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BEAR DAMAGE TO AGRICULTURE IN WISCONSIN

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Abstract: Black bear (*Ursus americanus*) are common in northern Wisconsin. The Wisconsin Department of Natural Resources (WDNR) has established a population goal of 6,000 bears across 46,361 km² of bear range. Bear damage to agriculture occurred for over 50 years, and various strategies have been used to address these problems. Bear damage to agricultural crops and livestock became eligible for reimbursement by the state in 1939. The legislature terminated this program in 1980 in favor of a new program that placed greater emphasis on damage prevention than on compensation. Since 1984, WDNR has bear damage primarily through abatement practices including electric fencing, scare devices, repellents, trapping and translocation of problem bears, and damage compensation provided by the Wildlife Damage Abatement and Claims Program (WDA). Recently, United States Department of Agriculture, Animal and Plant Health Inspection Service, Animal Damage Control has become an increasingly important partner with WDNR and WDACP counties in providing bear damage program services. Wisconsin bear management and damage costs total about \$250,000 annually in 23 counties. Annual levels of assessed damage vary greatly from year to year, averaging \$5,400 per county per year, with WDACP program costs averaging about \$2,000 county per year. Annual state costs for trapping and relocation of problem bears are approximately \$70,000. Bear depredation on sheep have drastically declined, from 52% of claims between 1939-1956 to less than 2% from 1986 through 1990, because of decreases in stock-sheep numbers and improved husbandry. Corn damage has dramatically increased, from 10% between 1939-1956 to 65% of damage claims during 1986-1990, due to increased use of short-maturity corn varieties during the late 1970s to the present. The attraction of bear to these varieties may require planting schemes to divert damage away from fields with lure crops. The primary abatement practice is culvert trapping and translocation. Wisconsin will continue to seek improvement and adjustment of its bear damage management program.

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Introduction

Wisconsin is ranked 8th in the United States in agricultural production, totalling \$5.6 billion annually. Approximately 6,000 black bears live in the northern third of the state, and conflicts between bears and agricultural interests have been common for over half a century. Various strategies have been tried to resolve these conflicts. Hyngstrom and Hauge (1989) summarized the history of bear damage management in Wisconsin. Our objectives in this paper are to describe the historic changes in bear damage characteristics, and to provide an update on the direction of Wisconsin's bear damage control.

Study Area and Methods

Current bear range in Wisconsin includes 46,361 km². The majority of this range (39,788 km²) is found in the northern third of the state (Zones A & B, Fig. 1), encompassing 20 counties. Bear range in Wisconsin is characterized by large tracts of federal, state, county, and industrial forest land interspersed with small towns, farms, resorts, and vacation homes. Most counties in bear range have a recreation/tourism-based economy. The human population of this area is less than 500,000 and there are approximately 8,000 farms located in this area of northern Wisconsin, averaging 90 ha each.

Since Wisconsin began documenting bear crop damage claims in 1939, most damage has occurred in a 9-county area of northwestern Wisconsin (Fig. 2). Crop and livestock production statistics from United States Department of Agriculture

