SUPPLEMENTAL BEAR FEEDING PROGRAM IN WESTERN WASHINGTON

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ABSTRACT: Black bear (*Ursus americanus*) damage to trees is a severe problem in the Pacific Northwest. Significant damage has been observed for many years, especially in highly managed private industrial forests in western Washington. The introduction of intensive silvicultural techniques resulted in higher yields, but may have also made trees more vulnerable to black bear destruction. Early lethal control efforts lost public support and the forest products industry investigated different methods that concentrated on non-lethal management tools. In 1985, the Washington Forest Protection Association introduced supplemental bear feeding as a damage prevention program in high damage areas during the spring months. This became a very successful alternative to the earlier methods of killing bears. The supplemental feeding program has great support from land managers and the public as an economically viable additional tool to black bear population control.

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INTRODUCTION

Black bear damage to Douglas-fir (*Pseudotsuga menziesii*) (Maser 1967), western hemlock (*Tsuga heterophylla*) and western redcedar (*Thuja plicata*) is a common problem in western Washington's intensively managed forests (Poelker and Hartwell 1973). The Washington Forest Protection Association has been managing black bear damage in cooperation with the Washington State Department of Wildlife since 1950.

The problem of black bear peeling conifers occurs only during the spring months, generally from mid-April to the end of June (Raine and Kansas 1989). Hardest hit are highly managed young forests 15 to 30 years of age with an average diameter of 8 to 12 inches, usually after precommercial thinning. It was repeatedly documented that a single bear can destroy 50 trees in one night (Flowers 1987). Damage ceases in early July when wild berries and other natural foods become more readily available.

Bears use their claws to remove the bark from a tree and scrape the sapwood (phloem) with their incisor teeth (Figure 1). This behavior seems to be natural for bears in their search for food. The technique of peeling may be passed on from the mother to the cub as a learned behavior.

Bears are greatly in need of nutritious food after being in the winter den for many months. The quality and immediate availability of energy to the animal within the first couple of days are important for well being, rather than the amount of food. Sugars are therefore an excellent food source. In the spring, highly photosynthesizing trees produce large quantities of these nutritious sugars and deliver it through the phloem throughout the tree. Glucose, fructose and sucrose account for 43% of the total organic material in the phloem and are the major single component (Radwan 1969). Modern silvicultural techniques such as precommercial thinning and fertilization may even contribute to further sugar content increases (Nelson 1989). Bears, equipped with well defined olfactory senses, easily identify and peel trees of high energy value. Observations indicate that intensive damage on young conifers depends not only on opportunity, but also on bear density, site factors, slope, aspect, elevation, habitat quality and the time of the year. Young conifer stands may increase the biotop capacity for bears.

Figure 1. Bear feeding in the spring.

Damage management in the past meant black bear population control. Professional control agents were paid by the bear tails they delivered to their supervisors. This strategy lost public support in the early 1980s. Private timberland managers began investigating alternative damage control tools, in particular non-lethal methods. In 1985, the Washington Forest Protection Association began research to learn more about the nutritional needs of bear (Flowers 1987). The first year, a pellet was developed and proved to be nutritious. Pellets were well taken by two wild bears in captivity. Initial field testing of the pellets was immediately successful on tree farms in western Washington. Intensive bear damage was reduced to an acceptable level for the landowner within the first year.

Concerns that bears would not search for natural foods anymore, but depend on the human made sugar pellets were unfounded. As soon as the natural berry crop came in, bears completely lost interest in the feeding stations and the pellets for the remainder of the season. Many bears remembered from one year to the next where feeding stations were and often showed up at these locations prior to feeding activities.

METHODS

Identification of Damage Areas

Identification of damage areas was easily done with aerial surveys in early May. Trees which were totally girdled the previous year show up as "red flags" on the ground, as the tree begins to decline and needles turn brown. Dead trees from earlier years are grey in color. Physiologically stressed trees have a light green to yellow color. All damage areas were mapped in the aircraft and later confirmed as bear related damage on the ground. In cooperation with the landowner and the Washington State Department of Wildlife, the best management strategy was determined. The supplemental feeding program was very often the preferred option for use in large, connected forests. After damage areas were identified, the WFPA staff biologist or other personnel assisted landowners in locating the best places for the bear feeding stations. Considerations in siting the feeders include:

1. proximity to the forest road to facilitate stocking the feeders with 50 pound sacks of pellets;
2. hidden from view to prevent poaching;
3. as close as possible to the newest damage location;
4. away from high traffic roads to avoid bear-human conflicts.

