# BLACK BEAR FEEDING ON SECOND GROWTH REDWOODS: A CRITICAL ASSESSMENT.

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ABSTRACT: Black bear (Ursus americanus) feeding on coastal redwood (Sequoia sempervirens) has been documented for several years. Quantitative analysis of the feeding damage has not been done. Feeding damage was analyzed on six belt transects in two drainages of the Smith River, Del Norte County, California. Bears are selecting trees of specific d.b.h. classes and not feeding on the size class most abundant. Damage estimates are presented for number of trees per hectare and percentage of stands that are impacted by bear feeding. A proposed approach to bear management is presented with emphasis on a multi-management approach.

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## INTRODUCTION

For a number of years people have been aware of black bears feeding on conifers (Lutz 1949, Zeedyk 1957, Maser 1967). In an account of black bear behavior Wright (1910) describes the fondness that bears showed to various conifers during the spring months during periods of high sap flows. In 1988 Giusti and Schmidt gave a descriptive overview of the damage, management strategies of the past decades, and changes in public attitudes towards black bear control programs. The conflicts that resulted in the latter part of the 1980s prompted this study of evaluating black bear feeding on second-growth redwoods in a quantitative manner.

The type of damage, seasonal occurrence, and tree species affected in northwestern California is described in detail by Glover (1955) and Giusti (1988, 1990). In brief, the damage most frequently occurs on trees between 10 and 20 inches d.b.h., with a few trees being fed on between 5 and 10 inches and still fewer fed on that are greater than 20 inches. No trees less than 5 inches d.b.h. have ever been reported or observed fed upon. The season of occurrence is limited to the spring months of May and June with damage sometimes extending into the early part of July.

In every case the bark is removed from near the base of the tree and peeled upwards in long strips. Once the bark is removed the cambial layer is exposed and the bears use their incisors to scrape at the moist wood. Bears exhibit this behavior not only near the ground level but will begin climbing the tree and feeding as they work their way upwards. In some cases bears will remove all of the bark from trees that are nearly 50 feet tall, climbing as high as the tree can support the body weight of the animal. The trees damaged are often clustered and the clusters scattered throughout the forest. Damage can occur both near roads and skid trails as well as in areas that have no visible signs of vehicular access. In many cases the literature has cited instances where this type of feeding behavior follows a thinning operation in the stand (Maser 1967, Poelker and Hartwell 1973, Schmidt 1987).

This paper examines data collected which identifies which age class of trees are most impacted, what percent of the stand is represented by the size class most impacted, and data are then extrapolated to determine the extent of the damage and the number of trees being affected.

In addition to the evaluation of field data, a discussion of current socio-political ramifications is presented with suggestions given that may lead to a practical solution of managing both bears and redwoods in a fashion agreeable to all parties.

## METHODS

Two areas were selected to evaluate bear feeding behavior on redwoods. Both areas are drainages of the Smith River in Del Norte County, California. The two sites are in the Rowdy Creek and Dominie Creek drainages. The area is in extreme northwestern California less than 5 air-miles from the California-Oregon border.

Sites were selected because of their accessibility, similarity to other sites in the area that were having feeding damage, similarity to one another, and the presence of damage. All work was done on forest lands owned by the Simpson Timber Company. The damage reported in this study occurred during the spring of 1985.

A total of six belt transects, 10 m × 100 m, were established in the two drainages, each study site having three. All trees within the transects were measured with a diameter tape. Trees were characterized by size class into six categories; 0-5", 5-10", 10-15",15-20", 20-25", and >25". Both damaged and undamaged trees were measured in a similar fashion.

## RESULTS

A total of 381 trees were measured in the six belt transects. The Rowdy Creek study sites had 188 trees while the Dominie Creek sites had 192. In the six transects, 41 trees had signs of bear feeding damage (10.7%); in the Rowdy Creek transects, 23 of the 188 trees were damaged (12.3%); on the Dominie Creek site, 18 of 192 trees were damaged (9.3%). The percent damage on each of Rowdy Creek transects varied from 8.5% (8 of 94 trees) to 20.9% (9 of 44 trees) (Fig. 1). On the Dominie Creek sites damage varied from 4.2% (3 of 72 trees) to 14.2% (9 of 63 trees) (Fig. 2).

Damage was restricted to trees greater than 5 inches d.b.h. and less than 25 inches (Fig. 3). On all sites the bears fed most heavily on trees that were 10-20" d.b.h. ($p>0.01$) while the most abundant tree class, 0-5", was never fed upon ($p>0.01$). The abundance of size classes within the transects and the percent damage sustained is shown in Figure 4. Bears are selectively feeding on the trees that are the least abundant in the stand ($P>0.01$).

