# CROP DEPREDATIONS BY CANADA GEESE IN EAST-CENTRAL WISCONSIN

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In 1973, I presented a paper on "Waterfowl Crop Damage in Wisconsin" at the 6th Bird Control Seminar at Bowling Green, Ohio (Hunt & Bell 1983). That paper reviewed crop damage by Canada geese *(Branta canadensis)* around Horicon National Wildlife Refuge and the program developed to pay for and control damage, and suggsted some recommendations related to future depredations management. At that time the fall goose population was about 200,000 at peak levels on the refuge. Since 1973, some significant changes were implemented in the Horicon area that reduced the peak concentration to less than 100,000. Crop depredations by geese, however, have remained a chronic problem and the goose management program has become a controversial issue throughout the Mississippi Flyway. The purpose of this paper is to review events since the 1972 season in relation to crop damages and to describe our new damage law payment system. Field data for this paper were generously provided by state and federal personnel working on crop depredations, and financial records were obtained from staff in the Central Files section of the Madison office.

## BACKGROUND INFORMATION

Horicon National Wildlife Refuge, located in east-central Wisconsin, is a major concentration site for Canada geese of the Mississippi Valley Population (MVP). These geese nest in northern Ontario, migrate primarily through Michigan and Wisconsin and winter on refuges in southern Illinois and nearby Kentucky. The east-central Wisconsin goose range contains numerous large lakes, several state waterfowl projects, abundant wetlands and a dairy farm economy which provides ideal goose foods of corn, alfalfa, small grains and grass pasture. Traditionally the Horicon region is the spring staging range for MVP geese in March and April; it is here that critical weight gains for reproduction are attained. Fall use has resulted from improved refuge management and manipulation of hunting regulations started about 1950. Increases occurred rapidly, from no geese in the 1940s to 100,000 by 1960 and 200,000 by 1970.

This abundance of geese was accompanied by a variety of problems and experiences, including: overharvest, regimentation of hunters, crop depredations, direct feeding, intensive hazing, disease outbreaks, delayed migration and dissatisfaction by public interests from all sectors.

Overkill of MVP geese by 1960 forced Illinois and Wisconsin to establish restrictive harvest quotas in large zones around major refuges. At Horicon, reduced hunter numbers, one goose tag/year and short seasons became the pattern, eliminating the gun as a factor controlling goose numbers and off-refuge feeding activities. Crop depredations became common in the early 1960's. Complaints were handled by federal personnel. In 1965, an early migration and delayed crop harvest season (wet weather) resulted in extensive crop damage. Local farmers forced legislation requiring state payment of waterfowl depredations. Wisconsin became only the second state, after Wyoming, to pay such damage, and is the only state where Canada geese are a major problem.

Law requirements were: filing notice of damage within 10 days, no claims payable during the waterfowl season, deductions of hunting revenue and damages limited to $750/claim. State and Federal offices at Horicon Marsh developed a telephone call-in complaint service that proved effective in minimizing damages and improving farmer attitudes. Exploders, shell crackers and flags were delivered free of charge. Not all complaints resulted in claims; however, only state personnel trained to estimate damage could settle claims. In 1967, the law was changed to allow damage payments of $1,500/claim and claims were payable for damage occurring at any time of the year.

In the 1965-72 period, complaints averaged about 100 in fall (range 49-170) and 20 in spring (range 10-31). Actual payments were made on an average of 16 fall (range 2-43) and 4 spring (range 0-16) claims. Costs per claim averaged $153 in fall (maximum $3631) and $274 in spring (maximum $520). Crops affected in spring were alfalfa (53%) and previous year's unharvested corn still in fields (43%) while fall complaints were largely on standing corn (92%). Claims paid were 93% on corn. Damage payments averaged about $10,000 annually, or less than $1.00 per goose in the harvest. The best solution to reduce goose crop damage appeared to reduce the goose population significantly at Horicon. It was suggested that a major event, such as a disease disaster, might be needed to precipitate reduction in the Horicon goose concentration. Let's now look at what happened in the past 10-year period.

## CROP DAMAGE AND RELATED ASPECTS 1973-1983

It is not my intent to detail management programs and events resulting in a major reduction in goose populations in east-central Wisconsin. Several publications are available (See Goose Watch I-V and Final Report), and others are in preparation. Major aspects that impact on depredations will be briefly reviewed.

1973

Fall goose damage complaints totaled 93, but only 9 claims were paid for a total of $1800. The peak goose count declined from 212,000 in 1972 to 185,000 in 1973. In late summer, a major botulism outbreak occurred on Horicon Marsh during a drawdown for chemical control of carp. The die-off continued into late October with the loss of ±15,000 ducks and shorebirds, but few geese were involved. Disturbance from clean up and surveillance kept geese from the affected areas and probably contributed to the reduced peak count. This disease loss, which occurred shortly after the Lake Andes DVE die-off, stimulated concern about the potential hazard of so many geese on 1 refuge, as at Horicon. On return in spring 1974, there were no further botulism losses and depredation complaints totaled 42, resulting in 9 claims paid for $4,042.

1974

Fall depredation complaints reached a new high of 262, with 66 claims paid in the amount of $26,746. Predictions of significant crop damage by geese in a poor crop season were well-founded. Corn planting was delayed by wet, cold weather and an early frost in September resulted in reduced yields. Geese arrived early, with over 193,000 present by October 1 and the peak of 214,000 present by October 10. Refuge crops were also reduced in yield, resulting in early and extensive feeding flights. Corn prices soared to an all-time high of $3.58/bu. Farmers complained bitterly to legislators to reduce the goose population, while hunters complained of only a 28,000 kill quota and asked that they shoot the problem away. On return in the spring of 1975, 20 complaints were filed and 13 were paid for $4,042.75.

1975

Fall complaints totaled 163, with 21 claims paid for $7,166.80. The geese arrived on schedule, but 136,000 were present by October 2 and a new peak of 225,000 occurred on October 27. Corn production was excellent throughout the goose range. A dry fall permitted rapid harvest and early fall plowing. Removal of the food base and several inches of snow in late November contributed to an early departure. The new peak fall count precipitated an intensive effort by Wisconsin DNR and Region 3 federal wildlife personnel to initial development of a plan to reduce the Horicon goose concentration. The high damage in spring in 1976 of 79 complaints and 14 claims paid for $12,429.50 stimulated planning to reduce the goose population.

