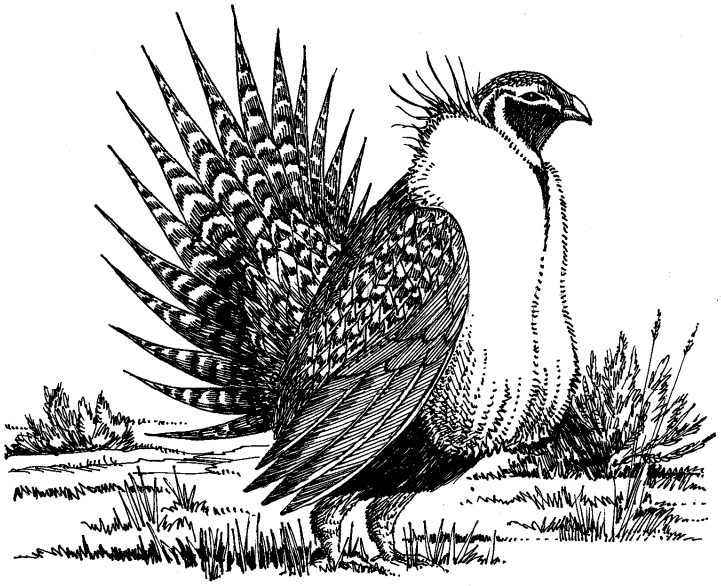
Translocation of Greater Sage-grouse from Montana to Alberta: 2019-2020 Progress Report



Internal Report

Government of Alberta

Translocation of Greater Sage-grouse from Montana to Alberta: 2019-2020 Progress Report

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Alberta Environment and Parks (AEP)

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Internal Report

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EXECUTIVE SUMMARY

In 2008, a collaborative project was initiated between Montana Fish, Wildlife and Parks (MFWP) and Alberta Environment and Parks (AEP) to augment the endangered population of Greater sage-grouse (*Centrocercus urophasianus*) in southeastern Alberta. Over a two year period (2011-2012) 41 sage-grouse were captured in Montana and translocated to Alberta. In 2016, an additional 38 sage-grouse hens were translocated from Montana to Alberta. These birds were monitored remotely through the use of Global Positioning System (GPS) Platform Transmitter Terminals (PTTs), which transmit geographic coordinates of sage-grouse locations via the ARGOS satellite system. These individuals produced important recruitment to the local population, and have helped reduce the chances of extirpation of the species in Alberta. In concert with predator and habitat management strategies, as well as future translocation programs, wildlife managers continue to be cautiously optimistic that Alberta's sage-grouse population has taken steps towards recovery.

In 2019, another 39 female sage-grouse were translocated from Montana to Alberta using the same methods and many of the same staff that assisted with the previous translocations. These hens were monitored through the breeding season and into the summer. Between 2019 and 2020 an estimated 15 chicks have been recruited to the local population as a direct result of translocation efforts. Monitoring of the remaining 6 actively transmitting birds continued through the winter season and into 2021.

As in previous translocations, many factors contributed to limitations in data collection and mortalities of translocated sage-grouse including malfunctioning/damaged PTTs, long ranging post translocation movements and predation. About half of the translocated birds in 2019 were juveniles. Some research has provided evidence that juvenile birds have lower nest initiation rates, overall reproductive success and survivorship rates. Conservation actions continue under guidance from the *Alberta Greater Sage-grouse Recovery Plan 2013-2018*. These efforts aim to enhance survival and nesting success rates of resident and future translocated sage-grouse. Some of these programs include: continued efforts to promote and assist in oil and gas reclamation activities in sage-grouse habitat, the removal of anthropogenic structures from the landscape, and the implementation of a predator management strategy focused on key sage-grouse predators. Ultimately, it will only be through joint efforts federally, provincially, privately, and across international borders that the Greater sage-grouse will recover and persist in southern Alberta and Canada.

INTRODUCTION

Greater sage-grouse (*Centrocercus urophasianus urophasianus*) are a sage-brush obligate species that has seen dramatic declines in population and range. Once numbering in the thousands, sage-grouse populations in Alberta have seen dramatic reductions in numbers. The current population estimate in the province is ~72 birds. The range of sage-grouse in Alberta has similarly declined from historical extents and is now limited to approximately 4000 km^2. The decline of sage-grouse is understood to be a culmination of numerous factors. These include native prairie to cropland conversion, altering hydrological processes (dugouts, canals), industrial activity related to the oil and gas sector, a loss in habitat connectivity, disease (particularly West Nile Virus), and predation. These factors all impact the Alberta sage-grouse population, with habitat connectivity to healthier populations lost due to agricultural development south of the Canada-US border.

Greater sage-grouse were listed as *Threatened* by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1997 because of very small and declining populations in Saskatchewan and Alberta. The species' status was upgraded to *Endangered* in 1998 (COSEWIC 2004), and is now listed under Schedule 1 of the Species at Risk Act. In June 2000, the Minister of Alberta Environment and Sustainable Resource Development designated greater sage-grouse (*Centrocercus urophasianus urophasianus*) as Endangered in Alberta. In late 2002, the Minister formally delegated the responsibility of drafting a provincial recovery plan to the greater sage-grouse recovery team. In 2005, the team produced the inaugural *Alberta Greater Sage-Grouse Recovery Plan 2005–2010* that recommended strategies and actions to recover the species. This plan had two main goals:

1. Enhance and maintain habitat for sage-grouse to satisfy life-cycle requirements in support of a viable population within its remaining historical range.
2. Achieve recovery of the sage-grouse population to a level that provides for sustainable recreational viewing and hunting.