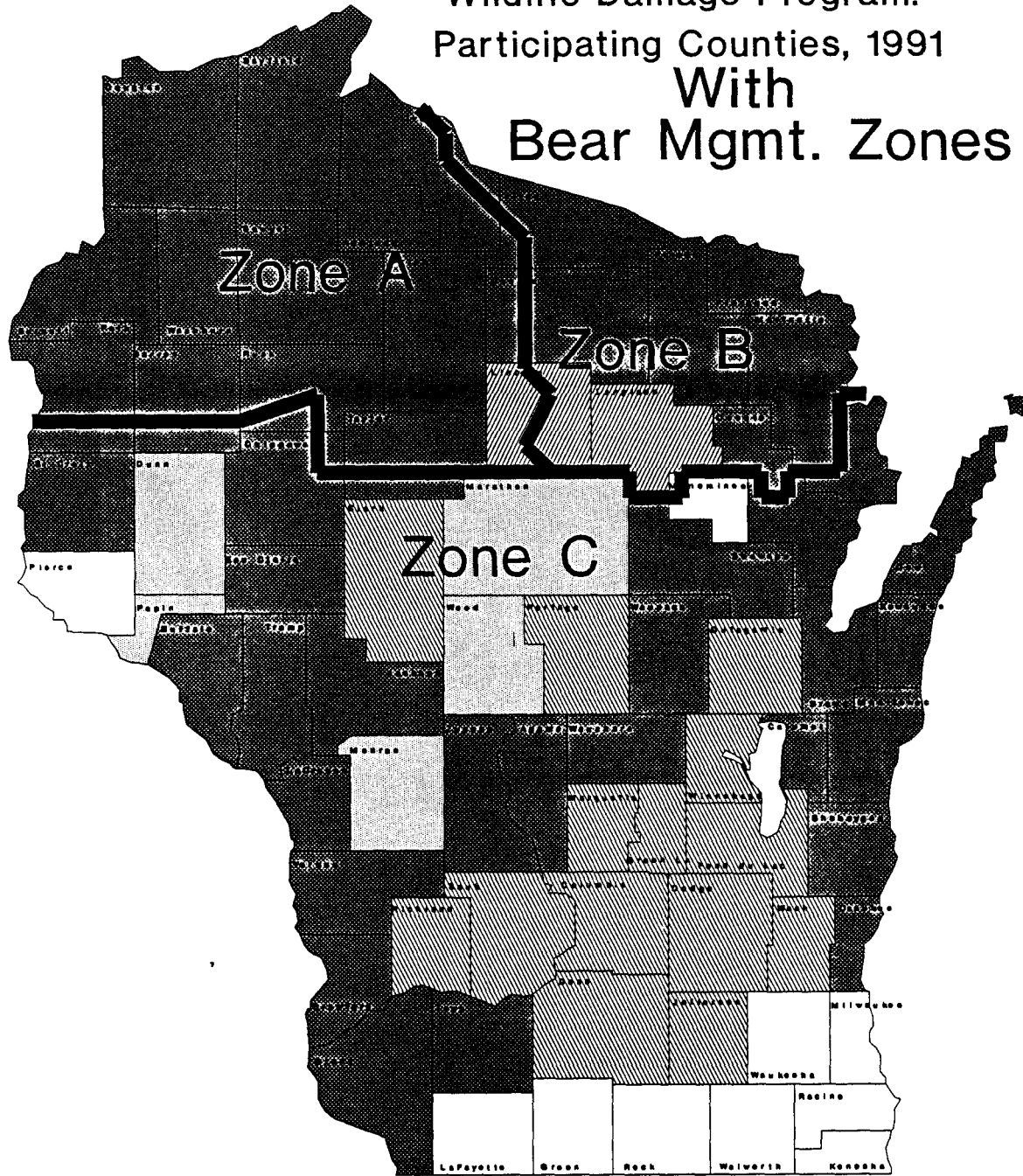
National Agricultural Statistics Service (MASS), the Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP), and bear crop damage statistics (Wis. Dep. Nat. Resour. unpubl. records) for these 9 counties were evaluated to demonstrate the relationship between changing agricultural practices and bear damage.

Current Bear Population Management

Bear hunting has steadily increased in popularity in Wisconsin. In 1974, 3,500 bear licenses were sold. License sales increased to 6,500 in 1980 (Kohn 1982:22), and in 1991, 17,668 hunters applied for 2,560 kill permits. Concern regarding overhunting of bears has led to more restrictive hunting regulations. Bears are long-lived, do not normally reach population levels that destroy their environment, and are not normally subject to large losses caused by adverse weather conditions (Kohn 1982:23). Therefore, management goals have been directed at maintaining the bear population at a viable, publicly-acceptable level.

In 1985, Wisconsin's bear range was divided into 3 zones or management units (Fig. 1) to more effectively distribute hunting pressure and harvest. The number of bear harvest permits issued in each zone is determined by the status of the population in relation to goals and hunter success rates. Hunters must apply for a harvest permit in **January**, and successful applicants are randomly selected using a continuous preference system.