1976

Fall complaints peaked at an all-time high of 287, while payments totaled $15,494.55 on 45 claims. Based on increasing proportions of MVP geese stopping at Horicon (60%), poor distribution of geese down the flyway, increasing concern about disease threat, continuing depredations, and widespread dissatisfaction with failures to "do something", a 5-year plan was initiated in east-central Wisconsin to reduce the number of geese in the area. Objectives were to (1) reduce goose-use days from the 10-12 million range to 5 million, (2) stabilize the peak fall population in the area at 100,000, and (3) manage the flock so that 95% of goose-use occurred by December 5. Reductions were to be made in food, water and sanctuary at Horicon Refuge and 5 nearby state satellite goose projects. All planted crops (±1400 acres) were eliminated on Horicon Refuge and reduced 50% on state areas. Horicon Refuge was drawn down as low as possible, leaving about 900 acres of water. Intensive hazing occurred using 4 airboats, 1 helicopter, 800 exploders and 1 fixed-wing aircraft (part-time) from mid-September to October 30. Hunting was delayed to October 30 to encourage early geese to move on south and to harvest the late migrating segment. The abatement program was increased with 6-8 personnel available at all times. Results of this effort did not reduce goose-use days (12 million) or the peak population (196,000), but large numbers of birds shifted west and north to large lakes and state projects to roost and feed. State aircraft were used to chase geese off the roosting lakes in December. Goose harvest (quota of 28,000) declined in the immediate refuge area. Hazing efforts did force more geese onto private lands around the refuge, and with no planted food available, the geese had to feed more on farm crops. Dry weather reduced corn yield but aided early and continuous harvest. Considerable waste in picked fields and lack of fall plowing (too dry) provided abundant feed and reduced actual damage situations. Increased complaints of geese on farms were reasonably processed. Rapid southward departure occurred in early December. Public reaction was negative to the dispersal program, resulting in extensive publicity (Harrison 1976, Gilbert 1977). Spinoff of the hazing effort carried over into spring of 1977 when a record 79 complaints were received and 14 claims paid for $12,429.

1977

Fall depredation complaints were again high at 209 and 26 claims were paid totaling $23,052.87. Despite general objection to the dispersal program at Horicon, efforts continued with some modifications. The main refuge pool was not drawn down, and only the north end had low water; airboats were not used as intensively nor was the helicopter, for direct hazing, but exploders were still placed throughout the marsh. Geese arrived on schedule, but peaked at only 118,000 at Horicon and 181,000 in east-central Wisconsin. The kill quota was increased to 35,000 and hunting started October 15. Corn harvest was hampered by a wet fall, but there was a bumper yield and storage was a problem that further delayed picking. Goose-use in fall declined to 9.5 million days, influenced by early departure in late November due to heavy snowfall. In 1977, the limit on amount of damage payable was increased to $10,000. Only one claim exceeded the previous $1500 limit, this claim was for $8,776. Following the 1977 hunting season and severe weather conditions on

the winter range, the MVP population reached an all-time high of 529,000. Spring damage in 1978 was very light with 54 claims but only 2 claims paid for $545.

1978

Damage complaints totalled 125, with 10 claims paid for $12,509.95. The largest claim ever received, $10,736, was settled for $10,000, the maximum allowed. In the 3rd year of the goose reduction program in east-central Wisconsin, a major disturbance throughout the fall resulted from another botulism outbreak that started at Horicon Refuge in late September. Over 7,000 dead birds, mostly ducks, were picked up. Daily monitoring with airboats and a helicopter served to keep most geese out of the disease area on the north end of the refuge. Only 60 of 111 dead Canada geese were diagnosed as having died of botulism. Because of the increased MVP level, a kill quota of 50,000 was assigned. This was taken in a 70-day season despite a peak of only 62,300 at Horicon. The corn harvest was late in starting due to wet weather but was completed rapidly. Early freeze and heavy snow in late November forced most geese on south before December. The program objectives of 5 million goose-use days, a peak of 100,000 and 95% use by December were achieved. Complaints in the spring of 1979 totaled only 19 but 6 claims had damages of $6,867.24.

1979

Damage complaints totalled 142 but only 5 claims were paid for $4,523.78. Because of greatly reduced goose numbers at Horicon and in east-central Wisconsin, objectives of the 5-year program were modified upward to allow 6.5 million use days, 50% of use at Horicon and a peak at Horicon of 60,000. Water levels were lowered during the summer following high spring rains, but no drawdown occurred in fall. Exploders were judged ineffective in controlling total goose numbers at Horicon and were not used. By October 5, 70,900 geese were on Horicon Refuge. Air boat hazing was initiated during morning and evening hours for 7 days (through October 11), reducing the refuge population to 30,500. There was no increase of geese on nearby areas, indicating some 40,000 birds moved on south. In late October, avian cholera mortality was identified at Eldorado, Horicon Refuge and a private roosting area (Clark Farm). Airboats and a helicopter were used throughout November at Horicon for clean-up and monitoring. All other concentration areas throughout east-central Wisconsin were checked several times per week resulting in lower peak numbers and fewer goose-use days. A drawdown for carp removal at Grand River Marsh helped reduce the goose population there. The quota was reduced to 35,000 due to a decine in the MVP to 434,900. Goose numbers increased again at Horicon to 57,700 in late November but the fall peak was only 94,000 in east-central Wisconsin. Corn harvest was late due to mild weather. Delayed freezeup and light snow contributed to 6,000 geese remaining over winter in the Grand River Marsh area.