Despite implementation of many of the recovery actions, the Alberta population had continued to decline. A subsequent report, the *Alberta Greater Sage-Grouse Recovery Plan 2013-2018* focused on and expanded the following short-term goals:

1. Restore, and prevent further loss of, identified critical habitat in the Alberta range through immediate implementation of updated land use standards, identified Conservation and Development Zones and enhanced land stewardship.
2. Increase suitable habitat available for sage-grouse through accelerated reclamation of industrial developments and restoration of marginal annual cropland.
3. Reverse population decline in the Alberta range through population augmentation, predator management, and habitat remediation.

In 2011, a collaborative project was initiated between Montana Fish, Wildlife and Parks (MFWP) and Alberta Environment and Parks (AEP) to augment the endangered population of Greater sage-grouse in southeastern Alberta. The goal of this project was to help maintain a viable population of sage-grouse until habitat restoration efforts could

have a positive impact on the ability of sage-grouse to persist in Alberta. After a severe winter, the first translocation took place in 2011, where nine female sage-grouse were translocated from Montana to Alberta. This was followed by an additional 32 sage-grouse (29 females and three males) in 2012. From 2011 to 2013 an average nest initiation rate of 39.1% was recorded. Of the remaining actively transmitting sage-grouse in 2014, five nests were initiated, with two hens successfully fledging young. Lek surveys revealed that male attendance reached a historical low of 13 males in 2011-2012; 14 males were counted in 2013 (AESRD 2013b). Further lek surveys showed increases in male attendance to 35 males in 2015, 46 males in 2016 and finally 43 males in 2017, showing that translocated sage-grouse were likely augmenting Alberta's population.

In 2016, a joint effort to translocate a further 38 female sage-grouse took place involving staff from MFWP, AEP, and Environment and Climate Change Canada (ECCC). Over the course of the 2016-2017 monitoring period, an average of 69.1% of females initiated nests with a success rate of 51.3%. Because the 2016-2017 translocation report (Nanninga et al. 2017) does not include data from 2018, those data will be summarized herein. These data are not included in results for the 2019 translocation.

SOURCE POPULATION AND RELEASE AREA

For the 2019 translocation, capture sites were located in Phillips County in northeastern Montana, approximately 50 km south of Malta. Thirty-eight active leks were identified by Montana state wildlife biologists for capture locations. In Alberta, the release sites were located in the Manyberries and Wildhorse areas in Southeast Alberta, adjacent to active leks.

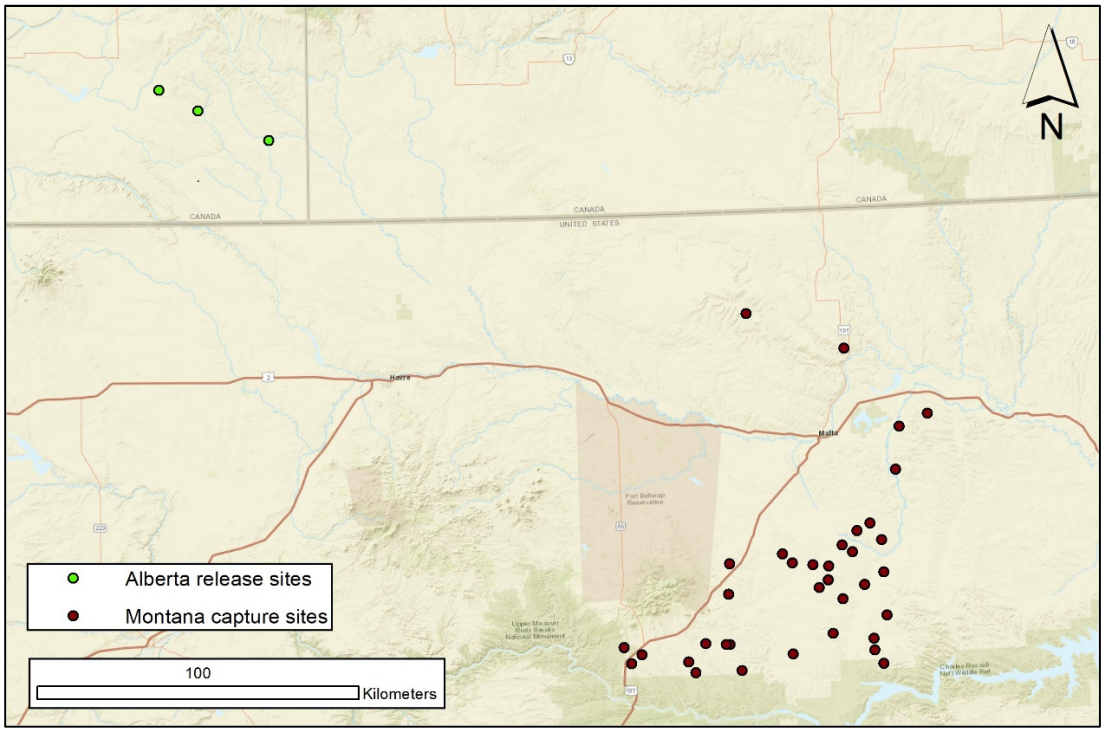

Figure 1: Capture and release sites for sage-grouse translocated from Montana to Alberta, 2019.

METHODS

Translocation

A planned translocation for the spring of 2018 had to be postponed due to a severe and lingering winter snowpack which created significant barriers for access and logistics. In the spring of 2019 conditions were more favourable and the translocation proceeded. Captures followed the *Alberta Wildlife Animal Care Committee Class Protocol #10* for obtaining sage-grouse in the field. Locations for capture were adjacent to lek sites provided by MFWP based on high lek attendance data and population trends. Captures were spread out between lek sites as directed by MFWP personnel in order to reduce impact to donor leks. This work was conducted at night in two person teams using All-Terrain Vehicles, spotlights and large handheld dip nets. Hand held spotlights and binoculars were used to detect eye-shine of the sage-grouse. The birds were captured on foot with nets while they were temporarily blinded by bright spotlights.

