

2021 Nebraska Light Goose Conservation Order Activities



**by
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Nebraska Game and Parks Commission
Lincoln, Nebraska
May 2021**

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EXECUTIVE SUMMARY

Nebraska Game and Parks Commission (NGPC) conducted a Light Goose Conservation Order (LGCO) from 8 February-15 April 2021. The LGCO allowed the use of special measures (i.e., electronic calls and unplugged shotguns), an extension of shooting hours to 30 minutes past sunset, and no bag or possession limits for the harvest of light geese (snow, blue, and Ross's geese). We obtained the names and addresses of potential LGCO participants from the summer 2020-spring 2021 Harvest Information Program (HIP). Online surveys were emailed to 20,719 HIP registrants to estimate LGCO participation, effort, hunting methods, and harvest of light geese. Of the 3,091 survey respondents (15% response rate), 435 individuals reported that they hunted light geese in spring 2021 (14% participation rate). Residents and non-residents participated in the LGCO at similar rates. We stratified survey respondents into four groups by anticipated participation and experience. We assigned 108 hunters who registered for HIP on or after 8 February to the SPRING group. Of the hunters that registered for HIP before 8 February, 279 indicated that they hunted light geese the previous season (SNOW group), 1,281 had only hunted ducks or dark geese the previous season (DUCK group), and 1,423 reported that they had not hunted waterfowl the previous season (OTHER group). We extrapolated survey results across all HIP registrants and estimated that 3,509 hunters spent a total of 17,720 days afield and harvested 64,377 light geese. Harvest in 2021 was 41% below harvest in 2020; hunter participation and number of hunt days also decreased. Hunters shot and failed to recover approximately 2,630 light geese during the 2021 LGCO, a significant decrease from the estimated 8,106 light geese not recovered in 2020. Harvest in 2021 was greatest in the East Zone (43%), followed by the West Zone (38%) and Rainwater Basin Zone (19%). Approximately 76% of LGCO participants used decoys, 14% used sneak or jump shooting tactics, and 10% used pass shooting or other methods of harvest. Although dry conditions in spring 2021 provided hunters excellent road and field access, less available wetland habitat concentrated birds on the landscape. The distribution of light geese across limited wetland habitat may have offered fewer opportunities for LGCO participants, potentially explaining the observed decrease in hunter participation, hunt days, and harvest between 2020 and 2021.

INTRODUCTION

Light goose populations have exploded in recent decades, detrimentally affecting the arctic tundra where they breed. The U.S. Fish and Wildlife Service (USFWS) allows states to implement Light Goose Conservation Orders (LGCO) to increase harvest and attempt to return light goose populations to sustainable levels. Nebraska Game and Parks Commission (NGPC) conducted a LGCO from 8 February to 15 April 2021. During the LGCO, participants could use expanded hunting measures (electronic calls and unplugged shotguns), there was a 30-minute extension of shooting hours, and harvest was not restricted by bag or possession limits. Nebraska had three light goose harvest zones in 2021—Rainwater Basin (RWB), East, and West zones (Figure 1). The LGCO opened on 8 February across the state and remained open until 5 April in the RWB and West zones and 15 April in the East zone. Hunting light geese was illegal on the Ducks Unlimited Verona Wetland Complex and most USFWS Waterfowl Production Areas (WPA) in Nebraska, with the notable exceptions of Harvard and Cottonwood WPAs. It was also illegal to hunt light geese within Platte River buffers that varied in width by hunting zone, location, and date. All state-managed Wildlife Management Areas remained open to LGCO activities.

Nebraska experienced below-average precipitation and above-average temperatures during summer and autumn 2020 that resulted in drier habitat conditions than 2019. Considerably dry conditions continued into spring 2021, despite above-average snowfall during the preceding winter (Table 1). To mitigate the dry conditions, NGPC and USFWS pumped water into 10 wetlands in the Rainwater Basin. Overall, less wetland habitat was available to spring-migrating light geese in 2021 than most years.

Peak spring migration in 2021 was similar to 2020, but earlier than 2019, likely because of above-average temperatures in late January and February (Table 1). Light geese began arriving around 24 February and light goose abundance in the state continued building until early March. Dry conditions kept light geese from dispersing widely across the landscape, while dry fields and roads offered abundant access to geese during the 2021 LGCO.