1980

Fall damage complaints totalled 131. A significant development in the 1979 state budget deliberations was the elimination of funding for all wildlife damage (deer, bear, waterfowl, cranes), effective June 30, 1980. There was one claim filed for spring damage in 1980 but it was not paid. State and federal abatement programs were continued in the fall and even intensified to assist farmers with goose problems. Exploders, shell crackers and plastic flagging were distributed as needed. Goose numbers at Horicon Refuge reached the 79,000 level on October 17, but hazing was not initiated due to low numbers of geese on other nearby areas. This peak count slowly decreased to 51,100 by November 18. Botulism again occurred during the summer, but clean up and high water levels prevented any further losses after early September. Regular airboat surveys were conducted on the refuge throughout the fall. Peak numbers of geese in east-central Wisconsin of 118,600 slightly exceeded objectives but total goose use was 6.1 million use-days, below the 6.5 million goal. Corn harvest was normal but mild weather persisted throughout the fall and early winter. About 20,000 geese stayed all winter on Grand River Marsh and several nearby lakes. A major lead poisoning loss of over 5,000 geese occurred in the area. Geese feeding largely on a corn diet contributed to the losses.

1981-82

Perhaps it is fortunate that there has not been a 15% annual increase in the MVP geese. While crop damage complaints were about average in 1981, totalling 142 in fall, there was a considerable increase in 1982 when 224 complaints were received. In the fall of 1982, cropping patterns changed significantly when farmers planted more fall-sown winter wheat as a cash crop to be harvested in 1983. Contributing to this shift was a near record low corn price of less than $2.00/bu. Geese in wheat fields represented over 40% of the complaints, but few serious losses occurred because of intensified abatement efforts and additional exploders available for distribution.

The basic results of crop depredations in the 1973-82 period are summarized in Tables 1-4 and Figures 1-4.

Strong agricultural interests in Wisconsin resulted in reestablishing a crop damage payment law in the 1983 state budget (see appendix A). The new law provided financing from the DNR budget for crop damages by deer, bear, and geese. The new procedures, however, prevented DNR from carrying out the program as in past years. The law requires state supervision of a county administered system. About $103,500 will be available in 1983 to get the program under way and funding increases to $383,000 in 1984 with $255,000 for paying claims. It is anticipated state and federal

Table 1. Annual Canada Goose crop damages, Horicon Marsh 1965-82.

| Year and Season | Number of Complaints | Number of Claims Paid | Cost of Claims | Peak Horicon Goose Count | MVP Population |
|---|---|---|---|---|---|
| *1965 Fall* | 91 | 43 | 10,948.26 | 120,000 | |
| *1966 Spring* | 20 | 11 | 2,682.52 | | 161,900 |
| *1966 Fall* | 49 | 11 | 1,608.10 | 147,150 | |
| *1967 Spring* | 10 | 0 | .00 | | 208,900 |
| *1967 Fall* | 170 | 40 | 7,413.00 | 113,360 | |
| *1968 Spring* | 11 | 0 | .00 | | 215,200 |
| *1968 Fall* | 97 | 8 | 1,252.60 | 172,300 | |
| *1969 Spring* | 23 | 0 | .00 | | 250,000 |
| *1969 Fall* | 134 | 16 | 2,748.71 | 144,100 | |
| *1970 Spring* | 20 | 2 | 264.00 | | 324,450 |
| *1970 Fall* | 59 | 2 | 980.00 | 172,500 | |
| *1971 Spring* | 31 | 16 | 5,312.80 | | 292,070 |
| *1971 Fall* | 97 | 5 | 741.60 | 232,690 | |
| *1972 Spring* | 18 | 1 | 50.00 | | 293,889 |
| *1972 Fall* | 88 | 6 | 780.67 | 210,300 | |
| *1973 Spring* | 18 | 1 | 187.50 | | 295,800 |
| *1973 Fall* | 93 | 9 | 1,800.00 | 178,000 | |
| *1974 Spring* | 42 | 9 | 4,772.25 | | 277,707 |
| *1974 Fall* | 262 | 66 | 26,746.39 | 203,900 | |
| *1975 Spring* | 20 | 13 | 4,042.75 | | 304,300 |
| *1975 Fall* | 163 | 21 | 7,166.80 | 220,100 | |
| *1976 Spring* | 79 | 14 | 12,429.50 | | 304,900 |
| *1976 Fall* | 287 | 45 | 15,494.55 | 172,200 | |
| *1977 Spring* | 54 | 2 | 545.00 | | 478,500 |
| *1977 Fall* | 209 | 26 | 23,052.87 | 130,800 | |
| *1978 Spring* | 39 | 7 | 4,909.51 | | 575,500 |
| *1978 Fall* | 125 | 10 | 12,509.95 | 62,300 | |
| *1979 Spring* | 19 | 6 | 6,867.24 | | 434,500 |
| *1979 Fall* | 142 | 5 | 4,523.78 | 70,900 | |
| *1980 Spring* | 5 | 1 | .00 | | 394,900 |
| *1980 Fall* | 131 | NA | NA | 79,100 | |
| *1981 Spring* | 25 | NA | NA | | 367,400 |
| *1981 Fall* | 142 | NA | NA | 90,300 | 250,900 |
| *1982 Spring* | 17 | NA | NA | | |
| *1982 Fall* | 224 | NA | NA | 86,450 | |
| *1983 Spring* | | | | | (±300,000?) |

personnel will assist in abatement in the fall of 1983, but not after this year.

In addition to the above law, another crop damage bill is being given public hearings by the state legislature. This bill would broaden funding by use of $1.00 from each hunting license and increase coverage to include ducks, cranes, blackbirds and possibly some mammalian predators. Public reaction has been critical of the large amount of funding that would be available (±$800,000/year), and requirements that hunting be permitted on lands where damage would be paid. (Note: This bill did not receive favorable action and was dropped by the Legislature.)