Birds were then restrained in the field in mesh bags and placed in padded containers for transport to a central processing area. At the processing area, veterinarian and wildlife disease specialists (Dr. Jennifer Ramsay, MFWP and Dr. Mark Ball, AEP) examined the birds for general signs of health and obtained samples for disease analysis. Testing for fecal parasites and a variety of diseases was conducted, including avian influenza, West Nile virus and Newcastle disease. Samples were taken on-site in Montana and sent to the USGS National Wildlife Disease Center in Madison, WI. This step was taken to ensure the safety of resident sage-grouse, other wild birds and domestic livestock.

The birds were banded with uniquely numbered Alberta Fish and Wildlife Division leg bands. A 26 gram Global Positioning System (GPS) Platform Transmitter Terminal devices (hereafter, "PTTs"; http://geotrakinc.com/index.html) were affixed to captured birds following established rump mount attachment protocols. These PTTs remotely transmit the GPS coordinates of 'tagged' birds via satellite to regional wildlife staff, providing valuable information on movements of released birds, habitat usage, breeding and mortality. The units were programmed to capture four GPS waypoints per day and locations were transmitted via ARGOS satellites. The birds were then contained within individual cardboard boxes lined with foam for travel via truck with an enclosed canopy to release sites in Alberta (Figure 1).

The Coutts/Sweetgrass international border crossing was utilized as it is the nearest border crossing that allows for international transport of animals including wildlife. A number of permits and/or agreements allowing for the translocation were obtained including:

- Canadian Food Inspection Agency Import Inspection Certificate
- Canadian Food Inspection Agency Import Permit
- United States Department of Agriculture (USDA) Origin Health Certificate
- United States Fish and Wildlife Service (USFWS) Federal Fish and Wildlife Permit

- USFWS Declaration for Exportation of Fish and Wildlife
- Bureau of Land Management MOU to capture birds on federal lands
- Alberta Environment and Parks Research Permit and Collection License
- Animal Use and Care Protocol (developed and approved by Alberta Fish and Wildlife Division Animal Care Committee). Alberta protocol was accepted by MFWP

After transferring the birds to Alberta, PTT harnesses were checked for correct fit before birds were placed into multi-chambered release boxes affixed with 30-m of rope to allow for boxes to be opened from a distance (Figure 2). The grouse were released approximately 250 m from active leks. All releases were done in the evening to encourage birds to settle down for the night and minimize the chance of a bird making a long-distance flight immediately after release.

Figure 2: Sage-grouse being released from release boxes near a lek in Alberta, 2019.

Nesting and Mortality Data

Mortalities were investigated when birds ceased transmission or remained within the same vicinity (<20m) for longer than 2 days. PTT temperature and sensor data was also used to assess the probability of mortality. At confirmed mortality locations photos were taken, PTTs were recovered when possible and bird remains were examined for evidence of cause of mortality. Identifying predator group/species was performed based on information provided by AEP raptor expert Dr. Gordon Court (AEP). Recovered PTTs were refurbished when possible to be utilized in future translocation activities. Translocated hens were monitored throughout the breeding season, when a hen returned to the same location for <6 days and spent most of the day (>20 hours) in that location, it was assumed she was "on nest." When the hen would leave that area and not return, it was assumed she was "off-nest." All nests were field-observed to confirm their fate. Nests were deemed to be successful based on the presence of egg membranes and caps in the nest bowl, as well as

hens exhibiting localized movement indicative of a brood hen. Egg shell remains were collected and used to estimate number of eggs. Clutch size for depredated nests indicate a minimum count due to the possibility of whole eggs being removed from the site without leaving shell remains. Hens with successful nests were again observed at the 45 day mark to record the size of the brood remaining with the female hen.

We considered nest success to be: $\#\ nests\ successful/\#\ nests\ initiated$ and brood survival to be: $\#\ eggs\ successfully\ hatched/\#\ chicks\ observed\ at\ 45\ days$.

RESULTS

2016 Translocated Grouse that Survived Past 2017

A total of 9 birds from the 2016 translocation survived into 2018. Of these 9, there were 5 nesting attempts, with 3 of those nests having successful hatches. One hen was observed with 5 chicks at the 45-day mark. Five of the 9 hens had confirmed mortalities in 2018 and one hen's remains could not be located and as such was recorded as an unknown mortality. Three of the five known mortalities were caused by great horned owls and two were predated by an unknown mammal. We did not detect a nest attempt in 2019 for the three remaining hens that survived through 2018 but two did have nesting attempts in 2020, both of which were depredated. Those two hens remain alive. The third hen ceased transmitting on February 4th, 2020, likely as a result of the end of life of the transmitter.

2019 Translocation

From April 7 to 10th, 2019, a total of 39 birds (all hens) were captured and translocated from Montana to Alberta. The annual (year-from-release) status of translocated sage-grouse for 2019 and up to the end of December 2020 is summarized in Table 1.

1.1. Disease Monitoring of Translocated Sage-grouse

Disease testing was conducted by the United States Geological Survey (National Wildlife Health Center). All translocated sage-grouse tested negative for avian influenza and Newcastle disease. Four birds tested positive for West Nile virus antibodies, indicating previous exposure and recovery in the wild. All released sage-grouse were determined to be in good health and of no threat of disease transmission to resident birds or domesticated livestock.