Based on the frequency of damage found within the transects, the number of trees damaged varied from three trees per .1 hectare to 9 trees per .1 hectare. Through extrapolation this equates to damage densities of between 30 and 90 trees/ha. (Figs. 5 and 6).

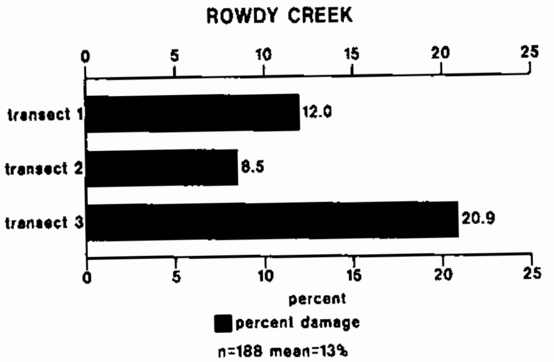


Figure 1. Percent of damage on second-growth redwoods on each of three belt transects on the Rowdy Creek site, Smith River, California.

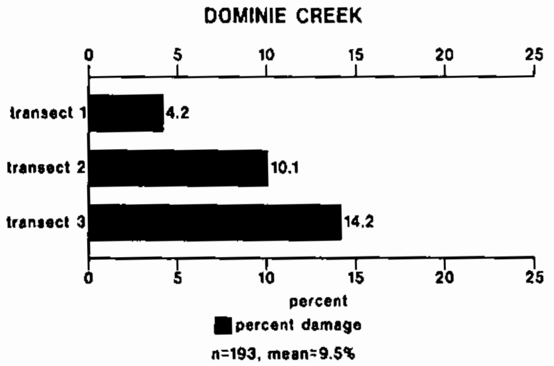


Figure 2. Percent of damage on second-growth redwoods on each of three belt transects on the Dominie Creek site, Smith River, California.

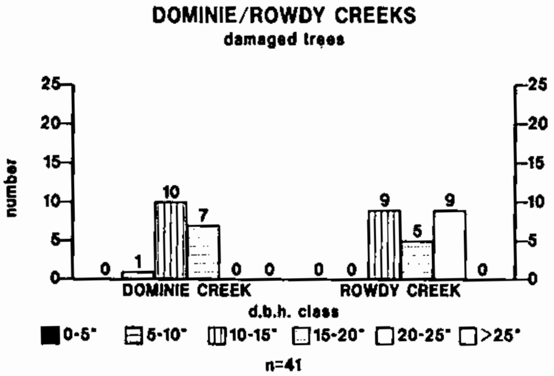


Figure 3. Distribution and size of redwoods that sustained feeding injuries at both Rowdy Creek an Dominie Creek sites.

## DISCUSSION

A quantitative approach to black bear feeding damage on second-growth redwood proved what Giusti and Schmidt (1988) suspected from their cursory inspections of the damage. Black bears do not feed on trees less than 5 inches in size, although this size class is the most abundant. In every case where damage was documented bears selected trees that were between 5 and 25 inches. Since these stands are relatively young, damage is heaviest in the size of trees that were the least abundant. Consequently, the trees that sustained the highest percent of damage are the trees which are being actively managed. Hence, they are considered to be the most valuable.

In each of the transects damage levels were higher than first suspected. Both sites, Rowdy Creek and Dominie Creek, had levels of similar damage, though the range of feeding damage varied greatly between transects. However, the levels sustained in both sites far exceeds the levels cited most often in the lay press. As in many cases of vertebrate damage, the damage is often clumped and scattered throughout an area. In the case of black bear feeding, the same distribution pattern is true. The damage is not evenly distributed throughout the stand. Giusti (1988) pointed out that the damage is not restricted to just roads and skid trails but can be found in areas void of such access points. However, the existing roads and trails are often used by bears as evidenced by the high number of tracks and scats found.

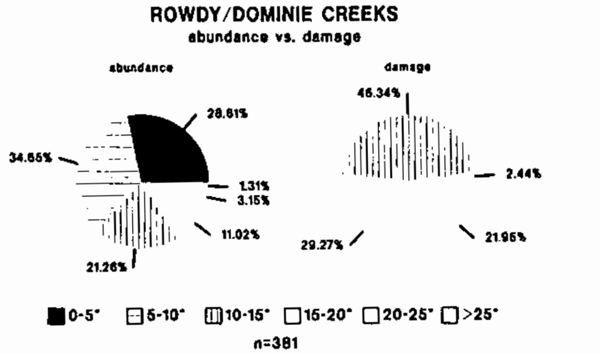


Figure 4. Abundance of each size class of trees and the amount of damage occurring on each dbh class relative to abundance.