Wildlife Damage Program: Participating Counties, 1991 With Bear Mgmt. Zones








-  APHIS Co.s; abatement only
-  APHIS Co.s; abatement & claims
-  Non-Participating Counties
-  Non-APHIS Co.s; abatement only
-  Non-APHIS Co.s; abatement & claims

Fig. 1. 1991 Wildlife Damage Abatement and Claims Program participating counties with the Bear Management Zones in Wisconsin.

WISCONSIN BEAR POPULATION ESTIMATES-'85-'91

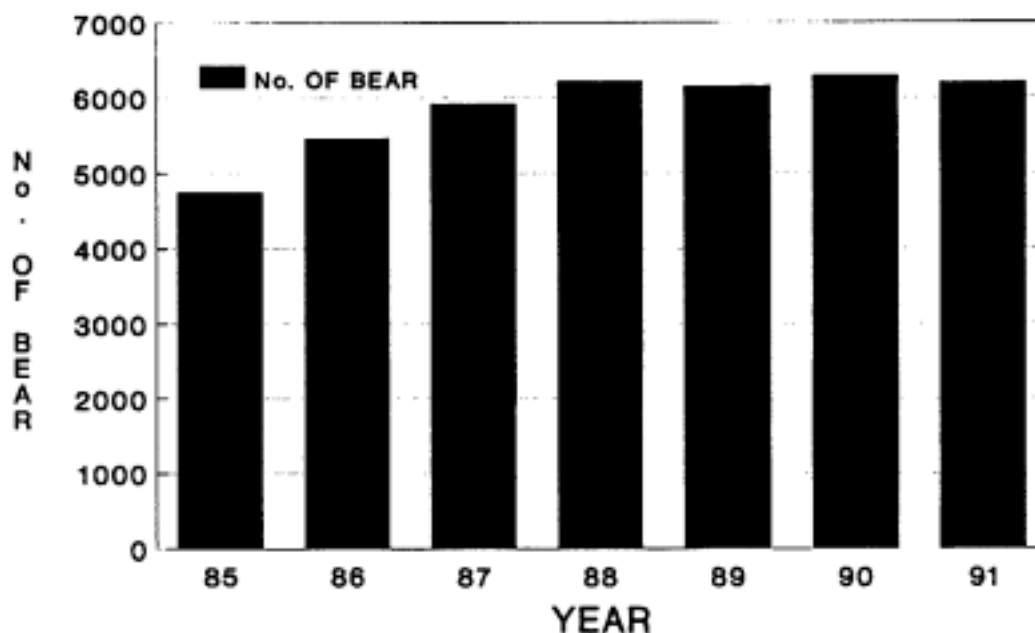


Fig. 3. Estimated Wisconsin bear populations, 1985 through 1991 (B. Kohn, pers. commun.).

The current bear population goal has been set at 6,000 animals. The population has been near goal since 1987, with a 1991 population estimated at 6,196 animals (Fig. 3). The bear population has increased from the 1985 level of 4,750, and is currently regulated by annual harvests.

Current Wisconsin Bear Damage Management

The Wisconsin Legislature terminated the 1931 Wildlife Damage Claims Program in 1980, and in 1983, created the Wildlife Damage Abatement and Claims Program (WDACP). This program provides agriculturists with damage prevention and compensation assistance for deer (*Odocoileus virginianus*), bear, and goose (*Branta canadensis*) damage. To provide local control and minimize costs, the legislature provided for county administration of the WDACP (participation is optional). The WDNR is responsible for coordinating the WDACP, reviewing county administrative plans, and providing technical assistance.

The WDACP is funded by a \$1.00 surcharge on hunting licenses that generates approximately \$1 million annually. Also, the 1991-1993 State Budget Bill provides revenues from a \$12 bonus-deer-permit fee to supplement program funding. However, revenue from bonus-deer permits will vary annually depending on deer population levels and permit application rates for individual deer management units. Damage prevention has priority over compensation, requiring county administrative and abatement costs to be paid before claims.