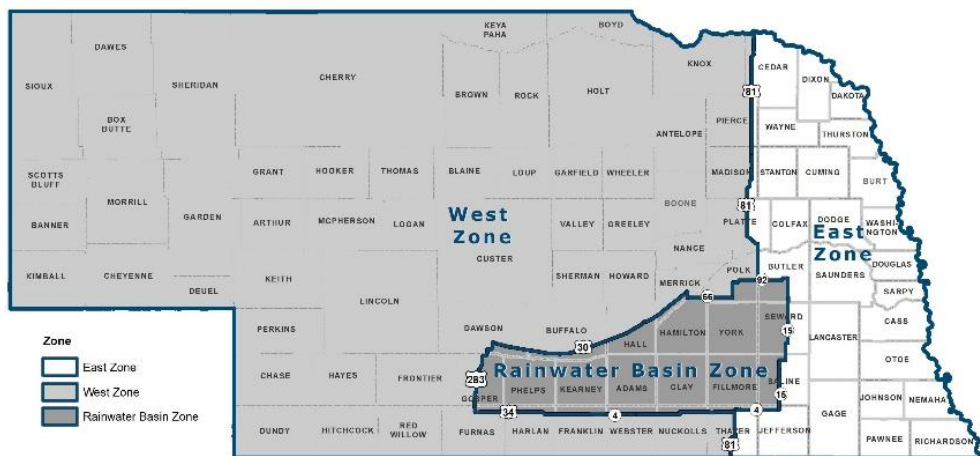


Figure 1. Nebraska light goose harvest zones during the 2021 Light Goose Conservation Order.

Table 1. Hydrology and migration chronology of light geese during the Light Goose Conservation Order in Nebraska, 2000-2021.

Year	Hydrology ¹	Light Goose Arrival	Light Goose Departure	Peak Migration
2000	5	7 February	20 March	24 February
2001	10	7 March	22 March	14 March
2002	4	14 February	22 March	15 March ²
2003	2	7 March	21 March	14 March
2004	5	22 February	8 March	1 March
2005	3	4 February	8 March	27 February
2006	2	1 February ³	8 March	1 March
2007	7.5	21 February	11 March	7 March
2008	5	24 February	16 March	7 March
2009	7.5	7 February	21 March	6 March
2010	8	1 March	14 March	7 March
2011	3	16 February	18 March	10 March ²
2012	3	17 February	5 March	25 February
2013	1	5 February	19 March	1 March
2014	3	26 February	14 March	11 March
2015	5	6 March	20 March	13 March
2016	6	17 February	27 March	23 February
2017	2	5 February	20 February	7 March
2018	4	21 February	9 March	1 March
2019	10	12 March	20 March	15 March
2020	8	15 February	12 March	5 March
2021	3	24 February	14 March	7 March

¹Hydrology on scale of 1-10, with 1 being the driest and 10 being the wettest conditions.

²In 2002 and 2011, there were two peaks of migration due to major cold front and snow. First peaks of migration were approximately 20 February in both years.

³Light geese began arriving into Nebraska during January, prior to initiation of Light Goose Conservation Action.

METHODS

Nebraska Game and Parks Commission issued an electronic survey to migratory bird hunters to estimate total participation, effort, and harvest success in Nebraska during the LGCO. Harvest Information Program (HIP) registrants from the current season were potential survey recipients. We stratified survey recipients into resident or non-resident hunters, then into SPRING, SNOW, DUCK, or OTHER groups. SPRING hunters were those who registered for HIP on or after 8 February; we expected they would have the highest participation rates, as those HIP registrations would only be valid for the 2021 LGCO. The SNOW group was comprised of hunters who registered for HIP before 8 February and indicated they had previously pursued light geese. The DUCK group was waterfowl hunters that indicated they had only hunted dark geese or ducks the previous season. Finally, the OTHER group included anybody that had not hunted waterfowl during the previous season (e.g., dove or new hunters). We assumed that SNOW hunters would participate less than SPRING hunters but more than DUCK hunters, while OTHER hunters would exhibit the lowest overall participation rates.

We emailed online surveys to 20,719 migratory bird hunters and sent mail-in surveys to 139 individuals that did not provide email addresses when they registered for HIP (Appendix A). We sent mail-in surveys to those from the SPRING group because of the group’s high rate of hunter participation and overall impact on the LGCO. The email surveys included questions about hunter residency, number of days hunted and light geese harvested in each zone, number of light geese harvested after 5 April in the East zone, number of light geese shot but not retrieved, and hunting methods (i.e., sneaking/jump shooting, pass shooting, over decoys, and with or without a guide). The mail-in survey was an abbreviated version that asked about hunter residency, number of hunt days and light geese harvested statewide, and geese shot but not retrieved.

