



Bear use of pine nuts  
by Katherine Clement Kendall

A thesis submitted in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE  
in Fish and Wildlife Management  
Montana State University  
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**Abstract:**

Whitebark pine (*Pinus albicaulis*), an important tree of high altitudes in the northern Rocky Mountains and Sierra Nevada, produces nuts eaten by bears. Grizzly bear (*Ursus arctos*) and black bear (*U. americanus*) use of pine nuts was studied in Yellowstone National Park and adjacent areas during 1978 and 1979. Spring use appeared to be correlated with cone production in the preceding year, while fall use was correlated with the current crop. Most of the nuts eaten by bears came from cones cached by red squirrels (*Tamiasciurus hudsonicus*). Pine nuts were a nutritious food which was often present in early spring and late fall when alternate foods were scarce or low in digestible energy and when nutritional requirements of bears were high. No evidence was found that bears ate the nuts of limber pine (*P. flexilis*).

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## ABSTRACT

Whitebark pine (*Pinus albicaulis*), an important tree of high altitudes in the northern Rocky Mountains and Sierra Nevada, produces nuts eaten by bears. Grizzly bear (*Ursus arctos*) and black bear (*U. americanus*) use of pine nuts was studied in Yellowstone National Park and adjacent areas during 1978 and 1979. Spring use appeared to be correlated with cone production in the preceding year, while fall use was correlated with the current crop. Most of the nuts eaten by bears came from cones cached by red squirrels (*Tamiasciurus hudsonicus*). Pine nuts were a nutritious food which was often present in early spring and late fall when alternate foods were scarce or low in digestible energy and when nutritional requirements of bears were high. No evidence was found that bears ate the nuts of limber pine (*P. flexilis*).

## INTRODUCTION

The large seeds (pine nuts) of whitebark pine (*Pinus albicaulis*) are commonly eaten in the spring (March-May) and fall (September-November) by grizzly bears (*Ursus arctos*) and black bears (*U. americanus*) in Yellowstone National Park and adjacent areas (Craighead and Craighead 1972, Knight 1977, Blanchard 1978, Mealey 1980) and western Montana (Tisch 1961, Sumner and Craighead 1973, Schallenberger and Jonkel 1980). Similar nuts from limber pine (*P. flexilis*) are eaten by grizzly bears on the east Rocky Mountain Front of northwestern Montana (Schallenberger and Jonkel 1980). The nuts of the European stone pine (*P. cembra*) are an important food for brown bears (*U. arctos*) throughout the taiga zone in the Soviet Union (Pavlov and Zhdanov 1972, Ustinov 1972, Yazan 1972). Both the production of whitebark pine cones (Forcella 1977, Blanchard 1978, Mealey 1980) and the quantity of nuts consumed by bears vary annually (Mealey 1975, Blanchard 1978, Knight et al. 1980).

Pine nuts are also an important food for red squirrels (*Tamiasciurus hudsonicus*) in whitebark forests. In fall, squirrels remove cones from trees and cache them in middens. Bears as well as other mammalian and avian seed predators compete with squirrels for whitebark nuts (Forcella 1977, Tomback 1978).

Confusion about the ripening process of whitebark pine cones has resulted in errors in the literature on the availability of pine nuts as

a bear food. Whitebark cones are indehiscent and do not disintegrate (Tomback 1981). Vertebrate foraging probably leaves few, if any, seed-bearing cones on trees by late fall; the cones remaining abscise sometime thereafter (Tomback 1981). Because cones do not abscise or release their seed in fall, bears may obtain pine nuts in two ways. Black bears may climb whitebark pine trees and break off cone-bearing branches to feed on cones (Tisch 1961, Mealey 1975, Forcella 1977); or both black bears and grizzly bears raid squirrel caches to feed on pine nuts (Tisch 1961, Craighead and Craighead 1972, Knight 1977, Blanchard 1978). The purpose of this study was to determine (1) the major source of pine nuts for bears, (2) why cone scales do not appear in bear scat containing pine nuts, and (3) what factors influence bear use of pine nuts.

## THE STUDY AREA

The study area was located in Yellowstone National Park and surrounding portions of Montana, Wyoming, and Idaho (Figure 1). Sites were located in whitebark pine forests in which bears fed on pine nuts. Whitebark pine occurred in upper subalpine and timberline areas between 2440 and 2870 m. Pure stands occurred on dry, exposed sites. On sheltered, moist sites, whitebark pine was mixed with subalpine fir (*Abies lasiocarpa*) and Engelmann spruce (*Picea engelmannii*) (Weaver and Dale 1974). Limber pine occurred between 1580 and 2500 m in sparsely timbered stands on arid, rocky sites (Cooper 1975). Mature whitebark and limber pine were present in 8% and 0.04%, respectively, of the forested area of Yellowstone National Park (Civilian Conservation Corps, unpublished data). Similar information was not available for the rest of the study area.

Stands were sampled for cone crop estimates and squirrel cone caching activity on ridges located 5 km north of Electric Peak on the northern boundary of Yellowstone National Park and in north-central Yellowstone on the west side of Mt. Washburn. These sites were 40 km apart.

















