Feeding Stations

The bear feeding stations are 50-gallon, metal food containers which hold up to 200 pounds of pellets (Figure 2). The self-feeding mechanism prevents bears from spilling food or playing with it. Feeders are stocked once a week, which reduces mileage and labor costs for feeding personnel. Feeding stations must be made durable or bears will destroy them easily. They are attached to a tree with heavy chains. No play between barrel and tree is important. Bears approach the feeders from the front and feed through an opening in the barrel. The barrel hole must be large enough for bears to put their whole head into without getting injured. A heavy roof, insulated with industrial foam keeps the pellets dry. Wet pellets will not be eaten by bears. It is recommended that feeders be installed 10 inches off the ground to avoid water or rodent contact. Feeding stations are installed in the forests in April and removed after the feeding season at the beginning of July. Bait, such as a beaver carcass, is used to attract the bear to the feeders in May. After bears find the stations, no additional bait is needed.

The Pellet

The food pellets are developed and produced by WFPA. They are 0.5 inches by 0.25 inches in size with a greenish color and resemble dry dog food. The moisture content of less than 10% helps to extend the shelf life to more than one year. The chemical composition of the pellets is important. Correct proportion of the ingredients and consistency of the mixture are also keys for success. Bears were found to feed only on the pellet form. Powder or smaller varieties of food was undesirable.

Sugar is by far the most important ingredient in keeping bears from girdling trees. Fats, protein, vitamins and minerals provide a balanced food but are less essential to prevent damage.

The chemical formula for the pellets and the production is controlled by the Washington Forest Protection Association. Since 1990, a large mill has produced and delivered the pellets directly to landowners in early April.

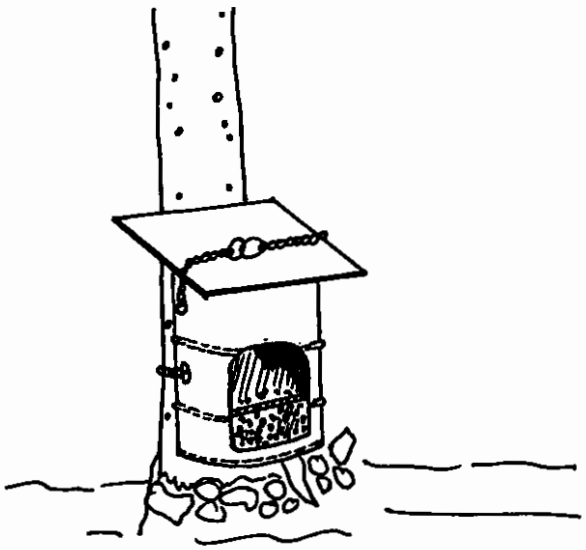

Figure 2. Bear feeding station.

Tree Damage Surveys

Tree damage surveys are an important part of the Animal Damage Control Program. After 30 years of experience in the field we can often predict where damage will occur in the future, however, many damage areas were found only after bears had already peeled trees for two to three years. If feeding stations are installed after damage is found, monitoring the work can provide valuable information for a successful program.

Surveys start usually in August or September, after the damage season. A crew of three workers is sufficient to do the job. Forests of 20 to 50 acres are selected, depending on homogeneity of the stand, tree species, age class and stocking level. Surveys are designed for a 95% confidence level. Plots are randomly chosen. The centers of the plots are marked and a circle of 10 meters is drawn around the center. Plot size is a constant 0.0314 ha (0.0776 acres) with usually 30 to 40 trees per plot. Ten plots provide the desired confidence level. Total area surveyed is 0.314 ha (0.776 acres).

Each tree in a plot is surveyed. Data is collected on tree species, year of damage, significance of individual tree damage, and a brief subjective prognosis about the survival chances of a damaged tree. The data are then

analyzed for total amount of damage, average damage per year and success rate of the supplemental feeding program.

Economic Analysis

One stand of timber in western Washington was selected in 1990 for economic analysis of the supplemental feeding program. The initial costs, such as feeding stations, labor, mileage and pellets were identified. The maintenance costs were calculated for 15 years since the vulnerable timeframe for bear damage is between 15 and 30 years of age. Present net value calculations were done with the following assumptions: Douglas-fir stands; 55 year rotation length; no commercial thinning; 7% real discount rate; analysis beginning at age 15, after precommercial thinning.

RESULTS

In 1993, the Washington Forest Protection Association produced 308,000 pounds of pellets to feed approximately 1,200 bears on nearly 800,000 acres of forestland. Membership for the ADCP increased since 1992 from 22 to 31 participants, including two Indian nations. The pellet production and use has doubled annually since 1986. Five hundred feeding stations were installed on industrial forest land in 1993, and an additional 100 are planned for the 1994 season.