We calculated percent participation, mean number of hunt days, and mean geese harvested for each residency and hunt group (resident SPRING, SNOW, DUCK, and OTHER, and non-resident SPRING, SNOW, DUCK, and OTHER) from the survey responses. We then multiplied those by the total number of HIP registrants in each group and summed across all groups to estimate total number of LGCO participants, days spent in the field, and geese harvested.

RESULTS

Harvest Information Program

Nebraska received 30,677 HIP registrations for the 2020-2021 season, including 25,271 resident hunters and 5,406 non-resident hunters. The total number of HIP registrations increased from the 2019-2020 season ($n = 28,064$). We stratified most resident HIP registrants into the DUCK (43%) and OTHER (49%) groups based on past participation and experience. Substantially fewer HIP registrants qualified for the SNOW (7%) and SPRING (1%) groups. Non-resident Nebraska hunters exhibited similar grouping trends during stratification, with the DUCK and OTHER groups receiving 34% and 57% of HIP registrants, respectively. The SPRING (5%) and SNOW (3%) groups included fewer non-resident HIP registrants. Nebraska residents comprised approximately 82% of HIP registrants in Nebraska (Table 2).

Table 2. Resident and non-resident hunters that registered for the Harvest Information Program in Nebraska during the summer 2020-spring 2021 registration period.

	Residents	Non-Residents
SPRING	266	290
SNOW	1,810	156
DUCK	10,805	1,863
OTHER	12,390	3,097
TOTAL	25,271	5,406

Electronic Survey Responses

Participation. —We emailed surveys to 20,719 individuals from HIP that had provided email addresses and received 3,091 survey responses. The response rate was lower in 2021 (15%) than 2020 (25%). Survey responses indicated an overall participation rate of 14% ($n = 435$), with similar participation between residents and non-residents. Participation in the LGCO trended as we expected for resident and non-resident stratified groups. Participation was highest among

SPRING hunters, followed by SNOW, DUCK, and OTHER hunters. Despite the high participation rates of resident SPRING hunters, resident SNOW and DUCK hunters spent more days in the field and shot more light geese per hunter. SNOW, DUCK, and OTHER hunters also made larger individual contributions to the total estimate of resident harvest than SPRING hunters (Table 3). Non-resident SPRING hunters exhibited higher participation rates than other non-resident groups, but non-resident SNOW hunters spent more days in the field and shot more light geese per hunter. However, non-resident SPRING hunters contributed the largest number of geese to total estimates of non-resident harvest (Table 4).

Residency. —Non-resident hunters comprised 27% of all respondents in the 2021 LGCO survey, which was similar in the 2020 survey. Non-resident participants in the LGCO came from 24 states, including Colorado (32%), Utah (10%), Wyoming (8%), Minnesota (8%), Texas (7%), and Iowa (5%). All other states contributed < 5% of total non-resident LCGO hunters.

Harvest Method. —Approximately 76% ($n = 387$) of respondents that participated in the 2021 LGCO reported using decoys to harvest light geese, and decoying accounted for 70% of reported light goose harvest (Figure 2). An additional 14% of participants indicated they used sneaking or jump shooting to target light geese; these methods accounted for 22% of reported harvest. Pass shooting (used by 10% of respondents) was used almost as frequently as jump shooting, but accounted for only 5% of reported light goose harvest. Only 1% of LGCO participants indicated they had used other methods to harvest light geese. Excluding “other” methods, mean harvest per technique was highest for sneaking/jump shooting, followed by hunting over decoys (Table 6). Of those participating in the 2021 LGCO, 24% ($n = 103$) indicated they hunted with a guide.

Table 3. Participation, hunt days, and harvest during the 2021 Light Goose Conservation Order, as reported on survey responses returned by resident Nebraska hunters.

Group	Percent Participating	Number of Participants	Mean Hunt Days	Mean Harvest	Total Hunt Days	Total Harvest
SPRING	74%	196	2.4	9.1	462	1,776
SNOW	59%	1,066	7.1	32.7	7,590	34,860
DUCK	10%	1,103	4.2	14.2	4,622	15,666
OTHER	6%	696	5.5	8.4	3,793	5,867
Residents	12%	3,061	5.4	19.0	16,468	58,169

Table 4. Participation, hunt days, and harvest during the 2021 Light Goose Conservation Order, as reported on survey responses returned by non-resident Nebraska hunters.