1.2 Post-Release Movements

A number of birds exhibited post-translocation movements, with most in the general vicinity of their release locations. Hens from previous translocations have exhibited wide circular movements shortly after release as the birds appear to adjust to their new habitat. A few movements of note from 2019/2020 include two hens that travelled to northern

Montana (separately) eventually dying. Evidence suggests a mammalian predator and an owl kill as causes. Only mortalities directly linked to post-translocation movements can be accounted for; however, a reduction in fitness and the conspicuous nature of these movements may also have contributed to their ultimate mortality.

In 2020, one hen moved into Montana and has since stayed, hatching a successful nest northwest of Glasgow. Because we considered this hen as removed from the Alberta population, nest success and brood survival data from this grouse were not included in our 2020 summarized data.

1.3 Mortalities

Many factors contributed to translocated sage-grouse mortalities. Limited information from malfunctioning PTTs or recovered PTTs (associated with no apparent signs of mortality) caused difficulty when calculating overall survival rates and nesting success. A total of 11 birds have an unknown status for 2019 and 2020. For these reasons, data only from confirmed mortalities and nests were used to calculate values associated with survival and fecundity.

Of the 39 active PTTs 21 mortalities have been confirmed with PTTs recovered when possible from associated birds (Table 1). Eleven birds appear to have been killed by great horned owls and eight causes of mortality were associated with mammalian predators. The cause of three confirmed mortalities could not be determined due to a lack of evidence.

The annual mortality for translocated hens in 2019 was 53.8% and in 2020 was 23.1% (Table 1). Since these values were calculated using only confirmed mortalities, rates represent a minimum rate of mortality and the actual mortality is likely higher.

Table 1: Mortality, nesting and brooding activity for sage-grouse translocated from Montana to Alberta in 2019.

	Unknown status	**Confirmed Alive**	**Confirmed Mortality**	**Nests Initiated**	**Nests Successful**	**Brood success**
2019 (n=39)	8	13	18	16	9	5
Percent (%)	20.5	33.3	53.8	59.3	56.3	55.6
2020 (n=13)	3	7	3	7	4	2
Percent (%)	23.1	53.8	23.1	66.7	57.1	50
Average (%)	21.8	43.6	38.4	63.0	56.7	52.8

Mortalities were most prevalent in the spring and summer months, with most mortalities occurring shortly after release (Figure 3). This is consistent with previous translocations to Alberta from Montana (Nanninga 2017). Using the Kaplan-Meir estimator (Kaplan and Meier 1958), the probability of survival of translocated sage-grouse can further be calculated (Figure 4). This method estimates that birds that survived the first year had a 54% probability of future survival and better accounts for those that were censored (lost or dropped transmitter).

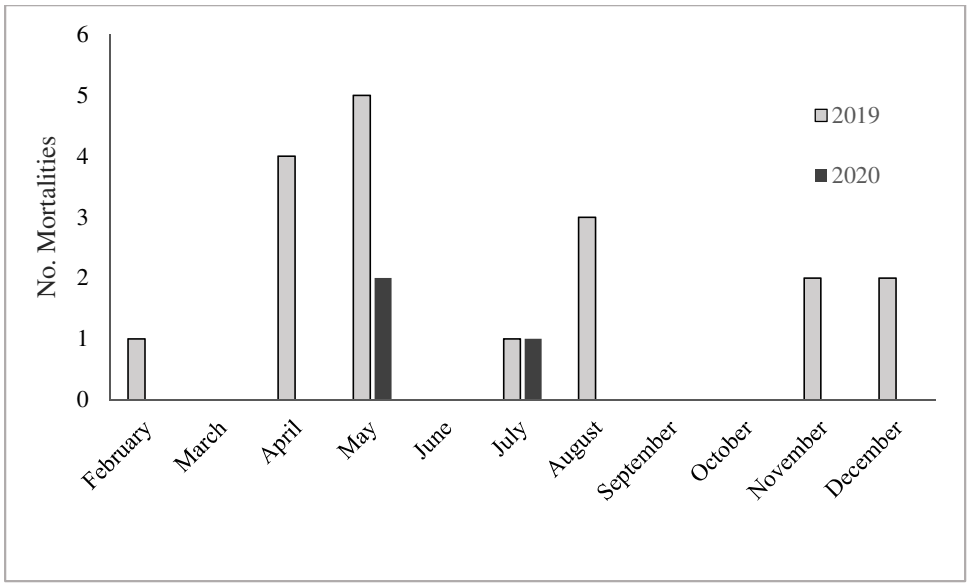

Figure 3. Translocated sage-grouse mortalities in Alberta by month, April 2019-December 2020.

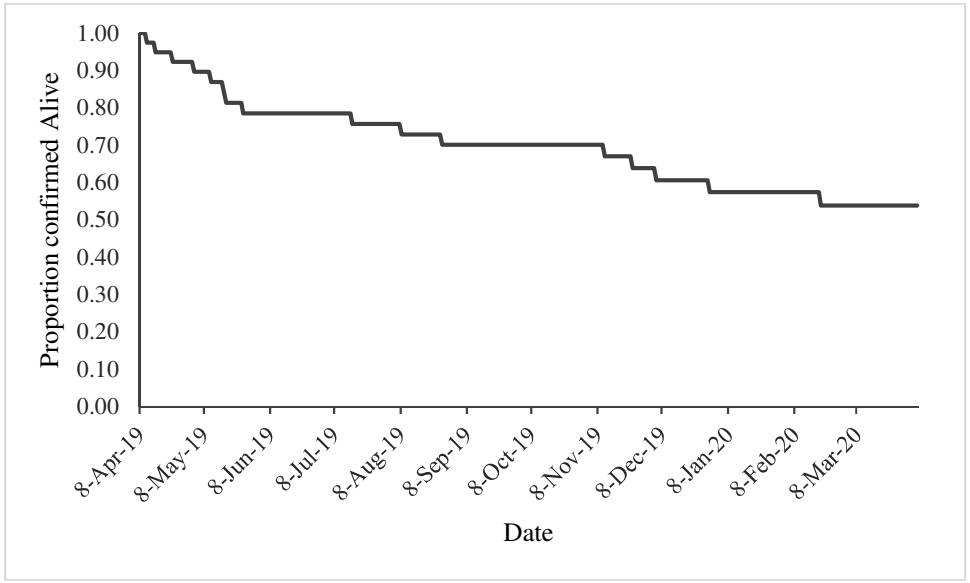

Figure 4. Translocated sage-grouse survival probability in Alberta, 2019-2020.