## DISCUSSION

There is very little information in the literature on economic aspects of waterfowl crop damage, particularly for Canada geese in the past 10 years. Although Clark and Jarvis (1978) and Kahl (1979) investigated goose depredations on ryegrass and wheat, respectively, no monetary losses were estimated. Frederickson (1980) evaluated the role of feeding and history of crop damage in California but Canada geese were not significantly involved. Wyoming, as the only other state paying waterfowl crop damage, has never had a published report on their program. Leonard Serdiuk, Migratory Bird Supervisor (Pers. Comm.) kindly provided a summary of their program for 1972-1982 (Table 5). Claims in that state often involved several species (cranes, ducks, geese) congregating on the same site resulting in some significant damage claims almost every year. Claims are investigated by the Wyoming Game and Fish Department and may be reviewed by disinterested arbitrators. Goose damage has been primarily in late summer and late fall on wheat and barley crops in the Bear River and Salt

**Table 2. Number of claims paid on crops damaged by Canada Geese in Wisconsin 1973-79.**

| Spring Season | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | Total | Percent by crop |
|---|---|---|---|---|---|---|---|---|---|
| *Previous Year's Corn* | – | 7 | 4 | 3 | – | 7 | 7 | 28 | 56 |
| *Alfalfa Seeding* | – | 1 | 2 | 5 | 2 | – | – | 10 | 20 |
| *Alfalfa Mature* | – | – | – | – | – | – | – | – | – |
| *Winter Wheat* | – | – | 5 | 4 | – | – | – | 9 | 18 |
| *Other Crops* | – | 1(rye) | – | 2(1 rye) (1 clover) | – | – | – | 3 | 6 |
| *Total* | – | 9 | 11 | 14 | 2 | 7 | 7 | 50 | 100 |
| Fall Season | | | | | | | | | |
| *Standing Corn* | 9 | 60 | 17 | 36 | 24 | 10 | 5 | 161 | 87 |
| *Alfalfa Seeding* | – | 3 | 3 | 2 | – | 1 | – | 9 | 5 |
| *Alfalfa Mature* | – | – | 1 | 1 | 2 | – | – | 4 | 2 |
| *Buckwheat* | – | 1 | – | 3 | 2 | – | – | 6 | 3 |
| *Winter Wheat* | – | 1 | – | 3 | – | – | – | 4 | 2 |
| *Other Crops* | – | 1(oats) | – | – | 1(barley) | – | – | 2 | 1 |
| *Total* | 9 | 66 | 21 | 45 | 29 | 11 | 5 | 186 | 100 |

**Table 3. Weekly distribution of crop damage by Canada Geese in Wisconsin 1973-79.**

| Spring Damage | February | | | | March | | | | April | | | | May | | | | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | |
| *Number of Claims Paid* | | 1 | | | | 3 | 12 | 5 | 7 | 6 | 4 | 5 | | | | | 43 |
| *Percent of Total* | | 2 | | | | 7 | 28 | 12 | 16 | 14 | 9 | 12 | | | | | 100 |
| Fall Damage | September | | | | October | | | | November | | | | December | | | | |
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | |
| *Number of Claims Paid* | | | 3 | 20 | 41 | 40 | 31 | 24 | 3 | 1 | 2 | 7 | 5 | 8 | 1 | | 186 |
| *Percent of Total* | | | 2 | 10 | 22 | 22 | 16 | 13 | 1 | 1 | 1 | 4 | 2 | 5 | 1 | | 100 |

River drainages (Figure 5). Why more states do not have a compensation program for waterfowl is unknown although a number of them cover big game species. The mushrooming spread and increase in Giant Canada goose flocks (*B. c. maxima*) suggests there may be a need for damage payment programs in the near future (Hansen and Swanson 1982).

In assessing the crop damage program, a number of points may be of interest with respect to our new payment program and to others encountering depredation problems and large goose populations.

1. In 1973, the most logical solution to reducing crop damage seemed to be in greatly reduced goose numbers at Horicon Refuge, from ±250,000 to perhaps ±60,000, a level judged to meet refuge cropping capability. Although this goal was nearly achieved, depredations remained a problem. Clearly the numerical level of geese present is not directly related to when, where or on what crops goose depredations occur in east-central Wisconsin. Total goose-use, however, by the entire Flyway MVP birds did decline from 60-75% before 1975 to 25-30% by 1980.

**Table 4. Geographic distribution of Canada Goose crop damage claims in Wisconsin 1965-79.**

| Distance from Horicon Refuge | Fall and Spring 1965-72 | | Spring Period 1973-79 | | Fall Period 1973-79 | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| *0–10 miles* | 124 | 79 | 16 | 35 | 162 | 87 |
| *11–20 miles* | 25 | 16 | 13 | 28 | 19 | 10 |
| *over 20 miles* | 9 | 5 | 17 | 37 | 5 | 3 |
| *Total* | 158 | 100 | 46 | 100 | 186 | 100 |

2. Management efforts on our state and federal projects in the past 10 years have denied or greatly reduced the elements of food, water, and sanctuary normally considered essential in attracting and holding waterfowl on any area. Surely, no Canada goose population has been so abused by managers, farmers or hunters. Why over 100,000 of these MVP geese have maintained their fall stopover habit defies logic. While the high threat of crop damage was one of the major reasons for instituting the dispersal-reduction program in 1975, we had already developed an adequate control-

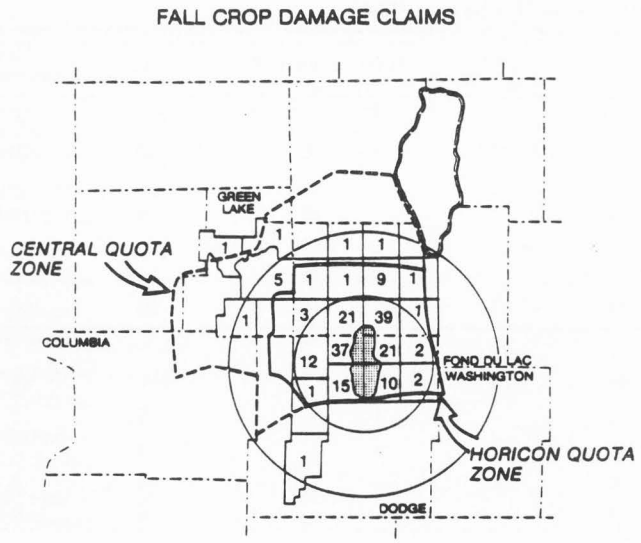


*Figure 1. Number and location by township of fall Canada Goose crop damage claims paid in Wisconsin, 1973-1979*

