

**Alberta Conservation Association  
2021/22 Project Summary Report**

**Project Name:** Alberta Spruce Grouse

**Wildlife Program Manager:** Doug Manzer

**Project Leader:** Michael Jokinen

**Primary ACA staff on project:** Michael Jokinen

### **Partnerships**

Alberta Trappers Association

Alberta Environment and Parks

### **Key Findings**

- We summarized harvest data provided voluntarily by hunters pursuing spruce grouse from 2015 to 2020. The average annual harvest of spruce grouse reported over six years (2015 to 2020) was 6,123 grouse taken by an average of 2,657 hunters that were willing to voluntarily report this information online.
- A total of 131 Registered Fur Management Area licence holders completed an online forest grouse questionnaire. Almost half of respondents believed the three-year trend has held stable for forest grouse, while almost a third believed numbers were decreasing.
- We tested a survey protocol to detect the occupancy of spruce grouse based on fecal pellets during snowmelt in early spring 2021. The method is quite simple and effective although it will be logistically challenging to undertake over a broad spatial area.

### **Abstract**

There is concern that spruce grouse (*Falci pennis canadensis*) numbers may be trending lower in Alberta, although the information to validate this assumption is lacking. We were asked by Alberta Environment and Parks to develop an approach for gaining a better understanding of trends over space and time. We began in 2021 with three main tasks: first, we summarized spruce grouse harvest data from 2015 to 2020 to better understand hunter success spatially and

among years; second, we asked trappers to provide their insight on spruce grouse numbers using a brief survey; and third, we trialed a methodology to detect occupancy based on the presence/absence of spruce grouse pellets.

Since 2015, spruce grouse harvest and hunter numbers have shown a general increasing trend, with lower harvest numbers in 2017 and 2020. The average annual harvest of spruce grouse reported was 6,123 (range 4,888 – 8,856) over six years (2015 through 2020) taken by an average of 2,657 (range 2,216 – 4,301) hunters that were willing to voluntarily report this information. We received and summarized responses from 131 Registered Fur Management Area licence holders, almost half of whom believed the three-year trend (2018–19 to 2020–21) for forest grouse has held stable, while almost a third believed numbers were decreasing. Lastly, we adapted a pellet survey protocol developed in Minnesota, and tested the methodology in April and May of 2021. We surveyed 13 transects and spruce grouse pellets were detected at three of those sites, all from the Northwest Region. A transect takes about 30 minutes to complete and surveyors require some guidance to confidently differentiate between pellets dropped by spruce vs. ruffed grouse. The pellet count survey proved to be simple and effective; however, conducting the surveys over a broad spatial area would be logistically challenging.

## **Introduction**

The spruce grouse (*Falci pennis canadensis*) is one of seven game birds available for harvest in Alberta under the game bird licence (pheasant and turkey have separate licences). An Alberta game bird licence allows an individual to hunt any grouse (spruce, ruffed, blue, and sharp-tailed grouse), partridge (grey), or ptarmigan (white-tailed and willow) with a daily limit of five and possession of 15 birds. In general, the game bird season runs from September 1 to January 15 in most wildlife management units (WMUs). A regulation change was implemented in 2015 when the end-date of the annual grouse hunting season was extended from November 30 to January 15.

There is conflicting information regarding the trend of spruce grouse in Canada and Alberta. The Status of Birds in Canada (2014) report suggests populations have increased in Canada over the last 30 years. Yet, spruce grouse has been identified as a priority for conservation in Canada since more than 80% of the global breeding population is located here (Status of Birds in Canada 2014). While the spruce grouse is considered *Secure* in Alberta (GoA 2017), it has not to our

knowledge been rigorously surveyed, and there is anecdotal evidence suggesting that numbers may be declining throughout the province. The Alberta Biodiversity Monitoring Institute (ABMI and BAM 2019) report that out of 1,126 biodiversity monitoring sites (camera traps), only nine sites detected spruce grouse, whereas ruffed grouse (*Bonasa umbellus*) were detected at 246 sites.

There is concern that spruce grouse numbers may be trending lower in Alberta, although the information to validate this assumption is lacking. We were asked by Alberta Environment and Parks (AEP) to develop an approach to track their trends over time and identify areas that may be of particular concern. In the past, a subsample of Alberta game bird hunters was surveyed randomly by direct phone contact. This involved a great deal of coordination and volunteer effort and therefore has been replaced with an online volunteer survey beginning in 2011. Only since 2014–15 has the data been relatively complete, including all game bird WMUs for the province. All those who purchase a game bird licence are asked to fill out an online survey annually, although their participation is not required and nor is the messaging personal like a phone call.

There are challenges with comparing metrics when switching survey approaches. For example, it is difficult to determine if the number of people participating through a volunteer survey remains proportional to the actual number of hunters pursuing spruce grouse from one year to the next. There may also be potential bias when translating metrics that involve measures of hunter effort, especially with grouse species that may be taken incidentally while pursuing other species. The volunteer survey does not clarify if hunters are primarily hunting spruce grouse, or primarily hunting big game and taking grouse as the opportunity occurs (Gregg et al. 2004). If the latter, then it is difficult to unravel the variation in grouse harvest from year to year if it is influenced by the effort hunters put toward their primary activity of hunting big game rather than grouse.