1.4 Nesting activity

In 2019, 16 nests were initiated and 9 (56%) were successful in hatching eggs. Clutch size for successful nests averaged 5.7 eggs per nest. Seven nests were depredated by predators, with evidence based on pecked eggs indicating corvids as the main cause of nest failure. Observed brood size at 45 days ranged from 1 to 3 chicks, with a total of 9 chicks recruited for the season. Eleven hens did not appear to initiate any nesting attempt. In 2020, one bird (#174849) returned to the capture area in Montana and thus was removed from our summarized data. From the remaining translocated birds, 7 nests were initiated and clutch size for successful nests averaged 6.1 eggs per nest. Four nests were depredated by

predators, again with evidence based on pecked eggs suggesting corvids as the main cause of nest failure. No re-nesting attempts were observed. Two hens were successful producing broods to 45 days, one with a single chick and the other with 5 chicks. Nest initiation rates from tagged hens in 2019 and 2020 varied between 59.3% and 66.7%, respectively (Table 1). The average nest initiation rate was 63.0% between the two years. Brood survival for 2019 was 14.7% and 25% for 2020.

Table 2: Nest initiation, nest success and brood success records for sage-grouse translocated from Montana in 2019 (n=39) and remaining live sage-grouse from 2016 translocation (n=3, in bold). Blank records for nesting attempt indicate a mortality event occurred before nest initiation.

	2019				2020			
PTT/Bird #	**Nesting Attempt (Y/N)**	**Nest Fate**	**Clutch Size**	**No. Chicks at 45 Days**	**Nesting Attempt (Y/N)**	**Nest Fate**	**Clutch Size**	**No. Chicks at 45 Days**
106253	Y	Successful	6	3				
106263	N				N			
106265	Y	Successful	7	1				
106266	Y	Depredated	≥4					
106275								
106276	Y	Successful	6	0	Y	Successful	8	0
148243	N				N			
148244	N				N			
148245	N							
148246								
148249	Y	Successful	8	0	Y	Depredated	≥4	0
148250	Y	Depredated	≥2					
161032								
161035	Y	Depredated	≥3	0	Y	Successful	8	1
161036	Y	Depredated	≥4					
161037	N							
161041								
161043								
161044	Y	Depredated	≥5		N			
174848	Y	Successful	7	1	Y	Depredated	≥3	0
174849	N				Y[a]	Successful[a]	8[a]	n/a[a]
174850								
174851	Y	Depredated	≥6		Y	Depredated	≥6	0
174852	Y	Successful	7	2				
174853	N							
174854								
174855								
174856	Y	Depredated	≥6					
174857	Y	Successful	8	0				
174858	N				Y	Successful	8	5
174859	Y	Successful	9	2				
174860	Y	Successful	3	0				
174861								
174862	N							
174863	N				Y	Depredated	≥6	0
174864								
174865	N							
174866								
174867								

161031	**N**				
161038	**N**	**Y**	**Depredated**	**≥10**	**0**
161039	**N**	**Y**	**Depredated**	**≥8**	**0**

[a]Bird 174849 returned to capture area in Montana in 2020. Eggs were collected from nest but a brood count was not performed. These data are not included in summarized totals.

DISCUSSION

1. Factors Affecting the Survival and Nesting Success of Translocated Sage-grouse

1.1 Factors Affecting Nest Success

The nest initiation rates in 2019 (59.3%) and 2020 (66.7%) were lower than translocated hens in 2017 (76.9%), but comparable to 2016 (61.3%) and 2012 (52.4%). These rates were also higher than the 2011 (25.0%) and 2013 (40.0%) rates. The average nest initiation rate since 2011 is now 45.6%. This average value is slightly higher, yet comparable to the 39.0% nest initiation rate reported in other translocation studies (Baxter et al. 2008). It should also be noted that eggs have been found in the transportation boxes, suggesting nest initiation could have been underway prior to capture and this could have impacted nest initiation post-release.

The success rate of initiated nests was 56.3% in 2019 and 57.1% in 2020 (Table 1). This average success rate of 56.7% is the highest average nest success rate reported for Montana-to-Alberta translocated sage-grouse. The average nest success rate since 2011 is now 50.1%, comparable to those reported by Crawford et al. (2004) (47.4%) and Aldridge and Brigham (2001) (46%).

The number of chicks observed at 45 days in 2019 (n=9) and 2020 (n=6) was similar to that of 2013 (n=6) and 2017 (n=6), but lower than chicks observed in 2016 (n=18). Partially due to a severe storm, there were no 45-day old chicks observed in 2012. There were also no 45-day old chicks in 2011, although only 9 hens were translocated that year.

1.1.1 Weather

Inclement weather did not appear to be a cause of nest or brood loses for any tagged hens during the 2019 and 2020 breeding seasons. Stochastic events are a common occurrence (Wallestad 1975); however, the impact is magnified on small populations when they occur. This is an example of why continued augmentation of the sage-grouse population in Alberta is important until other habitat restoration measures begin to show a significant effect on population numbers.