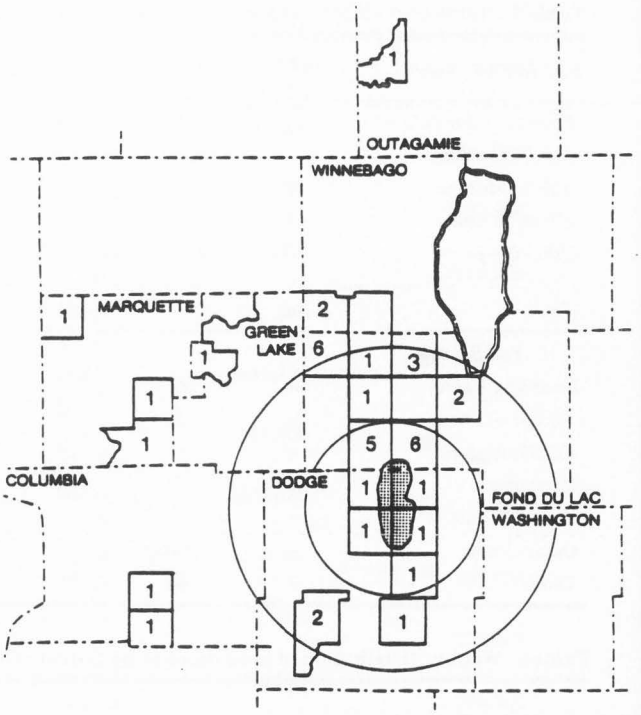


*Figure 2. Number and location by township of spring Canada Goose crop damage claims paid in Wisconsin, 1973-1979.*

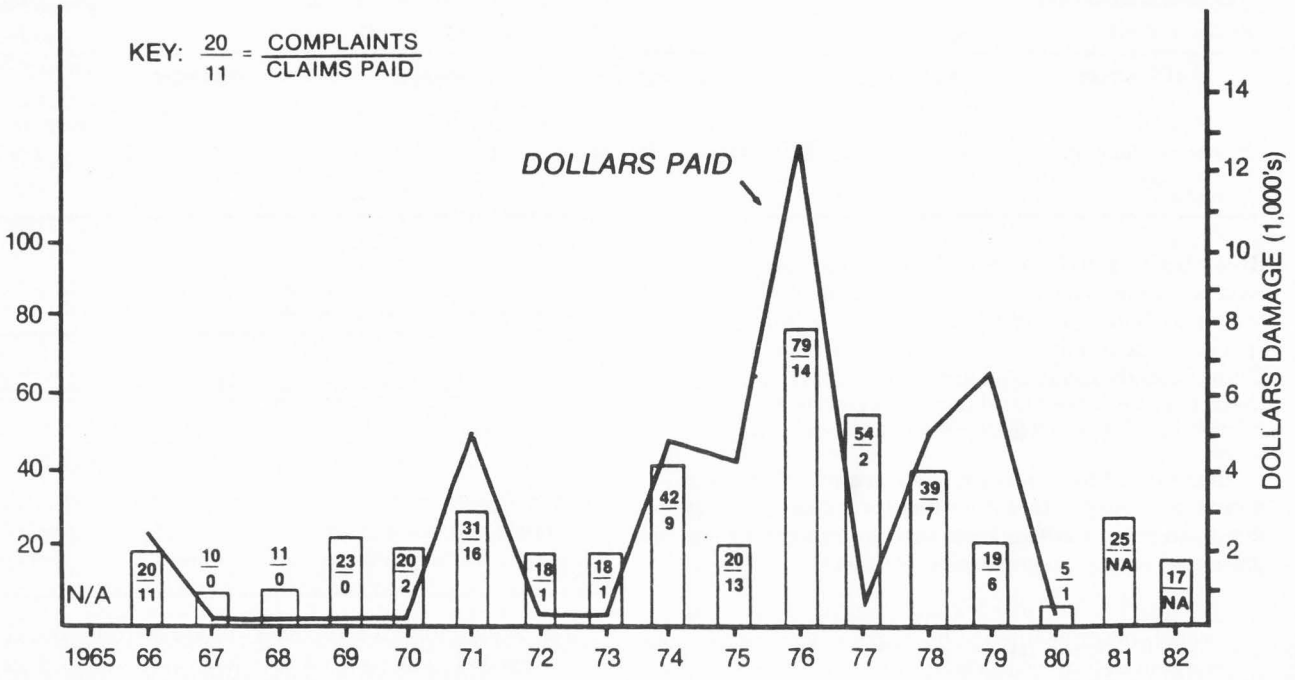


*Figure 3. Spring Canada Goose crop depredations in Wisconsin, 1965-1982.*

compensation system compatible with our investment and return from the MVP resource. In the last few years of the crop damage program (1977-82), claims paid were averaging about $1,000 per claim and cost to service a complaint was estimated at about $150. Equating goose harvest (average of 30,000/year) to cost of the depredations program suggests that less than $1.00 per goose bagged was being invested in Wisconsin. This is still a modest sum in light of limited expenditures on our wildlife projects managed for MVP geese.