Group	Percent Participating	Number of Participants	Mean Hunt Days	Mean Harvest	Total Hunt Days	Total Harvest
SPRING	84%	243	3.2	14.9	768	3,620
SNOW	47%	73	7.2	38.9	519	2,823
DUCK	5%	99	3.3	8.1	323	806
OTHER	4%	116	2.3	1.6	269	188
Non-Residents	10%	531	3.5	14.0	1,879	7,437

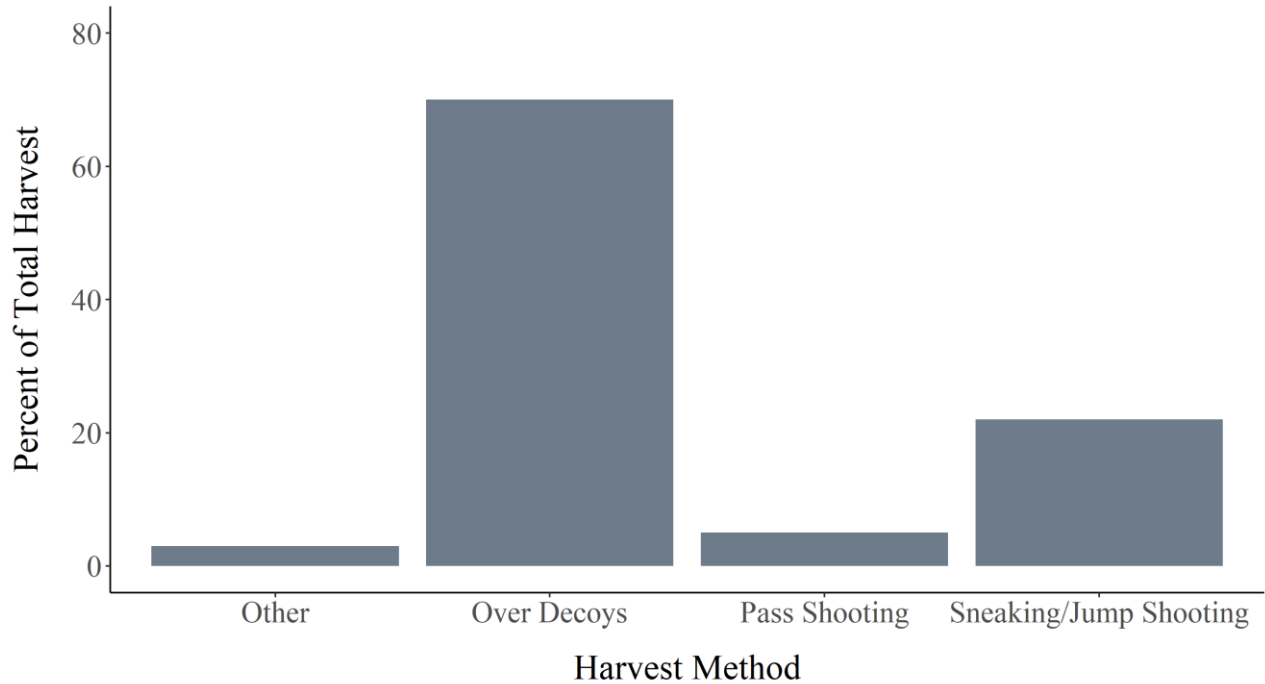


Figure 2. Percent of total estimated harvest taken by different hunting methods during the 2021 Nebraska Light Goose Conservation Order.

Hunt Zone.—Hunters participating in the LGCO targeted light geese more often in the East (45%, $n = 202$) and West (38%, $n = 168$) zones than the RWB zone (17%, $n = 78$; see Figure 1 for zone boundaries). Few participants (10%) pursued light geese in two or more zones. Light goose harvest in each zone was similar to proportion of LGCO participants hunting each zone, with 43%, 38%, and 19% of total estimated harvest occurring in the East, West, and RWB zones, respectively. The distribution of light goose harvest between zones was similar to harvest distribution in recent years (Table 5).

Table 5. Estimated percent of total harvest by zone during the Light Goose Conservation Order in Nebraska, 2015–2021.