With this study, we investigate practical approaches to better understand spruce grouse trends within Alberta. Volunteer harvest data is an important and useful means of creating comparable indexes over space and time. Although, as suggested above there are shortcomings as well. We explore approaches for gaining more resolution from online surveys, including estimates of harvest rate (harvest divided by hunter days) calculated for each WMU and comparing harvest rate spatially and over time. We also reach out to the trapping community for their insight on

trends with spruce grouse within areas that they know very well. And finally, we trial a field-based survey protocol for detecting the presence of spruce grouse to evaluate if it is a method that can be undertaken efficiently by volunteers in Alberta.

## **Methods**

### *Volunteer harvest data*

During the 2021–22 fiscal year, we completed a scoping exercise that involved three parts. First, we summarized the provincial game bird harvest data for spruce grouse. Since 2011, hunter harvest data have been submitted online; however, not until 2014–15 has the game bird harvest data included all game bird WMUs for the province. The game bird harvest dataset provides the aggregate harvest by WMU, the number of respondents who hunted, and the number of days hunted within each WMU. We summarized spruce grouse harvest data for each year from 2015 through 2020, as well as pooled harvests by WMU to compare harvest at the provincial scale.

### *Trapper opinion survey*

For the second component, we asked members of the Alberta Trappers Association (ATA) to voluntarily provide their observations on forest grouse (spruce and ruffed grouse) trends from their personal experience on their respective traplines. This grouse survey consisted of supplementary questions at the end of the annual trapper logbook questionnaire that Alberta Conservation Association (ACA) has been coordinating with ATA for the past four years. A total of 153 Registered Fur Management Area (RFMA) licence holders filled out the furbearer logbook questionnaire in 2021, and a subset of these also provided information on grouse. Those trappers who participated were asked a variety of questions, such as *which grouse species are present on their traplines, what type of forest cover were spruce grouse most often observed, and what is the trapper's opinion on local grouse abundance and overall trend in numbers/observations over the past few years*. An example of the 2020–21 furbearer logbook questionnaire including grouse-related questions is available here ([ATA RFMA Log Book 2020\\_21incl\\_grouse Nov18](#)).

### *Pellet survey*

We also wanted to develop an efficient and direct approach for determining trends over time using field-based observations, that can ideally be completed by non-professionals both safely and efficiently. For this third component, we trialed a late winter to early spring protocol to identify where spruce grouse were present or absent based on detecting fecal pellets. Recently, pellet surveys have shown potential for large-scale, long-term monitoring of spruce grouse populations in Minnesota, and it is a straightforward technique that is reportedly easy to teach to novice observers (Roy et al. 2018, 2019, 2020; Roy and Giudice 2021). We tested the method in select locations across three regions of Alberta with 1 to 2 days of survey effort at each location (southwestern, central, and northwestern Alberta).

We selected the location for each transect using a Geographic Information System (GIS) based on forest cover features, particularly the portion of conifer habitat (i.e., >30%; Roy et al. 2018). We laid out a starting point for each transect along a road to make it possible to complete multiple transects in a single day along a given road route. The survey along each transect is conducted as a circular walk following a 100-m radius around the centre point for a total route of 628 m in length. A key underlying goal of the protocol is a survey design that enables volunteers to participate safely and efficiently. As such, the starting location of survey routes are based along an existing road network with the transect centre typically at a road. This enables the survey route to be walked without doubling back on your path, while always staying within roughly 100 m of a road/vehicle the entire time (Roy 2020, Pers. Comm.).

We focused our efforts during late winter and early spring (2021) since detecting pellets is suggested to be most effective while the snowpack recedes, and the pellet groupings become exposed and easier to see (Roy et al. 2020). Each survey began 100 m from the transect centre by walking in a clockwise direction, carefully observing the snow/ground surface within a 1-m buffer on both sides of the line. We used the Avenza Maps smart phone app along with a georeferenced map (created in office using GIS prior to going into the field) to guide the observer along the path and around the 628-m circular route. Each time a pellet or group of pellets was encountered, they were identified to species and tallied. Ruffed and spruce grouse pellets can be differentiated by their size and colour. For more survey detail, see the ACA pellet

survey form developed for this scoping exercise here ([Alberta Spruce Grouse Survey Form\\_Draft Apr\\_FINALDRAFT](#)).

## Results

### *Harvest summary*

The apparent aggregate harvest of spruce grouse shows a slight increasing slope from 2015 through 2020, with interannual dips in 2017 and again in 2020 (Figure 1). Hunters participating in the voluntary survey were quite similar from 2015 to 2018, with a jump in 2019 and then receding moderately off that top again in 2020.