Tree Damage Survey

Tree damage surveys were very encouraging. Stands of timber were monitored where bear damage was reduced by 100% after implementing the supplemental feeding program. Often, only a few new peeled trees were found, but generally bears stopped using the trees as a food source even after previous years of damage activities.

During three years of surveys, 2,547 trees were monitored in high damage areas. Bears were feeding in these stands for an average of three years. During this time period the average bear damage was 27.7% in these stands. Bears may destroy between 10 to 15% of a forest stand each year. This can lead to a major decline of a forest within five to six years. After the supplemental feeding program was installed, an average of only 0.7% additional damage was observed.

Table 1 indicates a clear trend of reduced damage after initiating supplemental feeding programs.

Economic Analysis

Results concerning the economic analysis are based on one field example and may have to be adjusted for individual landowners. The data of the 1990-91 calculations showed a 28% increase in present net value (PNV) over the 55 year rotation period with the supplemental feeding program. In this example, the research area had 100,000 acres. Start up costs for the supplemental feeding program (pellets, labor, feeding stations) were $13,700. Maintenance costs over a 15 year period were $11,600 (Table 2 and Figure 3).

Although the supplemental feeding program has higher initial costs and annual maintenance costs, the greater timber volume and value outweighed these costs by the end of the rotation.

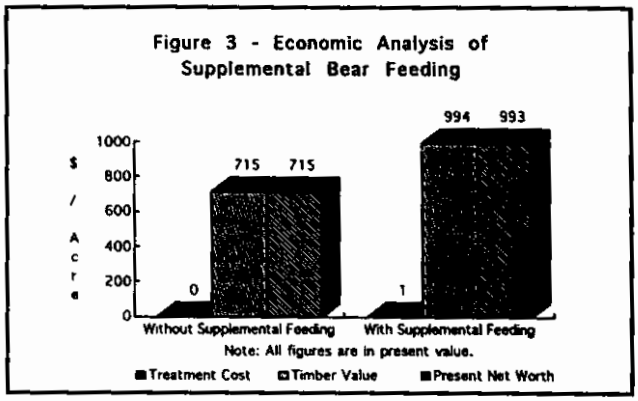

Figure 3. Economic Analysis of Supplemental Bear Feeding.

Public Acceptance

Public acceptance of the ADCP in Washington is very good. Public relations are excellent with considerable free media coverage, especially on the supplemental bear feeding program. The Washington Forest Protection Association's management program was frequently reported as a positive strategy in major newspaper articles, many radio interviews and approximately ten television reports. The public seems to appreciate the non-lethal approach to wildlife/human conflict resolutions even after they understand that non-lethal methods are not the exclusive solutions on private lands. Involving the media and the public are a continuing part of our program.

DISCUSSION

The human population in Washington is rapidly increasing. This means more pressure to natural resources such as wood and fibre products but also increasing conflicts with wildlife. Society will have to make choices in the future, in addressing animal damage control efforts and balanced natural resource management. Successful animal damage control programs effectively meet management objectives, are economically feasible, humane, ecologically safe and publicly acceptable. The supplemental feeding program for bears may be such a program. It provides forest landowners with choices, is effective in reducing the amount of damage, is economically efficient and acceptable to the public.

The supplemental bear feeding program will continue to develop. Scientifically sound research is needed on the long-term impacts of the program on bear population densities. The Washington Forest Protection Association supports the present direction of damage management and recognizes the need for research.

Future program achievements can best be accomplished through cooperative research efforts by private landowners, universities, federal and state agencies.

Table 1. Tree damage.

Survey Area	Damage Periods in Years	No. of Trees Sampled	Total Damage Before Supplemental Feeding (%)	Average Annual Damage Before Supplemental Feeding (%)	Additional Damage After Supplemental Feeding (%)
1	3	410	49.0	16.4	2.0
2	2	372	9.4	4.7	1.1
3	3	210	24.1	8.0	0.0
4	3	492	24.0	8.0	0.0
5	3	220	21.8	7.3	1.0
6	3	349	45.6	15.2	0.3
7	3	287	25.1	8.4	0.5
8	3	207	22.1	7.4	0.5
Average	2.9	318.4	27.7	9.4	0.7

Table 2. Economic Analysis.

	With Feeding	Without Feeding	Difference
Present net value/ac	$993.00	$715.00	$278.00
Present value benefits/ac	994.00	715.00	279.00
Present value cost/ac	1.193	0.00	1.193
Initial startup costs/ac	0.136	0.00	0.137
Annual maintenance costs/ac	0.116	0.00	0.116
Timber value/ac at 55 years	14,889.00	10,705.00	4,184.00

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