Year	Zone		
	East	Rainwater Basin	West
2015	29%	33%	38%
2016	42%	23%	35%
2017	58%	24%	18%
2018	54%	13%	21%
2019	45%	14%	41%
2020	47%	19%	34%
2021	43%	19%	38%

Estimates of Total Participation, Hunt Days, and Harvest from Electronic Survey

We extrapolated the survey data across all HIP registrants and estimated that 3,509 hunters participated in 17,720 hunts and harvested approximately 64,377 light geese during the 2021 LGCO in Nebraska (Table 6). Estimates of total hunt days, harvest, and participants decreased from 2020 and were below the long-term averages (2000-2021). However, the estimated mean harvest was slightly above the long-term average. Non-resident hunters harvested an estimated 11% of light geese taken during the 2021 LGCO. SNOW hunters had the highest per capita harvest (33.4 geese) and days spent in the field (7.1 days) and accounted for 58% of the overall estimated harvest (Table 7).

Table 6. Estimates of total participation, hunt days, and harvest of light geese by resident and non-resident hunters during Light Goose Conservation Orders in Nebraska, 2000-2021.

Year	Estimated Number of Participants	Estimated Mean Hunt Days	Estimated Mean Harvest	Estimated Hunt Days	Estimated Harvest
2000 ^a	7,283	7.8	17.2	56,853	125,400
2001	4,624	4.2	9.5	19,501	43,974
2002	7,013	4.6	11.4	33,186	109,834
2003	7,741	3.7	12.1	26,780	87,585
2004	12,886	4.1	17.9	50,574	138,012
2005	8,104	5.2	20.2	44,057	111,172
2006	8,052	4.1	18.4	44,681	129,631
2007	5,604	4.9	20.6	32,637	96,724
2008	5,270	5.4	14.1	28,266	65,947
2009	5,609	4.6	21.7	33,566	135,247
2010	4,119	3.8	11.4	17,302	58,592
2011	5,191	4.0	21.1	26,303	156,891
2012	5,629	4.2	17.8	32,590	121,784
2013	4,022	3.8	17.8	18,620	107,283
2014	3,804	4.2	17.6	21,913	86,175
2015	5,597	4.0	17.4	25,495	106,226
2016	4,312	5.0	20.0	24,064	96,450
2017	6,001	4.9	24.7	36,024	127,897
2018	6,052	4.9	23.2	27,319	129,536
2019	3,042	4.9	11.5	15,459	30,358
2020	5,045	5.0	21.5	25,021	108,563
2021	3,509	5.0	18.3	17,720	64,377
LTA^b	5,841	5.0	17.1	29,905	101,712

^aA regular hunting season was held from 2 February – 10 March 2000.

^bLong-term average from 2000-2021.

Table 7. Estimates of total number of participants, hunt days, and harvest of light geese by group during the Nebraska 2021 Light Goose Conservation Order.

Group	Estimated Number of Participants	Mean Days	Mean Harvest	Estimated Total Days	Estimated Total Harvest
SPRING	448	2.9	13.2	1,312	5,912
SNOW	1,120	7.1	33.4	7,977	37,422
DUCK	1,157	4.1	13.5	4,709	15,620
OTHER	784	4.8	6.9	3,722	5,423
TOTAL	3,509	5.0	18.3	17,720	64,377

Estimates of Total Participation, Hunt Days, and Harvest from Mail-In Survey

Of the 139 mail-in surveys sent to SPRING hunters, we received five returned as undeliverable and 27 responses (20% response rate). Approximately 59% ($n = 16$) of respondents were non-residents, with Iowa (25%, $n = 4$), Minnesota (13%, $n = 2$), Michigan (13%, $n = 2$), and Illinois (13%, $n = 2$) being most represented among non-resident hunters. The participation rate among mail-in survey respondents was 85% ($n = 23$) for the 2021 LGCO. SPRING hunters that returned mail surveys reported spending an average of 3.2 days in the field and harvesting an average of 13.1 light geese per hunter (Table 9). Approximately 119 light geese were shot but not recovered by hunters that responded to the mail survey.

Table 9. Number of participants, mean hunt days and harvest, and total hunt days and harvest from a mail survey of SPRING hunters during the Nebraska Light Goose Conservation Order, 2016-2020.