1.1.2 Post-translocation Movements

Wide ranging movements were again observed from a number of tagged hens in the weeks following translocation, including short periods of time in both Montana and Saskatchewan. Post-translocation movements are believed to be a direct result of birds attempting to reorient to a new landscape. This behaviour has been documented in other

translocated gallinaceous birds (Kemink and Kesler 2012, Graham 2013). The effect of these post-translocation movements on hens is unknown but can be assumed to be energy intensive; energy that otherwise could be used towards maintaining weight and raising successful broods (Letty et al. 2007).

1.1.3 Predation

The overwhelming cause of nest failure in 2019 and 2020 was predation, with approximately half of initiated nests being depredated. Both avian and terrestrial predators are suspected of depredating sage-grouse nests in Alberta (Aldridge and Brigham 2003); however, inspection of egg shell remains in 2019 and 2020 showed signs that there was only corvid predation. Corvids, coyotes (*Canis latrans*) and American badger (*Taxidea taxus*) are suspected to be the primary sources of sage-grouse nest predation across their distribution, with red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*) and raccoon (*Procyon lotor*) being additional probable nest predators (Conover and Roberts 2017). Increasing nesting success is an important factor to recovering sage-grouse populations. As such, intervention to reduce predation is required to bolster reproductive success in southeastern Alberta.

1.1.4 Age at time of translocation

Of the thirty-nine birds that were translocated in 2019, seventeen were juvenile in age (44%). These birds would be breeding for the first time after translocation. Some research indicates translocated juvenile birds have the lowest nest initiation rate compared to resident and adult translocated birds (Duvuvuei et al. 2017). Our 2019 nest initiation rate by yearling female of 47.1% was comparable to the initiation rate of 50.0% found for yearling newly translocated females, which were the lowest nest initiation rates recorded across all age groups in their study. (Duvuvuei et al. 2017). Interestingly, translocated adult hens in 2019 had a nest initiation rate of 31.8%, which was lower than yearling females in our study and much lower than to rates of adult newly translocated females (79.0%) recorded by Duvuvuei et al. (2017).

1.2 Factors Affecting Survival

The 2019-2020 average mortality rate of 38.4% was similar to the 39.4% average annual mortality rate of breeding aged female sage-grouse compiled from six separate studies by Crawford et al. (2004). It was lower than the 45.6% average annual mortality reported by Baxter et al. (2008) in translocated sage-grouse in Utah and comparable to the 36% average mortality rate reported for translocated sage-grouse in Idaho (Musil et al. 1993).

1.2.1 Post-translocation Movements

Large movements similar to those found by Balderson (2017) suggests that habitat at Alberta release sites was of poorer quality than capture sites in Montana which may have caused stress and could have encouraged movement. These large movements could also explain the lack of nesting behaviour for these birds.

1.2.2 Predation

Predation plays a major role in the mortality of adult sage-grouse (Connelly et al. 2000, Aldridge and Brigham 2003). It has been reported that predation accounts for >60% of annual mortalities (Connelly et al. 2000). In 2019, predation of translocated sage-grouse accounted for over 90% of total documented mortality. In 2020, five more birds were killed by a predator (with one mortality unable to be located). Species responsible for predation events are difficult to determine but examining PTTs for chew marks and conducting thorough investigations of mortality sites have yielded reliable results. Similar to what was found in Washington State (Washington Department of Fish and Wildlife 2019), great horned owls appear to be the primary predator of translocated sage-grouse in Alberta, based on analysis of mortality site remains (i.e. lack of boney remains and the clipping of primary feathers). Efforts continue to be made to minimize the nesting and roosting opportunities afforded to these predators by removing old anthropogenic structures and using direct removal techniques to eliminate particular individuals in core areas. It appears that sage-grouse have little defense against great horned owl attacks and will continue to be depredated at a high rate without continued intervention.

2. Changes Implemented to Increase Survival and Fecundity of Translocated Sage-grouse

As a result of the experience gained through past translocations, changes have been enacted to improve habitat and survival rates for resident sage-grouse and subsequent translocated birds in Alberta. Key projects expected to have the greatest impact on sage-grouse are highlighted herein. The complete status of the sage-grouse recovery and associated action plan can be found in the *Alberta Greater Sage-grouse Recovery Plan 2013-2018* (AESRD 2013a).

2.1 Reclamation of Oil and Gas Infrastructure

Industrial development and activity in sage-grouse range has decreased since 2013 due to recent global oil prices, a 2014 federal environmental protection order and a provincial economic recession. A large oil and gas company that went into receivership has now had the majority of its assets transferred to the Orphan Well Association (OWA). Over the last two years abandonment and reclamation activities on these sites has increased dramatically. As a result, approximately 330 oil and gas sites are set to be reclaimed in sage-grouse habitat over the next 3-5 years. Highlights in 2020 include: 123 sites fully decommissioned, 242 pipelines abandoned and 119 wells cut and capped. More work is being conducted in 2021 as part of this program. This work represents the most significant opportunity to improve sage-grouse habitat in Alberta in recent memory.

2.2 Removal of Anthropogenic Structures

Since the last translocation in 2016, 2 more abandoned structures have been removed from core sage-grouse habitat and 18 structures that were in close-proximity to core habitat have been removed. Conversations with landowners and spatial analysis continue to identify additional structures for future removal. Prior to the removal of any structures a site assessment is conducted to determine predator usage through direct observation and/or sign (i.e. scat, tracks, pellets, whitewash, feathers and nests/dens) and camera trapping. The majority of sites assessed had evidence of predator use including nesting and roosting by great horned owls, common ravens (*Corvus corax*) and use by terrestrial predators such as raccoons, skunks, feral cats, weasels, coyotes and badgers.

