

## QUANTIFYING CROP DAMAGE BY GIANT CANADA GEESE IN DAY COUNTY, SOUTH DAKOTA, 2003

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### ABSTRACT

Giant Canada goose (*Branta canadensis maxima*) populations have been increasing steadily as a result of several management techniques including habitat management and reintroduction programs. Unfortunately, this population increase has resulted in damage to agricultural crops. To alleviate this problem, the South Dakota Game, Fish, and Parks Department (SDGFP) initiated a program to reduce crop damage caused by giant Canada geese. We attempted to determine the severity of crop damage by giant Canada geese, and the effectiveness of the crop damage program in Day County, South Dakota during summer, 2003. Damaged fields were located through landowner complaints and aerial surveys. We found 70 damaged fields, 68 of which were measured, which accounted for 119 acres (48.2 ha) of damaged crops. Complaint landowners, defined as those who received SDGFP assistance, had an average crop loss of 1.3 acres (0.5 ha) per field. Landowners that did not receive SDGFP assistance, non-complaints, lost an average of 2.1 (0.9 ha) acres of crops per field. The overall average of crops lost to giant Canada geese was 1.8 (0.7 ha) acres per field. The SDGFP crop damage program appears to be successful if administered early in the growing season.

### Keywords

*Branta canadensis maxima*, crop damage, giant Canada geese

## INTRODUCTION

The giant Canada goose, *Branta canadensis maxima*, is considered a success in wildlife management. At one time thought to be extinct, giant Canada goose populations have significantly increased. This population increase may be attributed to several management techniques such as reintroduction programs, habitat management, and regulation of hunting (Delacour 1954, Hanson 1965). Unfortunately, this successful restoration has created problems including goose damage to lawns, golf courses, beaches, and agricultural crops (Conover and Chasko 1985, Hindman and Ferrigno 1990). Crop damage by foraging Canada geese has been increasing throughout the United States (Flann 1999) as agriculture has expanded and wetlands and their associated food supplies have declined.

Most crop damage occurs where giant Canada geese are attracted to crops planted immediately adjacent to the water's edge. Geese select shorelines with gentle slopes having little or no vegetation barriers which increases their ability to see approaching predators. The summer molt for giant Canada geese begins in mid-June and proceeds through July. During this time, young geese are flightless and adult geese concentrate in molting areas, which can lead to localized crop damage. The extent of damage to emerging crops by flightless Canada geese may be a function of the local breeding population behavior, along with the possible influx of molt-migrators (Flann 1999).

Giant Canada geese feed on immature crops which are capable of meeting increased nutrient requirements due to brood-rearing and molting. Soybeans and other crops have a higher nutrient value at the time when graminoid species are maturing and becoming unpalatable to geese (Flann 1999), resulting in crop damage that poses a problem to landowners.

In eastern South Dakota, giant Canada goose damage on field crops has caused numerous landowner complaints. Due to these complaints, SDGFP initiated a program to reduce crop losses. Landowners that file a complaint are given free access to abatement techniques offered by SDGFP. These options include but are not limited to; 1) Visual deterrents such as flags and eagle kites; 2) Propane cannons or sonic deterrents; 3) Hazing or physically moving giant Canada geese either by shooting cracker-shells and/or by scaring them with boats; 4) Permanent or temporary electric fences, which are constructed to provide a physical barrier between the water and growing crops. SDGFP also provides contracted wheat and alfalfa buffer strips between the shoreline and crops. There has been no research to confirm the actual amount of goose damage that is occurring, or to verify the success of the crop damage program. The purpose of this study was to accurately measure crop damage caused by giant Canada geese on agricultural fields in Day County, 2003.

## STUDY AREA AND METHODS

The study area was Day County, located in northeast South Dakota. This county has historically had giant Canada goose damage and numerous land-

owner complaints occur annually. The study area lies within the Prairie Pothole Region, a glacially created region in the northern prairies of North America, characterized by a large quantity of wetlands (Kantrud et al. 1989). Although the area is not the most optimal for farming due to numerous wetland basins, the most common land practice includes row crops, (mainly soybeans, small grains, and corn) and cattle production.