Year	Estimated Number of Participants	Estimated Mean Hunt Days	Estimated Mean Harvest	Estimated Total Hunt Days	Estimated Total Harvest
2016	777	3.4	21.3	2,650	16,534
2017	617	3.5	17.1	2,177	10,579
2018	348	3.4	20.1	1,183	6,994
2019	70	3.0	13.5	207	949
2020	164	2.9	11.5	513	2,010
2021	114	3.1	13.1	353	1,493

DISCUSSION

Overall, responses to the email survey indicated a significant decrease in total participation, harvest, and effort between the 2020 and 2021 Conservation Orders. However, mean hunt days and harvest per participant in 2021 were relatively similar to 2020 and the long-term average (2000-2021). Dry spring conditions in 2021 kept light geese from dispersing and may have limited access to geese for many hunters, resulting in low participation, effort, and harvest. Shifts

in light goose distribution during spring migration (Table 5) may also contribute to fluctuating estimates of total light goose harvest in Nebraska.

As expected, resident and non-resident hunters participated in the LGCO at higher rates than hunters in the SNOW, DUCK, and OTHER groups. Despite participation rates, SNOW and DUCK hunters spent more days in the field and harvested more light geese per hunter. We assigned hunters to the SPRING group based only on HIP registration dates in Nebraska. In contrast, we assigned hunters to the SNOW and DUCK groups according to HIP registration dates and evidence of previous waterfowl hunting experience. Furthermore, hunters in the non-resident SPRING group spent more days in the field and harvested almost twice as many light geese per hunter as the resident SPRING hunters. The resident SPRING group may have included experienced LGCO participants or new hunters; the non-resident SPRING group may have included experienced LGCO participants, new hunters, or avid waterfowl hunters that registered for HIP in different states prior to the start of the LGCO in Nebraska. Apparent discrepancies in hunting experience and effectiveness between groups confirm the need to stratify survey respondents and HIP registrants when calculating total estimates of harvest and effort.

Presumably, our estimates of participating hunters, per capita hunt days and harvest, and total hunt days and harvest would improve with a higher survey response rate. The decrease in survey response rate between 2020 and 2021 (15% in 2021 compared to 25% in 2020) was concerning. Surveys are being used more frequently among wildlife professionals to assess hunter satisfaction and harvest success, but are also used daily by companies and organizations for market research, to assess customer satisfaction, etc. The constant inundation of survey requests from various sources may lead to survey fatigue, causing survey response rates among hunters to continue to decline. It may be necessary to determine a response rate or respondent sample size at which the LCGO survey is no longer effective to estimate total harvest, effort, and participation if current response trends continue.

ACKNOWLEDGEMENTS

J. Lusk designed email survey and provided data, T. Rohrs assisted with mail survey, and L. Hershberger provided technical advice about the HIP survey. Thanks to the survey participants that returned surveys, especially those that participated in the LGCO.

Appendix A

Mail survey (2 pages) used to estimate participation and harvest of individuals registering for the Harvest Information Program after 10 February.



Dear Light Goose Hunter:

To help us evaluate the effect of the Light Goose (Snow, Blue and Ross's geese) Conservation Order on light goose populations, please take a few moments to respond to the survey on the back of this letter.

Your response is very important to us since only a portion of Nebraska's 30,000-plus migratory bird hunters are surveyed. Please provide information that reflects ***only your personal hunts*** and harvest. **DO NOT** give us the hunts or harvests of other hunters. Your name and information will remain confidential.

It will be extremely helpful if you can reply to this survey quickly. Simply complete the survey, detach the survey portion with the postage-paid, business reply mail on the back and put it in the mail.

Thank you for helping us better manage our waterfowl resources.
Sincerely,

A handwritten signature in black ink, appearing to read "Matthew Garrick".

Matthew Garrick
Waterfowl Program Manager
Wildlife Division



Nebraska Game and Parks Commission

2020 Light Goose Conservation Order Survey

33-479 / rev.4/20

The term "light geese" refers to Snow, Blue and Ross's geese.

Did you hunt light geese in Nebraska during the February 10 - April 15, 2020, conservation order (Spring 2020)? Yes No

Are you a Nebraska resident? Yes No

If no, in what state do you reside? _____

Please report the number of days **YOU** hunted light geese and the number of light geese **YOU** harvested during the February 10 - April 15, 2020, season.

Number of Days Hunted _____

Light Geese Harvested _____

How many light geese did **YOU** shoot, but did not retrieve during the Light Goose Conservation Order in 2020? _____

Do you believe the light goose conservation order has been effective in controlling light goose populations?

- Yes
- Yes, but not to a large degree
- No
- I don't know

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