The WDACP reimburses participating counties for the costs for administration, and materials for abatement measures. Abatement is cost-shared with landowners at a 50:50 ratio. The county WDACP technician reviews each damage complaint, prescribing the appropriate abatement practice for each damage situation. Bear damage to beehives is often abated with electric fencing. Minor damage may be abated with repellents and propane exploders. Extensive or persistent crop damage often requires trapping and relocation. Though occurrences are few (<10 annually), chronic depredations on livestock or crops occasionally result in issuance of a special kill permit by the WDNR. Program participation by the landowner requires that he or she first sign an affidavit agreeing to allow hunting access for the species causing the damage. The landowner may not deny access unless he or she has given permission for a minimum of 2 hunters per 40 acres of land suitable for hunting, per day.

WDACP may pay a maximum of \$5,000 to each claimant, with a \$250 deductible for damage claims compensation. County WDACP technicians use approved Federal Crop Insurance assessment techniques (U. S. Dep. Agric. 1984, 1986a,b,c,d) to measure levels of damage. If funding is inadequate to pay claims in-full, compensation is prorated to ensure that each grower with damage receives some level of compensation. Eligibility requirements for a crop owner's participation in the WDACP (Wisconsin 1989, Wisconsin 1990) areas follows: (1) damaged fields must be within WDACP

participating county; (2) crop owner must file a complaint within 14 days of damage initiation and notify the county not less than 10 days to harvest; (3) crop owner must sign an affidavit allowing hunting of the damaging species on all contiguous land under his control (leased, owned or occupied); (4) crop owner must follow abatement prescription; (5) crops must be managed and harvested in accordance with normal agricultural practices; and (6) all lands on which assistance is sought shall have been in cultivation or in an Agricultural Stabilization and Conservation Service set-aside program for at least 5 years prior to the application.

WDNR has the statutory authority to determine the circumstances under which wildlife are removed or destroyed. Responding to the increasing value of the bear resource, the WDNR has shifted its problem bear management from lethal to nonlethal control (abatement or translocation). From 1957-1979, 1,041 bears were destroyed (Hyngstrom and Hauge 1989). The WDNR began relocating problem bears to large tracts of wild forest land > 65 km from the damage site in the early 1950s. **From 1980-85, 288 bears were trapped and relocated.** About 300 bears were relocated during 1986 (Hyngstrom and Hauge 1989). Poor availability of natural foods in 1990 resulted in 990 complaints and 381 bears being relocated. Though trapping and translocation is currently the primary abatement procedure, this service has not been provided nor funded via the WDACP.

Because of the expertise required, WDNR has historically provided bear trapping and translocation services. In 1990, because of WDNR wildlife management workload concerns, Wisconsin added bear translocation work to its comprehensive cooperative agreement with the ADC.

Records of state expenses from 1939-1980 revealed an average of \$82.42 per claim (\$229,453 for 2,784 bear damage claims), and an average of 70 claims per year. However, state costs for wildlife staff time and effort in assessing damage, shooting, trapping, and relocating damage bears are unknown.

From 1985-90, WDACP bear damage costs included \$67,958 for county administration and \$138,208 for county abatement costs, and \$353,117 of assessed bear damage resulted in eligible claims of \$232,876. In addition, WDNR expended approximately \$70,000 per year from 1985-90 for capture and relocation of problem bears (Hyngstrom and Hauge 1989; Wis. Dep. Nat. Resour., unpubl. data).

Discussion

Bear damage has fluctuated greatly during the 40 years of the old claims program (Fig. 4). The variation in number of claims compared with total value of claims paid during the 1970s reflected an increase in the average claims paid. During the early years (1939-56) average claims were less than \$50 per claim, but by the late 1970s, this average had risen to more than \$450 per claim. Under the current program, claims payments

have greatly increased. The average claim paid from 1985-90 was \$1,059 for 220 claims. Reported bear damage can vary greatly from one year to the next (Fig. 5).