Landowners that notified SDGFP regarding crop damage caused by giant Canada geese were referred to as complaints. Damage abatement techniques were then applied to each complaint area. If crop damage occurred, evidenced by physical sighting of birds or presence of footprints, feathers, and/or droppings, the total area damaged by geese was measured. Measurement was always done after geese vacated the area and no further damage occurred. Measurements were taken with a Trimble Asset Surveyor, a GPS unit with sub-meter accuracy. The perimeter of the damaged portion of the field was walked as the Trimble unit calculated the encompassed acreage with +/- .02 acre accuracy.

In mid-July, we conducted an aerial survey over wetland areas of Day County to locate goose damage in fields where landowners did not file complaints. These landowners were referred to as non-complaints. The survey was flown in two-mile transects at an altitude between 1,000 and 1,400 feet above ground. Three people conducted the survey; a pilot, a person to spot damage, and a recorder. Binoculars aided in determining damaged fields. Crop damage was marked on a county map during the aerial survey and then located and measured on the ground. Non-complaint crop damage was also measured with the Trimble Asset Surveyor. ANOVA was used for statistical analysis to compare complaint and non-complaint crop damage.

## RESULTS

The SDGFP in Day County received giant Canada goose damage complaints from 22 individual landowners in 2003. This crop damage occurred on 31 separate fields (Table 1). During the aerial survey, we found an additional 39 non-complaint fields, for a total of 70 fields damaged by geese in Day County in 2003 (Table 1). Only 37 of 39 non-complaint fields were measured because two landowners refused access to their fields.

In 2003, the total crop acreage lost on 31 complaint fields was 40.7 acres (16.5 ha). An average of 1.3 crop acres (0.5 ha) was lost on each complaint field (Table 1). The most crop damage sustained by one complaint landowner was a combined total of 8.6 acres (3.5 ha) on two fields. Of the 37 fields owned by non-complaint landowners that we measured for crop damage, the total acreage lost to geese was 78.4 acres (31.7 ha). An average of 2.1 acres (0.9 ha) of crop loss occurred on non-complaint fields (Table 1). The most crop damage sustained by one non-complaint landowner was 11.6 acres (4.7 ha), which occurred on two fields. Due to high variability, there was no significant difference in mean crop damage between complaints (1.3 acres) and non-complaint fields (2.1 acres) ( $P = 0.108$ ) ( $\alpha = .05$ ). In 2003, Day County averaged 25 bushels of soybeans per acre, which means the average loss to complaint landowners was \$195, and the

**Table 1. Giant Canada goose damage to agricultural fields in Day County, South Dakota, 2003.**

COMPLAINTS				
		Damage		
CROP	# OF FIELDS	AVERAGE (ac)	RANGE (ac)	TOTAL (ac)
Soybeans	20	1.6 (0.7 ha)	0 to 6.0 (0 to 2.4 ha)	32.7 (13.2 ha)
Corn	4	1.6 (0.7 ha)	0 to 5.5 (0 to 2.2 ha)	6.2 (2.5 ha)
Small Grains	6	0.3 (0.1 ha)	0 to 1.0 (0 to 0.4 ha)	1.8 (0.7 ha)
Sorghum	1	0	0	0
<b>Total</b>	<b>31</b>	<b>1.3 (0.5 ha)</b>		<b>40.7 (16.5ha)</b>
NON-COMPLAINTS				
		Damage		
CROP	# OF FIELDS	AVERAGE(ac)	RANGE (ac)	TOTAL (ac)
Soybeans	32	2.4 (1.0 ha)	0.2 to 11.0 (0.1 to 4.45 ha)	76.4 (31 ha)
Corn	2	0.3 (0.1 ha)	0.2 to 0.4 (0.1 to 0.2 ha)	0.7 (0.3 ha)
Small Grains	3	0.4 (0.2 ha)	0.2 to 0.7 (0.1 to 0.3 ha)	1.3 (0.5 ha)
<b>Total</b>	<b>37</b>	<b>2.1 (0.9 ha)</b>		<b>78.4 (31.7 ha)</b>

average loss to non-complaint landowners was \$315, with soybeans at \$6/bushel. Landowners that received SDGFP assistance from mid-May to early June lost from 0.0 to 1.0 acres of crops due to giant Canada goose damage in 2003. On eight of these complaint fields, no crop damage was sustained. Landowners that filed a complaint in July and August, when the majority of the damage had already occurred, lost from 2.9 to 8.5 acres. Landowners that did not receive SDGFP assistance (non-complaints) suffered slightly higher crop loss on fields due to giant Canada geese.

