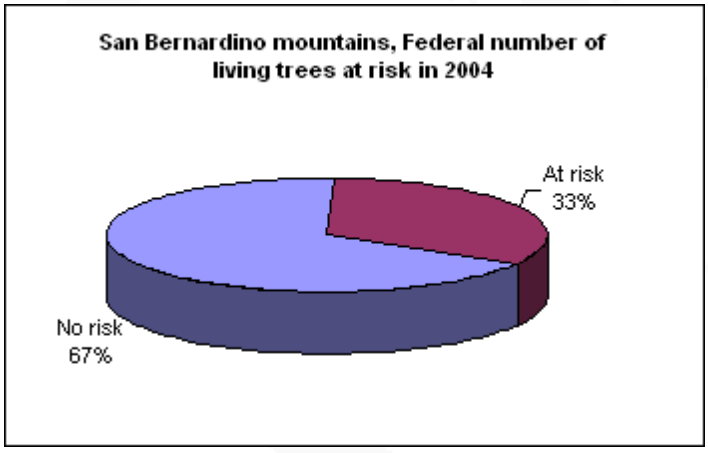
San Bernardino mountains, number of living trees by owner and forest type at risk in 2004

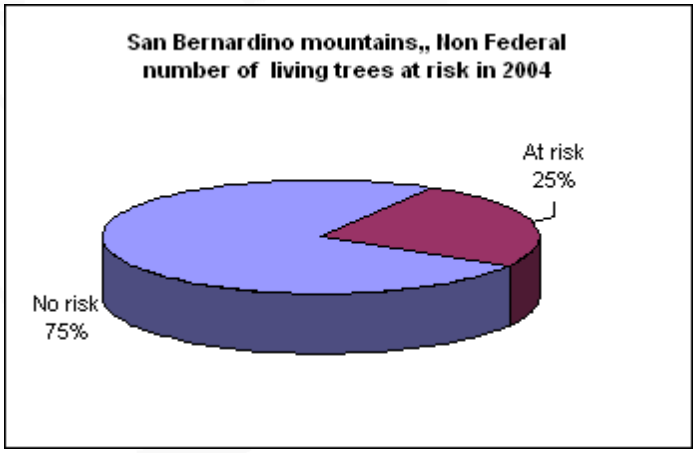
Appen.#6d

Owner	Forest type	No risk	At risk	Total
Federal	Fir	6,430,580	2,611,439	9,042,019
	Pine	2,112,125	1,510,388	3,622,512
	Hardwood	2,695,150	418,174	3,113,324
	Pinyon juniper	548,217	1,418,599	1,966,816
	Subalpine mixed	451,417	2,333	453,750
	Total	12,237,488	5,960,933	18,198,421
Non Federal	Fir	2,158,403	403,085	2,561,488
	Pine	348,402	505,296	853,698
	Hardwood	732,105	70,233	802,339
	Pinyon juniper	53,512	124,422	177,934
	Subalpine mixed	1,771	0	1,771
	Total	3,294,193	1,103,036	4,397,229
Grand total		15,531,681	7,063,970	22,595,650









Status data: May 2005
Inventory data: Spring 2004
Vegetation Strata data: Fall 2003