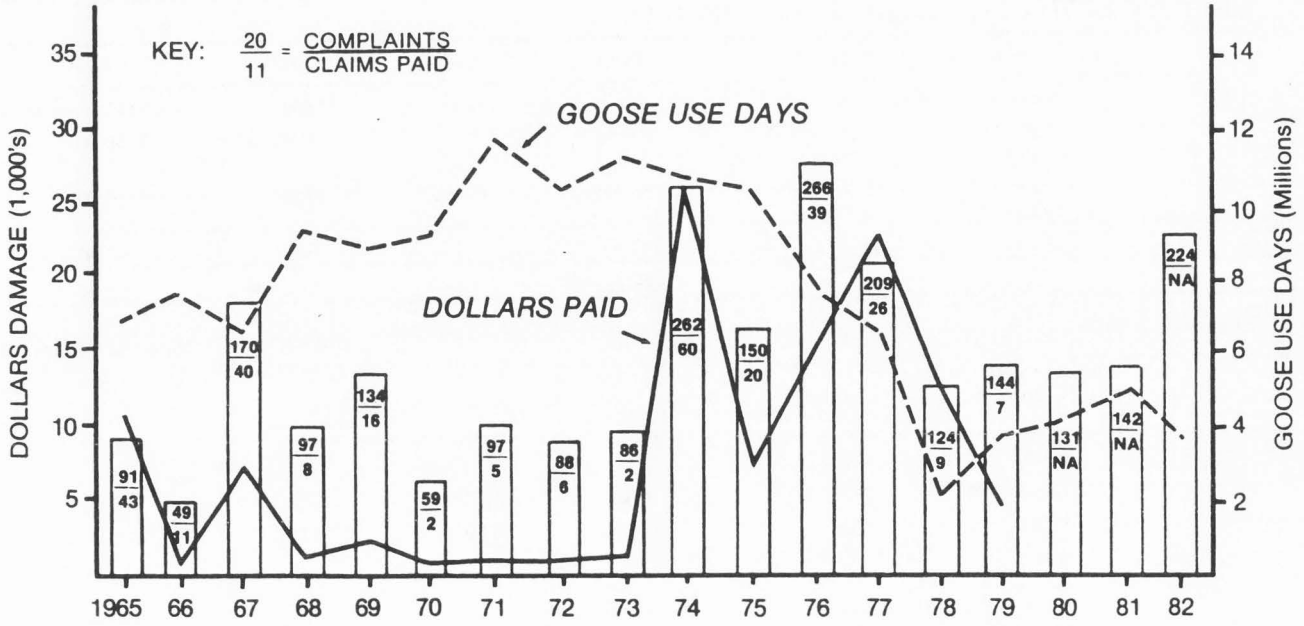


*Figure 4. Fall Canada Goose crop depredations in the Horicon Marsh area, 1965.*

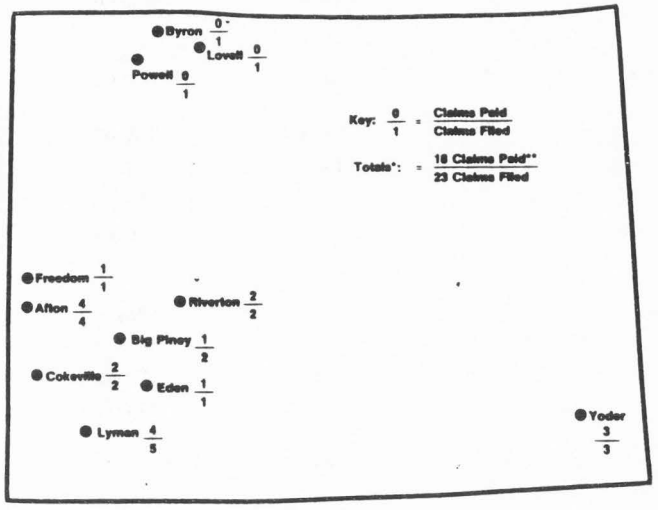


*Figure 5. Locations of Canada Goose crop damage claims in Wyoming, 1972-1982*.*

3. Although significant numbers of Canada geese were dispersed to several state satellite projects and large lakes around Horicon refuge, crop damage did not increase at such sites. In general, geese on other sites fed in the same traditional areas used prior to dispersal and mixed regularly with those geese feeding out from Horicon refuge. Observations of neck-collared (Craven 1978) and radio-marked (J.A. Bartelt, pers. comm.) geese confirm that Horicon refuge is still the hub of activity and influence of MVP geese in east-central Wisconsin.

4. The high disease threat did materialize in several years. Prompt action by refuge personnel and the highly competent staff of the National Wildlife Health Laboratory in nearby Madison, Wisconsin quickly implemented actions to control and mitigate disease outbreaks. Nevertheless, disease threats will continue to be a high risk ecological factor in east-central Wisconsin. Disease control programs are likely to compound crop depredations because of disturbance from various vehicles and aircraft needed to solve the problem.

5. Of all dispersal (scaring) techniques tried, large airboats used before and after sunrise and sunset proved most effective in reducing large goose concentrations on roosts. Helicopters were often effective during daylight but were not safely operable after dark when large numbers of geese returned to roost on water sites.

6. Hunting was not a controlling factor on goose behavior because the kill quotas severly limited the number of hunters and potential harvest. Even a 50,000 quota in 1978 did not impact on depredations. However, research (banding and neck-collaring) suggested that high harvest in the 1977-79 period contributed importantly to reduced numbers of geese in the MVP in Wisconsin and the Flyway.

7. Weather is the basic factor affecting crop production. Any delays in corn planting or harvest, or yield can affect supply and price. Most farmers want to harvest their crops, not collect damages; generally they will tolerate some geese on their land and minor crop losses. If adverse economic conditions affect the farmer, geese can be of concern. Some instances of significant crop losses do