A variety of factors may account for this variability. Availability of wild food appears to be the most important. In 1990, wildlife managers across the north reported a scarce mast. Wisconsin experienced a record level of bear damage nuisance complaints in 1990, resulting in a record number of bears being relocated. High levels of damage were also experienced during the severe drought year of 1988. Drought not only caused severe damage to northern Wisconsin crops, but it greatly decreased farmers' tolerance of bear damage.

Hyngstrom and Hauge (1989) compared percentage claims paid by agricultural commodities between 1938-56 and 1956-80. We've extrapolated their analysis to include characteristics for the current program, 1985-90 (Fig. 8). Changes in sheep depredations and corn damage are the most profound. Stock-sheep numbers drastically declined after 1950 (Fig. 7). The decline in sheep numbers was primarily due to frequent infestations of the giant deer liver fluke (*Fascioloides magna*) (W. Ishmael, pers. commun.). Also, with more intensive husbandry, fewer sheep were vulnerable to bear depredation.

In contrast, corn damage increased from 10% of claims in 1939-56, to 65% of claims in 1985-90. Corn acreage increased from about 18,200 ha in the 9 major bear counties in 1940 (NASS 1954) to between 24,300-28,300 ha in 1990 (MASS 1991) (Fig. 8). More important than the increase in total corn land area was the type of corn planted. From 1940 to the mid-1970s, long-maturity corn varieties (for silage) were planted in the core bear damage counties (Fig. 8) because the growing season was too short for grain corn. Only after the short-maturity (75-90 day) corn varieties were developed and available in the late 1970s, did corn grain hectares increase dramatically.

County WDACP coordinators, wildlife managers and bear researchers (Bruce Kohn, pers. commun.) have noticed an increase in damages to fields containing short-maturity corn varieties. Increased losses for these varieties is not just restricted to bear, as deer damage has also increased. Observations by P. Carter, UW-Extension Corn Agronomist, suggested that this wildlife preference for short-maturity varieties was not likely a function of corn ear physiological differences. Wildlife focus on short-maturity fields earlier and longer, resulting in greater damage. The attraction of corn to bear is greatest when the ear is in the "milk stage", the growth stage when sugar content is high. Short-maturity corn enters this stage of development from late July to mid-August in northwestern Wisconsin, and this coincides with the period when most bear-corn damage occurs. It's apparent Wisconsin bears have quickly adapted to exploit this food supply.