2.3 Habitat Enhancement and Protection

In partnership with the Alberta Conservation Association (ACA), Alberta MultiSAR (Multiple Species at Risk), Nature Conservancy of Canada (NCC) and other partners, over 5,748 acres have been purchased or had easements placed in sage-grouse range. Alberta Environment and Parks also helped facilitate the purchase by NCC of 160 acres of deeded land adjacent to an active lek. This property is undergoing a restoration to native prairie and is also used by the Calgary Zoo as a staging area for their captive sage-grouse breeding and release program. AEP staff are assisting with the reclamation of this property, and have provided ~10 kg of locally-collected silver sagebrush seed.

The Emergency Protection Order for sage-grouse under Section 80 of the federal *Species at Risk Act (SARA)* came into force on February 18, 2014. Prohibitions under the Order include seasonal and chronic noise restrictions, prohibition on killing or moving native plants, height restrictions on new structures and standards on new fence (Environment Canada 2014). This protection order continues to benefit sage-grouse populations by providing protection to key pieces of sage-grouse habitat, including areas around remaining active leks where translocated birds were released.

In 2021, a new provincial land use protection (Protective Notation – PNT) was enacted in core sage-grouse habitat areas. Changes were also made to the Master Schedule of Standards and Conditions (MSSC). These land use protections will provide greater certainty for future development projects while recognizing the need to limit disturbance to remaining core habitat.

2.4 Predator Management Program

A locally-focused predator management program was developed to assist in sage-grouse recovery efforts. The removal of specific predators around known active leks, nesting areas and locations of translocated hens included both avian and mammalian species that are known to kill adult sage-grouse, chicks and/or depredate nests. This program was informed by predation results of previous translocations and addresses key sage-grouse predators on three fronts:

- through focused removal of specific avian species

- through trapping and hunting of coyotes by residents
- through the use of avicides, focused on corvid species

2.4.1 Great horned owls and raptor removal

Great horned owls and other large raptor species not listed provincially or federally as *Special Concern*, *Threatened* or *Endangered* were directly removed within sage-grouse range in an opportunistic fashion from 2014 to present. This was done in a focused area (leks, nesting/brood rearing habitat) with the recognition that sage-grouse are critically endangered. Although the native grasslands of southeastern Alberta are not viewed as primary habitat, great horned owl numbers have been observed to be increasing across the range. Regional increases of greater than 1.5% annually were recorded by the North American Breeding Bird Survey (BBS) between 1996 and 2003 (Cornell Labs 2017) for southern Alberta. Observations by AEP staff of sage-grouse mortalities suggest that great-horned owls represent the greatest threat of predation to adult birds. A continued focus on the direct removal of Great horned owls and the removal of anthropogenic subsidies found on the landscape should assist in boosting the survival and recruitment of translocated and resident sage-grouse.

2.4.2 Corvid bait program

In 2013 an avian predator survey was conducted to provide baseline data for determining abundance of select avian predators in sage-grouse range. Results showed an abundance index (#birds/10km) of 2.42 black-billed magpies, 3.53 crows (*Corvus brachyrhynchos*) and 0.16 ravens, as well as strong habitat correlations with anthropogenic features (Quinlan 2013). Corvid species such as common ravens are believed to be one of the primary nest predators of sage-grouse and their focused removal has shown an increase in nest success (Conover and Roberts 2017). Since 2014 an application for emergency registration has been submitted annually and accepted by the Pesticide Management Regulatory Agency of Canada (PMRA) for the use of DRC-1339 (Starlicide). The avicide DRC-1339 has been utilized in controlling nest depredating corvids in sage-grouse habitat in the United States, with positive results. The Environmental Protection Agency has allowed registration of DRC-1339 (Reg. No. 56228-29) for controlling corvids due to its specific toxicity and low incidences of non-target mortality. Alberta Environment and Parks is currently working on permanent registration of this avicide for continued use on the recovery program.

3. Desired Outcomes from Translocation

Desired outcomes from the translocations were laid out in the MFWP draft environmental assessment, *Sage-grouse Translocation (Montana to Alberta)*. While success was not achieved in all cases, examination of these deliverables shows positive results from the translocation efforts.

- *Evaluate the potential for restoration measures to support maintenance or recovery of sub-population units prior to augmentation.*

Research from the University of Regina has revealed a greater understanding of the habitat selection and nesting ecology of translocated sage-grouse in Alberta. As a result of this research several management recommendations were made including:

- enhancement of habitat surrounding leks
- adopting translocation strategies to decrease post-translocation movement
- increasing nesting success through soft release techniques

A predicted intensity map was also developed that will assist in strategically guiding habitat enhancement efforts in south-eastern Alberta (Balderson 2017).

- *Increase knowledge of best practices for sage-grouse translocation in silver sagebrush ecosystems.*

Significant knowledge has been gained through the translocation process. Valuable experience on field capture and bird handling techniques was obtained by staff members from both AEP and MFWP. Past translocation efforts have provided valuable experience regarding timing and efficiency of captures.

In 2019, birds were released in the evening hours instead of the early morning as is traditionally done. This was a technique first used in two of the four 2016 translocation releases in an effort to reduce the amount of time the translocated birds spent in their transport boxes. The stress response of the birds to capture and handling before release is thought to be considerable. Releasing the birds in the evening under suitable conditions could reduce the total capture time spent in boxes of between 10-12 hours and may result in a corresponding decrease in stress. With darkness approaching, it is also speculated that translocated birds would be more likely to roost for the evening thereby, reducing and/or limiting their immediate post translocation movements.