**Table 5. Migratory bird crop damage in Wyoming 1972-1982.***

| Year | Species and Number | Crop | Amount | Claimed | Paid |
|---|---|---|---|---|---|
| 1972 | *Geese* 200 | *Barley* | 45 ac. | $1859 | None (41.25 approved) |
| | *Geese* 300<br>*Ducks* 1000 | *Barley* | 6 ac. | 150 | $150.00 |
| | *Geese* 50<br>*Ducks* 100 | *Barley* | 370 bu. | 350 | 50.20 |
| | *Ducks* 5000 | *Corn* | ? | 699 | 40.00 |
| 1973 | *Geese* 150<br>*Ducks* 200 | *Barley* | 5 ac. | 252 | 252.00 |
| | *Geese and Ducks* ? | *Grain* | ? | 4399 | None (52.50 approved) |
| | *Geese, Ducks, and Cranes* ? | *Barley* | ? | 1500 | None |
| 1974 | *Geese* 200<br>*Cranes* 150 | *Barley* | 30 ac. | 1440 | 960.00 |
| 1975 | *Geese* 380 | *Oats* | 7 ac. | 420 | 420.00 |
| | *Geese* 150<br>*Ducks* some<br>*Cranes* 15 | *Barley* | 150 bu. | 396 | 200.00 |
| | *Ducks* sev. thousand | *Corn* | ? | 50 | None |
| | *Geese & Cranes* ? | *Grain* | ? | 4000 | 2268.00 |
| 1976 | *Cranes* ? | *Barley* | 1380 bu. | 3450 | 1037.00 |
| | *Geese* 700<br>*Ducks* 200<br>*Cranes* 200 | *Alfalfa* | 30 ton | 1950 | 1000.00 |
| | *Geese* 2000<br>*Ducks* 3000 | *Barley* | 3¾ ton | 979 | 300.00 |
| | *Geese & Ducks* ? | *Barley* | 35 ton | 2800 | 480.00 |
| | *Geese & Ducks* ? | *Grain* | ? | 3800 | None |
| | *Geese* 200 | *Barley* | ? | 655 | 655.00 |
| | *Geese* 150<br>*Ducks* 200<br>*Cranes* 100 | *Wheat* | 6.6 bu | 491 | None |
| 1977 | *Geese* 30<br>*Ducks* 1000 | *Oats* | ? | 300 | None |
| 1978 | *Ducks* 500 | *Barley* | 5 ac. | 500 | 360.00 |
| | *Geese, Ducks, & Cranes* ? | *Grain* | 6 ton | 423 | 240.00 |
| | *Ducks* ? | *Corn* | 5.6 ac. | 1066 | 1066.00 |
| | *Ducks* ? | *Grain* | ? | 7298 | 7298.00 |
| 1979 | *Geese & Ducks* ? | *Corn* | 43 ac. | 3900 | 1722.00 |
| | *Ducks* 1500 | *Corn* | ? | 375 | 375.00 |
| 1980 | *Geese* 700 | *Pasture* | ? | 315 | None |
| 1981 | *Geese & Cranes* ? | *Barley* | ? | 371 | None |
| | *Geese* 1000<br>*Cranes* 150 | *Barley* | 20 ton | 2000 | 1813.00 |
| | *Geese & Cranes* 100 | *Barley* | 750 bu. | 1875 | 742.00 |
| | *Geese* 20<br>*Cranes* 80 | *Barley* | 10 ton | 1010 | 1010.00 |
| | *Geese* 800 | *Barley* | 900 bu. | 2138 | 2052.00 |
| | *Geese* ? | *Barley* | ? | 548 | Part ? |
| 1982 | *Geese & Cranes* 500 | *Grain & Hay* | 5 ton | 300 | 300.00 |
| | *Geese, Ducks, and Cranes* ? | *Wheat* | ? | 1064 | None |

* Data provided by Leonard Serdiuk, Migratory Bird Supervisor, Lander, Wyoming 82520.
} Multiple species involved in claim.

occur, either before it is noticed or despite direct abatement efforts. Most damage is within a few miles of Horicon Refuge, usually in October on field corn while harvest is in progress. Winter wheat is not normally planted in large acreages (as in 1982) or subject to extensive damage. First-year alfalfa may be damaged in wet weather but this crop is declining as farming practices change to more high moisture corn, super silos, and barnyard feeding of dairy herds. Wetland drainage contributes to the problem, too, through loss of lowland pasture important for goose grazing in both spring and fall, and through conversion to corn ground, which is more subject to flooding and frost.

8. Controlling depredations on private lands has been greatly aided by the telephone call-in service available at local wildlife agency offices. With or without a damage payment program, providing assistance with exploders, flags and shell crackers has been helpful. The farmer can see that the agencies are trying to do something. Some may view farmer assistance efforts as unnecessary. In the Horicon area, the geese have no other source than private farm land to meet food requirements. Keeping the farmer tolerant of geese seems to be wise management.

## FUTURE PROSPECTS

Goose crop damage will probably always be a factor in the management scheme in east-central Wisconsin. The intent of increasing the peak fall population to at least 200,000 Canadas on state areas (50%) and the Horicon federal refuge (50%) certainly sets the stage. The absence of planted crops, (like corn and browse) on refuges dictates the need to provide for damage because the geese will seek these foods on nearby private lands. Horicon Refuge could again become a major problem area. Several large water management pools have been created in the former crop lands, which are now very attractive to all waterfowl. Current policy is that there will be no more hazing or even waterfowl hunting (potential for 40% open) on the refuge, despite the number of geese present. If the MVP winter flock is ultimately increased to half a million or more, the fall flight will be double present numbers and many of these birds probably will stop in the Horicon area. The strong spring tradition also fortifies fall use.

The transfer of wildlife crop damage payments to County Agricultural Conservation Committee control has resulted in some problems already. None of the 5 or 6 counties with large goose concentrations want to establish crop damage prevention or payment programs. As a consequence, the Department of Natural Resources has classified the Canada goose as a "nuisance species", wherein, state personnel will respond to any complaints of geese doing crop damage (beaver and sandhill cranes are also considered in this category). As a result, it is "business as usual" in providing assistance to farmers with goose problems. The federal office at Horicon is continuing its program but is working with counties in trying to transfer equipment to them to handle the problem.

Attention should be given to modifications in farming practices. Minimum till and other conservation planting and harvesting methods could impact on depredations. Canada geese and field-feeding mallards made extensive use of corn stubble when chopped for chisel plowing and planting. Over 20% of corn ground is now so managed and projections are that it will total 80% in a few years. Incentives or subsidies to encourage conservation tillage would save soil and provide much more feeding range than normal fall plowing. My 1973 paper suggested that surplus grains be used to repay farmers for crop losses. The current federal Payment in Kind (PIK) program suggests this is still a valid alternative to cash payments.

The Wisconsin Natural Resources Board in August 1983 stated its intent to protect the Wisconsin Canada goose cohort from over-harvest, both within and outside the state. This action was in response to extension of the Flyway goose hunting season closing date to January 31 to benefit southern states that receive the late departing MVP geese from Wisconsin. Actions contemplated included direct feeding and aeration of roost sites until February 1 to hold geese in the state. This could lead to extended depredations abatement and perhaps purchase of grain in feeding fields around late concentration sites.

If delayed migrations result in crop damage, lead poisoning, disease losses, etc., the need exists to scare or disperse geese. Current techniques are the same used for the past 25 or 30 years. One innovation tried in 1982 was the use of blaze orange plastic flags (cost $4.20/yd.^2$) which proved superior to the standard black flagging. Clearly, however, research should be directed at finding other new or improved dispersal methods.