BEAR DAMAGE CLAIMS 1939 TO 1979

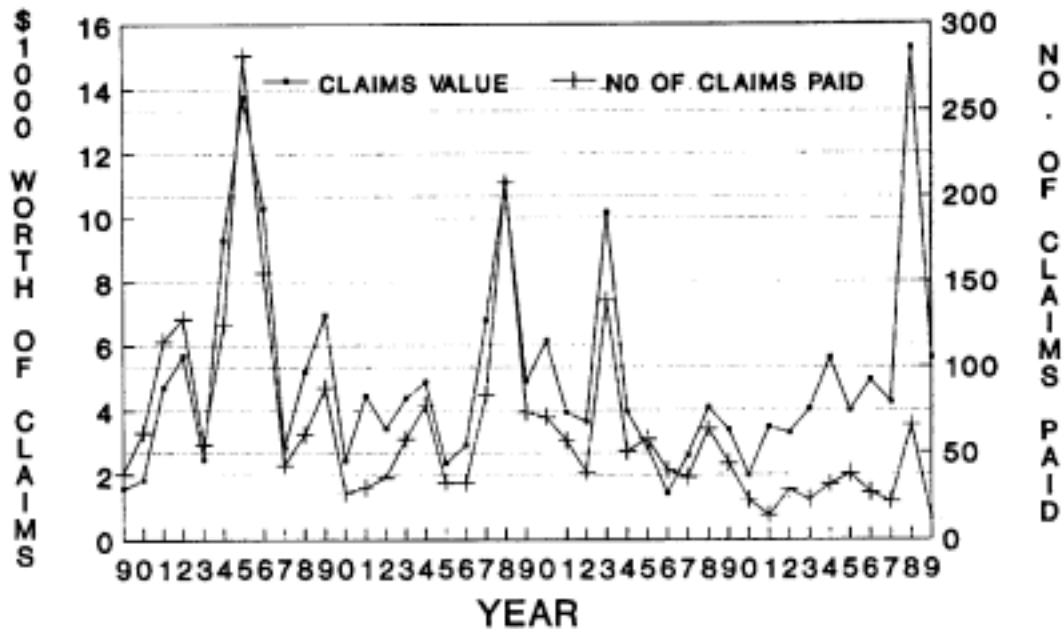


Fig. 4. Total bear damage claims paid from 1939-79 under the 1931 Wildlife Damage Claims Program (Wis. Dep. Nat. Resour., unpubl. data).

CURRENT WILDLIFE DAMAGE ABATEMENT & CLAIMS PROGRAM--CLAIMS PAYMENTS

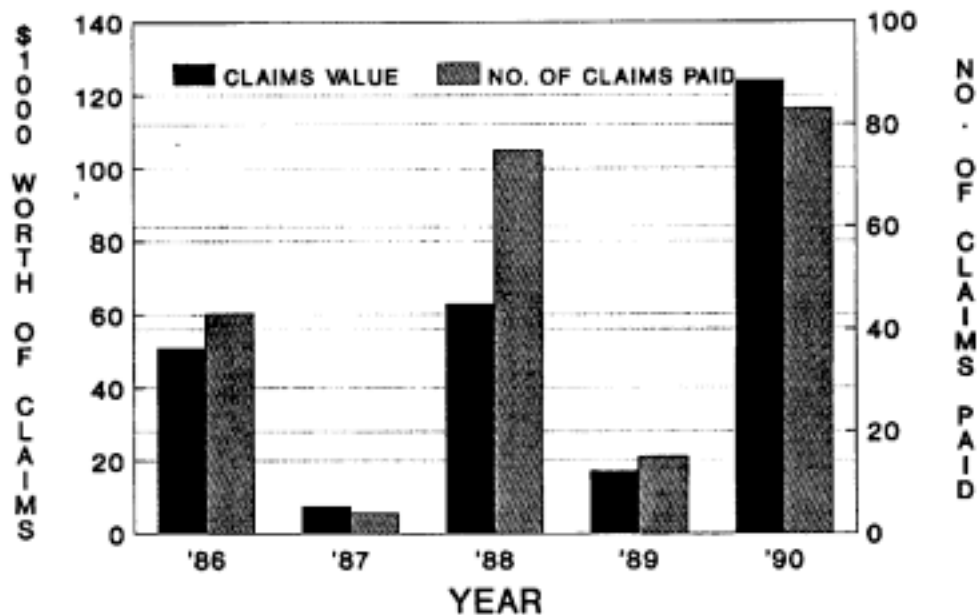


Fig. 5. Total bear damage claims paid from 1986-90 under the current Wildlife Damage Abatement and Claims Program (Wis. Dep. Nat. Resour., unpubl. data).