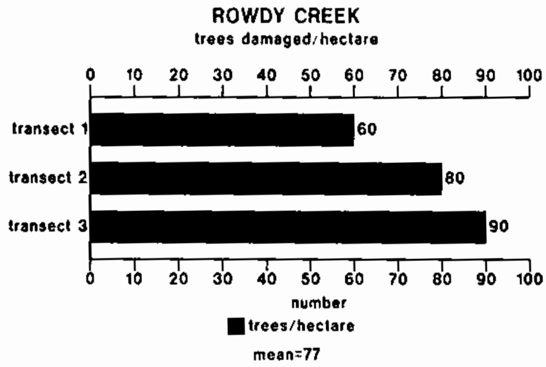


Figure 5. Estimated number of trees damaged/ha on the Rowdy Creek site, Smith River, California.

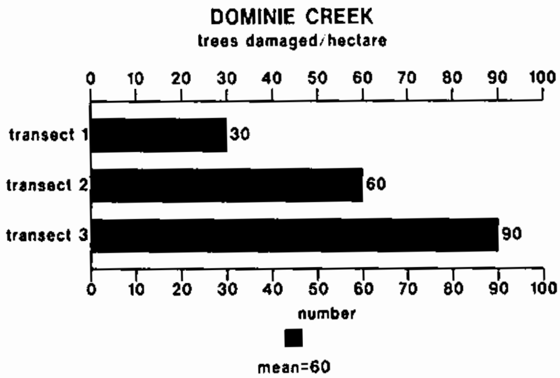


Figure 6. Estimated number of trees damaged/ha on the Dominie Creek site, Smith River, California.

In discussions with employees from both the California Department of Fish and Game and USDA Animal Damage Control personnel, many of them believe that the feeding behavior is learned from adult to juveniles. However, Wright (1910) talks of a captive bear raised from a very early stage that showed a strong attraction to conifers in the absence of receiving "training" from any adult bear or siblings. He suggested that bears could somehow perceive the availability of a food source beneath the bark during the spring months. Poelker and Parsons (1980) described how concentrated hunting of black bears in areas of high populations could reduce the amount of feeding damage within a stand, suggesting that extensive feeding occurs when bear densities are high. If this is the case, then bears could possibly be attracted to feeding on redwoods if the necessary criteria are present: 1) trees of proper size, 2) season, and 3) a bear population large enough to be searching for alternative food sources. At this time it does not seem possible to predict where damage will occur within the stand if these criteria are present.

A basic problem exists for developing a management plan or predictive model that could help address bear feeding on second-growth redwood. Presently, there are no published reports on bear densities, natality, mortality, or habits in this ecotype, though one such study is under way by the U.S. Park Service (T. Hoffstra, pers. comm.). With these types of data gaps it is virtually impossible to predict where bear densities are approaching densities that might produce unacceptable levels of damage. Weaver (1979) outlined an approach to understanding bear biology that would be very helpful in assisting forest landowners by defining specific areas of study that could help answer questions most often asked by those concerned. In addition to basic biological questions he incorporates the problem of illegal take that must be considered when trying to manage for a viable population in the remote parts of California's northwest.

It has become quite apparent to those of us involved in black bear depredation on timber that the status quo approach of removing bears will not be acceptable to the public (Gourley and Vomocil 1987, Giusti and Schmidt 1988). It may therefore become necessary to take an innovative approach to solving the problem. It will be necessary to identify basic biological parameters of bears in the redwood ecotype in order to answer the most basic questions. Secondly, a better understanding is needed of black bear population trends in this ecotype. Particularly, when do bear populations begin to increase following timber harvest, and at what point, within the rotation, do bear numbers plateau, and finally at what point in the maturation process of the forest do bear numbers begin to decline due to the reduction of the carrying capacity of the forest? Only when these rudimentary questions are addressed can a visionary management plan be developed.

In addition to a better understanding of black bear biology in redwoods, the time appears right to develop an advisory commission on predator management. This commission will need to be sanctioned by the state with appropriate funding, with its primary focus being to serve as a forum for discussion and action dealing with conflicts associated with predators and depredation management. The commission will need to be made up of people with differing views who represent all concerned parties in order for the group to have credibility and respect. Such forums already exist in the north coast region focusing on other non-related forest issues. The commission could be charged with developing guidelines and direction for the appropriate state regulatory agency that could assist in the development of a strategic plan for managing California's predator populations, including bears, in a nonconfrontational manner. In this way a focus could be maintained for management objectives that could be developed for an apparently expanding population of bears and other predators on the north coast (Giusti et al. 1990).

California continues to expand in population. Resource management conflicts most likely will not decrease in number and intensity within the foreseeable future. An approach that incorporates sound biological information, open and direct dialogues between parties of opposing views, and long-term strategic planning appears to be the only positive and progressive avenue available.

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