In conclusion, the Canada goose is a major wildlife asset in Wisconsin despite 25 years of dealing with a host of so-called management problems. In most instances, these problems should be viewed from the positive side. As wildlife managers, we should feel fortunate that Canada geese are so adaptable and so abundant; this is not always the case, look at the current black duck situation. Crop damage by Canada geese is not always a preventable problem but it is manageable with current skills where geese utilize private lands for feeding. And techniques to improve abatement are awaiting further interest to find them. Charles Lindberg said "I'd rather have birds than airplanes"; I'd rather have geese and some crop depredations, than no geese.

## LITERATURE CITED

Clark, S.L. and R.L. Jarvis. 1978. Effects of winter grazing by geese on yield of ryegrass seed. Wildl. Soc. Bull. 6:84-87.

Craven, S.R. 1978. Distribution and migration of Canada geese associated with Horicon Marsh, Wisconsin. PhD thesis. Univ. WI., Dept. Wildl. Ecol., Madison. 135 pp.

Fredrickson, L.H. 1980. An evaluation of the role of feeding in waterfowl management in southern California. U.S. Dept. Inter. Fish and Wildl. Serv. 173 pp. (mimeo).

Gilbert, B. 1977. Uncle Sam says scram. Audubon Magazine 79:42-55.

Hansen, J. and G. Swanson. 1982. Iowa's giant Canada goose program and efforts to deal with depredations. Pages 62-64 in Michael A. Johnson, editor; Trans. of the Canada goose symposium, Apr. 28-29, Bismark, N.D.

Harrison, G. 1976. The wild goose chase of 1976. Field and Stream, 81(5):132-139.

Hunt, R.A. and J.G. Bell. 1973. Crop depredations by waterfowl in Wisconsin. Proc. 6th Bird Control Conf. Bowling Green, OH: pp. 85-101.

Kahl, R.B. 1980. Crop depredations by Canada geese in north central Missouri. M.S. Thesis. Univ. of MO. Columbia. 142 pp.

U.S. Fish and Wildl. Serv. 1976-81. Goose watch I-V, and Final Report. Region III (mimeo).

**Appendix A. Wisconsin Wildlife Crop Damage Law – 1983.**

SECTION 821m. 29.598 of the statutes is created to read:

29.598 Wildlife damage abatement program; wildlife damage claim program. (1) DEFINITION. As used in this section, "wildlife damage" means damage caused by wild deer, bear or geese to commercial seedings or crops on agricultural land, to orchard trees or nursery stock or to apiaries or livestock.

(2) DEPARTMENT POWERS AND DUTIES. (a) *Assistance.* The department shall assist counties in developing and administering the wildlife damage abatement and wildlife damage claim programs. The department shall provide this assistance through technical aid, program guidance, research, demonstration, funding, plan review, audit and evaluation services.

(b) *Eligibility and funding requirements.* The department shall adopt by rule eligibility and funding requirements for the wildlife damage abatement program and the wildlife damage claim program in order to maximize the cost-effectiveness of these programs.

(c) *Review of county administration plans.* The department shall provide guidelines to counties applying for participation in the wildlife damage abatement and wildlife damage claim programs under sub (3)(b). The department shall review each plan of administration submitted under sub. (3)(c) and the administrative rules adopted by the department.

(d) *Administrative funds.* The department shall provide funding to each county participating in the wildlife damage abatement program, wildlife damage claim program or both for costs incurred in administering these programs. The amount of funding to be allocated for each county shall be based on the estimate of anticipated administrative costs prepared under sub. (3)(c) 8 but the department shall determine payments based on the actual administrative costs incurred. If actual costs exceed the estimate, the department may allocate additional funding based on criteria and using procedures established by rule.

(3) COUNTY ADMINISTRATION. (a) *County participation required.* Eligibility for the wildlife damage abatement program or the wildlife damage claim program requires participation of the county in the administration of these programs as specified under sub. (4)(a) and (6)(a). The department may not administer a wildlife damage abatement program or wildlife damage claim program on behalf of or instead of a county.

(b) *Application.* A county seeking to administer the wildlife damage abatement program or the wildlife damage abatement and wildlife damage claim programs shall apply to the department on forms provided by it on or before November 1 for the administration of these programs in the following calendar year or other period specified in the application.

(c) *Plan of administration.* The application shall include a plan of administration to which the county agrees and in the form required by the department. The plan of administration shall include all of the following:

1. An agreement that the county shall make all records and files relating to the wildlife damage abatement program and wildlife damage claim program, including records and files concerning access of hunters to lands for which a wildlife damage claim is filed, available to the department fo audit at reasonable times with the full cooperation of the county.

2. A description of authorized wildlife damage abatement measures, including designation of specifications for woven wire deer fences, for which reimbursement may be provided under the wildlife damage abatement program or which may be recommended under the wildlife damage claim program.

3. A summary of billing, allocation and accounting procedures to be used by the county and the department under this section. These procedures shall be consistent with generally acceptable accounting practices.

4. The procedure or formula to be used to determine land suitable for hunting and other hunting requirements necessary to comply with sub. (6)(e).

5. The procedures to be used in administering the wildlife damage abatement and wildlife damage claim programs.

6. A commitment that the county agrees to administer the wildlife damage abatement and wildlife damage claim programs so that participants are encouraged to pursue sound conservation as well as normal agricultural practices.

7. A summary of the organization and structure of the agency or unit of the county which is responsible for the administration of the wildlife damage abatement and wildlife damage claim programs.

8. An estimate of anticipated administrative costs, anticipated wildlife damage abatement assistance costs and anticipated wildlife damage claim payments.

9. Other information and conditions the department requires.

(d) *Department approval; revocation.* A county may not administer the wildlife damage abatement program or the wildlife damage claim program and a county is not considered a participating county for the purpose of administering these programs unless the department approves the plan of administration. The department may revoke its approval if a county does not comply with the plan of administration or this section.

(4) WILDLIFE DAMAGE ABATEMENT PROGRAM; ELIGIBILITY. (a) *Participating county.* In order to be eligible for wildlife damage abatement assistance, the land for which assistance is sought is required to be located in a county which is participating in the administration of the wildlife damage abatement program.