BEAR DAMAGE CHARACTERISTICS IN WISCONSIN--1939-1990

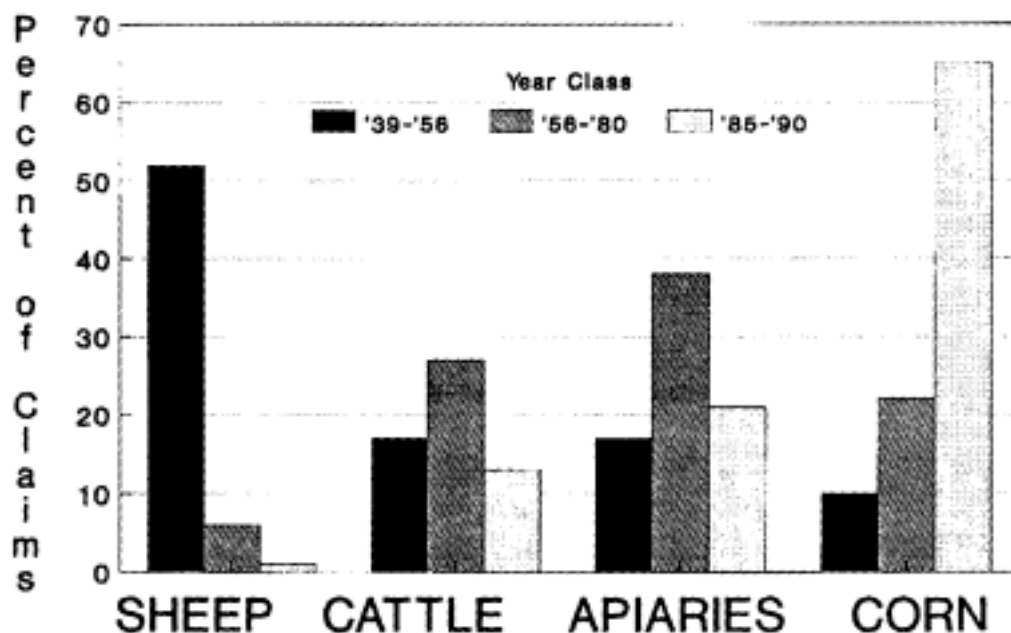


Fig. 6. Bear damage characteristics of bear damage claims paid from 1939-90 (Hyngstrom and Hauge 1989, Wis. Dep. Resour. unpubl. data).

CORN AND SHEEP PRODUCTION FROM 1940 TO 1990

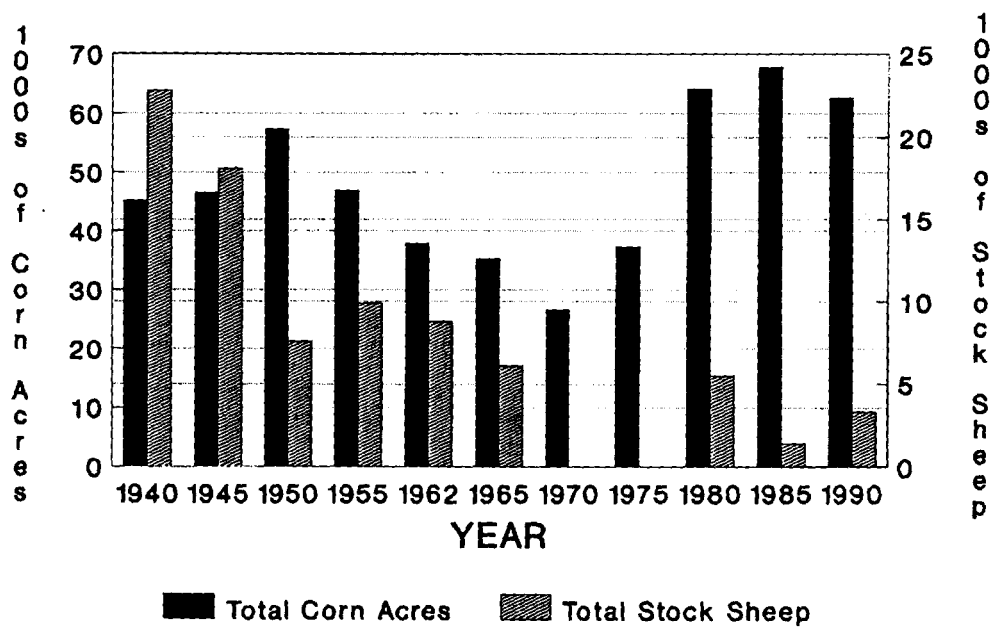


Fig. 7. Total corn and sheep production in the 9 core bear-damage counties from 1940-90 (Nat]. Agric. Stat. Serv. 1954, 1963, 1966, 1971, 1976, 1981, 1986, and 1991).