## DISCUSSION

The aerial survey was effective in locating crop damage in areas not visible from a road. It is possible, but unlikely, that some smaller damaged areas were not included due to visibility constraints, but all large damage sites were located with this method. Additional areas damaged after the survey was completed may not have been included, unless observed from a road. In addition, there were several crop fields recorded as damage sites from the air, but were later determined to be water damage.

Measurements of damaged crops from Canada geese were taken at various time periods depending on the crop type and its associated re-growth rate in response to foraging. Measurement of small grains (wheat, oats, and millet) was conducted during late June. By this time plants had grown high enough to become unattractive to giant Canada geese and the majority of small grain crop damage already occurred. We saw many small grain fields exhibit substantial

re-growth in 2003. While plants may appear damaged by grazing, wheat yield is not always reduced and may even increase after goose foraging (Biehn 1951). Factors such as growth stage, soil type and moisture, and overall growing conditions affect crop yield under grazed conditions (Flegler et al. 1987). A few areas where geese had begun to eat mature wheat were included in this assessment, but some damage may have occurred after the aerial survey was completed. These damaged areas occurred following the molt, and all were small (<0.5 acres) and inconspicuous. It is important to note that damage to windrowed grains was not included in this study, as this type of damage is difficult to quantify.

Corn measurements were conducted in late June when plants were too tall for giant Canada geese to eat and would not sustain further damage. Corn also exhibits substantial re-growth. For example, an initial measurement taken of an area of damaged corn was 5.5 acres (2.2 ha), but a few weeks later the same area had only 1.7 acres (0.7 ha) not producing corn.

Soybean measurements were conducted during late July and August after the majority of giant Canada goose damage had occurred. During this time, giant Canada geese began to fly again and moved to harvested small grain fields to feed. Soybean plants exhibit very little re-growth, and do not provide height constraints against foraging geese like small grain and corn. As a result, soybean fields exhibited the most obvious and severe damage.

## RECOMMENDATIONS

The reduction of crop damage by giant Canada geese is best accomplished by using a combination of abatement techniques. Goose damage was prevented through mid-June 2003 in Day County through the use of abatement techniques. Eight of the 22 complaints filed with SDGFP in Day County during 2003 sustained no damage.

We recommend that landowners with historic giant Canada goose problems be pro-active rather than reactive. Landowners should become involved with the contracted buffer strip program SDGFP offers because this method is effective in preventing damage on target crops. If this program is not feasible, application of abatement techniques in varying combinations within the potential problem areas as early as possible is recommended. Also, monitoring fields throughout the growing season proves to reduce crop losses. Ultimately, the willingness to work with SDGFP will provide landowners a means to reduce crop losses to giant Canada geese.

Crop damage was less severe when complaints were filed as early as possible in the growing season. In May 2003, complaints on four fields were received, having an average of 0.1 acres of damage per field at the end of the growing season. During June, 16 complaint fields averaged 1.0 acre of damage per field. July complaints averaged 2.5 acres on 8 fields, and August complaints averaged 1.6 acres on three fields.

There are some factors that should be considered for future research. One important consideration is the variability of fields in successive years. Every goose damage area is dependent on location, crop type, amount of surface water,

number of geese, and goose behavior in that area. Researchers must be able to assess wetlands, as well as the population dynamics of geese inhabiting the area, as these will vary from year to year. It is also important to note that not all damaged areas reported resulted in complete crop loss, but just that geese had at one time damaged the crops.

The SDGFP crop damage program appears to be successful if utilized properly and early in the growing season. We did not find extreme crop damage that is often reported. In fact, the damage caused by geese was minimal during the 2003 growing season. With over a half million acres of farmland in Day County, the 119 acres of crop damage by geese in 2003 accounted for a 0.02% crop acreage loss. Damage can occur and will be more severe if the geese are left undisturbed during the summer molt. A combined effort between SDGFP personnel and landowners may substantially decrease the amount of crops damaged by giant Canada geese. Further research conducted in subsequent growing seasons within areas of the giant Canada goose breeding range in South Dakota may allow SDGFP to allocate resources to areas of greatest need.

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