- *Evaluate the potential for augmentation to maintain or increase the number of sage-grouse associated with treated and adjacent leks in silver sagebrush ecosystems.*

Translocated sage-grouse hens showed fidelity to the release areas and subsequently nested in the vicinity of the release leks. Nest success was comparable to reported numbers for the species in North America. A total of 15 chicks were observed in 2019-2020 at 45 days, a metric that continues to be a challenge for population recovery in Alberta. Adult birds were seen to integrate into the resident population as evidenced by repeated visits to lek sites and winter flocking behaviour.

- *Coordinate augmentation with habitat restoration activities to achieve long term self-sustaining sub-population units.*

Habitat restoration and securement activities remain a priority to support both translocated and resident sage-grouse in Alberta. Alberta Environment and Parks continues to work in partnership with various organisations to secure, acquire and enhance land within sage-grouse range. Working partnerships with industry and local stakeholders are ongoing to help reduce the anthropogenic impact on sage-grouse

habitat. Oil and Gas reclamation through the OWA (~330 sites) and associated removal of supporting infrastructure (power-lines/poles) shows the most promise for landscape level habitat restoration.

- *Develop a refined understanding of the spatial ecology of sage-grouse in the recovery area.*

In the years since the initial 2010 translocation knowledge about the ecology of sage-grouse habitat in Alberta has increased significantly. The utilization of PTT data from translocated hens has provided wildlife managers with the ability to compare theoretical critical habitat mapping with real time locations. This real world data confirmed areas of high sage-grouse use and its seasonality. Research out of the University of Regina indicates that sage-grouse avoid anthropogenic structures (especially oil wells, power lines, buildings and trees) up to a distance of 5 km. This suggests that sage-grouse are avoiding these features because of the disturbance of the features themselves and not because the features occur in poor sagebrush habitat (Balderson 2017). The research suggests that anthropogenic structures should be prioritized for removal with a focus on areas that have suitable habitat. The knowledge from this research and its management implications could not have been gained without the data used from the Montana translocated sage-grouse.

- *Collaborate with agencies, corporations and local communities to build awareness and increase support for sage-grouse conservation.*

Awareness of sage-grouse and the need for protection has never been greater than at present time. AEP has partaken in multiple meetings and committees directly related to the conservation of sage-grouse. The *Alberta greater sage-grouse recovery plan 2012-2018* is a publically available document that outlines the key recovery strategies in the Province. This plan is due for an update and a current situational analysis will help guide the next recovery plan.

Several public presentations and interagency meetings regarding the sage-grouse translocation project and the recovery program in AB have been undertaken. These include:

- MultiSAR
- Prairie Conservation Forum
- Northern Sagebrush Steppe Initiative
- Medicine Hat Fish and Game Association
- Pheasants Forever
- Grassland Naturalists
- Lethbridge Community College

In addition, a sage-grouse/species at risk elementary school program has been presented in local classrooms raising awareness of the Greater sage-grouse and the threats to native grassland.

- *Effectively communicate results of the project to the public through information & education branches of relevant agencies and organizations.*

This document has been compiled to be an all-encompassing report on the results of the 2016-2020 translocations to-date. Information will be available to other agencies and the general public by way of this AEP publication. Past television and radio shows, newspaper articles and presentations have effectively communicated results from the translocation project and will continue to provide information to the general public in the future. This information could include habitat enhancement activities, biology and phenology knowledge or status and updates of translocated sage-grouse that shed light on the successes and failures of individual birds.

- *The short-term measure of success of translocating 40 sage-grouse will be the expected 10-21 nests and 27-57 fledged sage-grouse in year 1.*

The total number of birds translocated in 2019 was 39. In 2019, sixteen nests were located and an estimated 9 chicks were fledged from translocated sage-grouse in year 1. Including the surviving hens in 2020, all initiated nests resulted in 6 additional chicks for a total of 15 fledged chicks in 2019-2020. While nest success exceeded the benchmark, chick survival continues to be lower than the species average and a challenge to recovery of the species in Alberta.

CONCLUSIONS

Translocations from Montana to Alberta have increased the profile of sage-grouse and likely helped stave of extirpation of the species in the province. Invaluable data has been collected through the monitoring of translocated birds such as habitat utilization, survival and fecundity and post-translocation movements. Research and habitat restoration work is continuing with the aim of providing long term sustainability for Greater sage-grouse in Alberta. The *Alberta Greater Sage-grouse Recovery Plan 2013-2018* has laid out priorities and an action plan to recover sage-grouse to a self-sustaining level. This plan will soon be updated taking into account the learnings of the past eight years of recovery actions. With the assistance of government, local communities and industry, the continued implementation of the action plan will increase the quality of habitat available to sage-grouse in the future.

Six translocated sage-grouse are still actively transmitting information via PTTs from the 2019 translocation and two continue to transmit from the 2016 translocation. Additionally, one bird that ceased transmission remained unaccounted for likely due to a malfunctioning/end of life PTT. The contribution of 2019 translocated sage-grouse to the resident population has been confirmed at 15 fledged chicks. Considering the Alberta total sage-grouse population in 2020 was at an estimated 72 individuals the influence of the 2019 translocated birds is substantial.

The results to date shows translocation to be a viable tool to bolster the local sage-grouse population in Alberta. The removal of anthropogenic structures and reclamation of oil and gas sites is a medium to long term priority to improve habitat. In addition, the focused removal of sage-grouse predators to assist both translocated and resident birds will

continue. A planned translocation for 2020 has been postponed until 2021 due to COVID-19 border closures and other restrictions and associated logistical challenges. These translocations have been invaluable to the Alberta population, providing additional time for the population while all stakeholders work together to implement further habitat restoration measures. Ultimately, it will only be through joint efforts both provincially, privately, and across international borders that the Greater sage-grouse will recover and persist in southern Alberta.

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