BEAR COUNTY CORN PRODUCTION FROM 1940 TO 1990

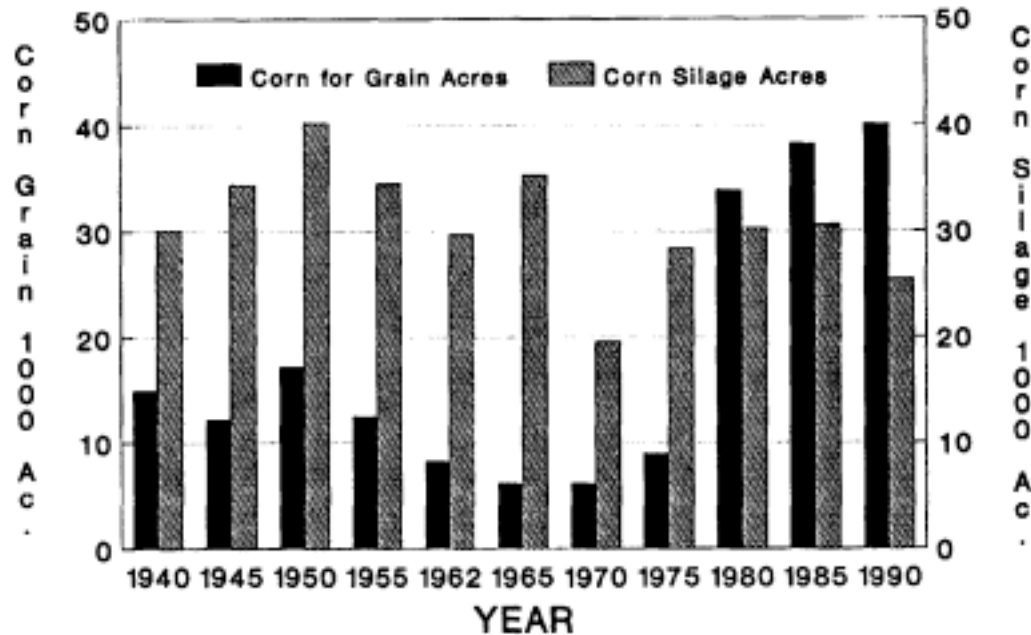


Fig. 8. Corn for grain and for silage production for the 9 core bear-damage counties from 1940-90 (Nail. Agric. Stat. Serv. 1941, 1955, 1963, 1966, 1971, 1976, 1981, 1986, and 1991).

Damage to corn is currently the most important agricultural impact caused by bear in Wisconsin. WDNR and ADC's primary method for providing agriculturalists with relief for this damage is to trap and translocate damaging bears. Translocated problem bears often return to their original home ranges, therefore translocation is only a temporary solution (Massopust 1984:27). However, the timing of such returns has provided growers with some relief. Massopust (1984:10) observed mean homing times of 24 days, averaging 14 days for males and 34 days for females. This allowed corn to mature past the vulnerable milk stage, making the corn less susceptible to bear damage. The timing of return also corresponded to Wisconsin's September bear hunting season. Massopust (1984:21-27) observed a greater vulnerability of translocated bears to mortality from hunters. The hunting access requirements of the WDACP could accentuate hunting mortality on crop-damaging bears.

Damage to apiaries is a major concern in Wisconsin. Electric fencing has proven effective in reducing apiary damage, and is a cost-shared abatement practice of the WDACP. Recent efforts to provide apiary damage control through apiary platforms (Flanigan 1989) is worthy of further investigation. The WDNR will provide limited WDACP funding to determine

the efficacy of such platforms in providing bear damage relief to apiaries. If proven a viable abatement technique and compatible to productive bee keeping in Wisconsin, platforms may possibly replace fencing as preferred bear control alternative.

Management Implications

The attraction of wildlife to short-maturity corn varieties appears to be a function of temporal availability rather than increased palatability. A commonly used abatement practice found effective in reducing local concentrations of Canada goose damage, and in some instances white-tail deer damage, is the use of lure crops (J. Heinrich, Anim. Damage Control, pers. commun.). The timely planting of lure crops in strategic locations, relative to surrounding bear habitat, could possibly be used to focus corn damage away from primary corn fields.

This is a recognized cost-share abatement practice by the

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