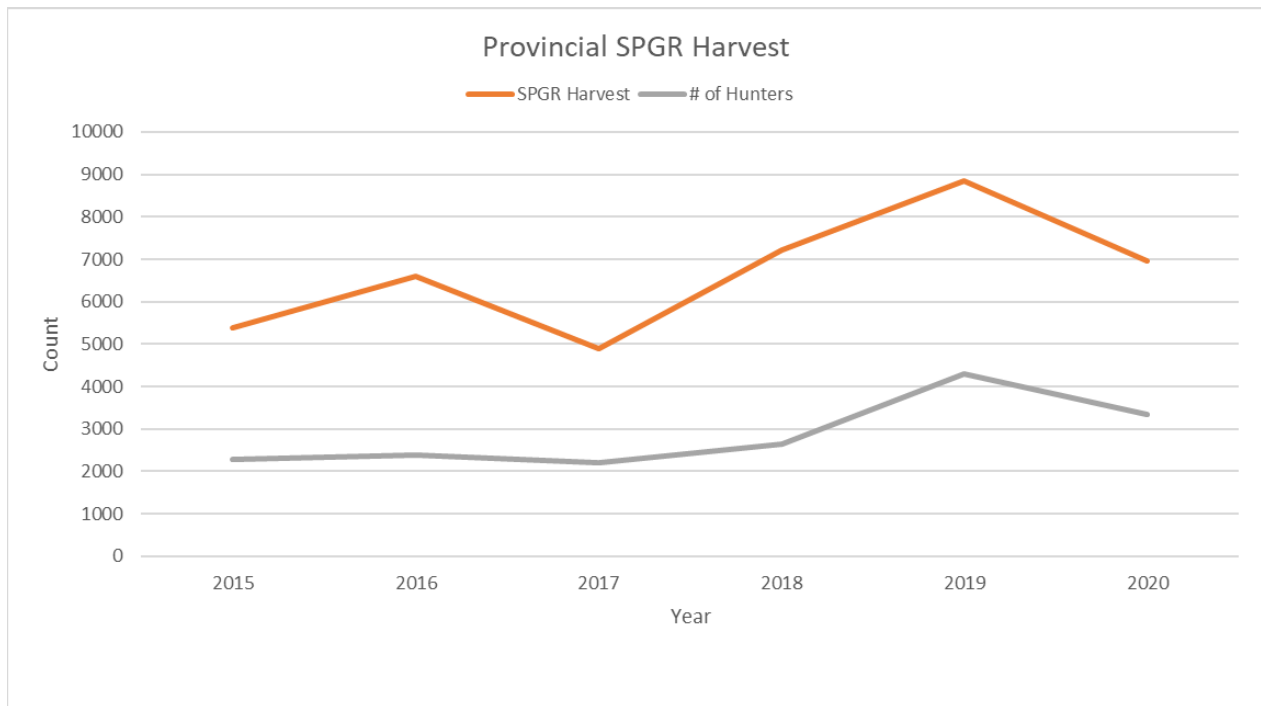


Figure 1. The aggregate harvest of spruce grouse (SPGR) across Alberta reported voluntarily by hunters from 2015 to 2020. Since this is a voluntary reporting process, we assume this does not represent the actual total harvest per year.

We pooled the reported spruce grouse harvests from 2015 to 2020 and mapped harvest by WMU.

The rate of harvest reported through this voluntary survey varied substantially among WMUs (Figure 2). Most prairie WMUs are very unlikely to have spruce grouse present, but even so, hunters indicated they harvested this species in areas lacking coniferous forest habitat. Prairie

WMUs were classified as low on Figure 2, whether hunters reported some degree of spruce grouse harvest or not, as the level of harvest was within the low category. We are not confident that these data are accurate and are almost certainly due to entry errors or species misidentification (e.g., mistaking sharp-tailed grouse or ruffed grouse for spruce grouse). A small number of boreal WMUs also fell within the low category due to a lack in hunters, harvest and/or voluntary reporting in those WMUs.

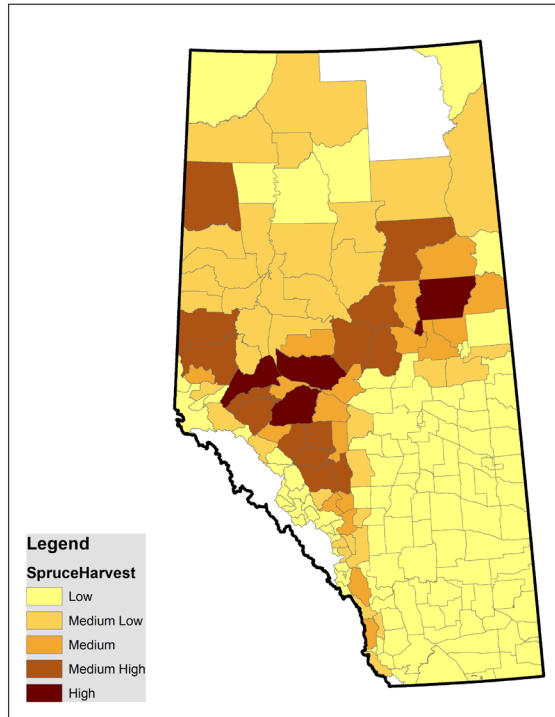


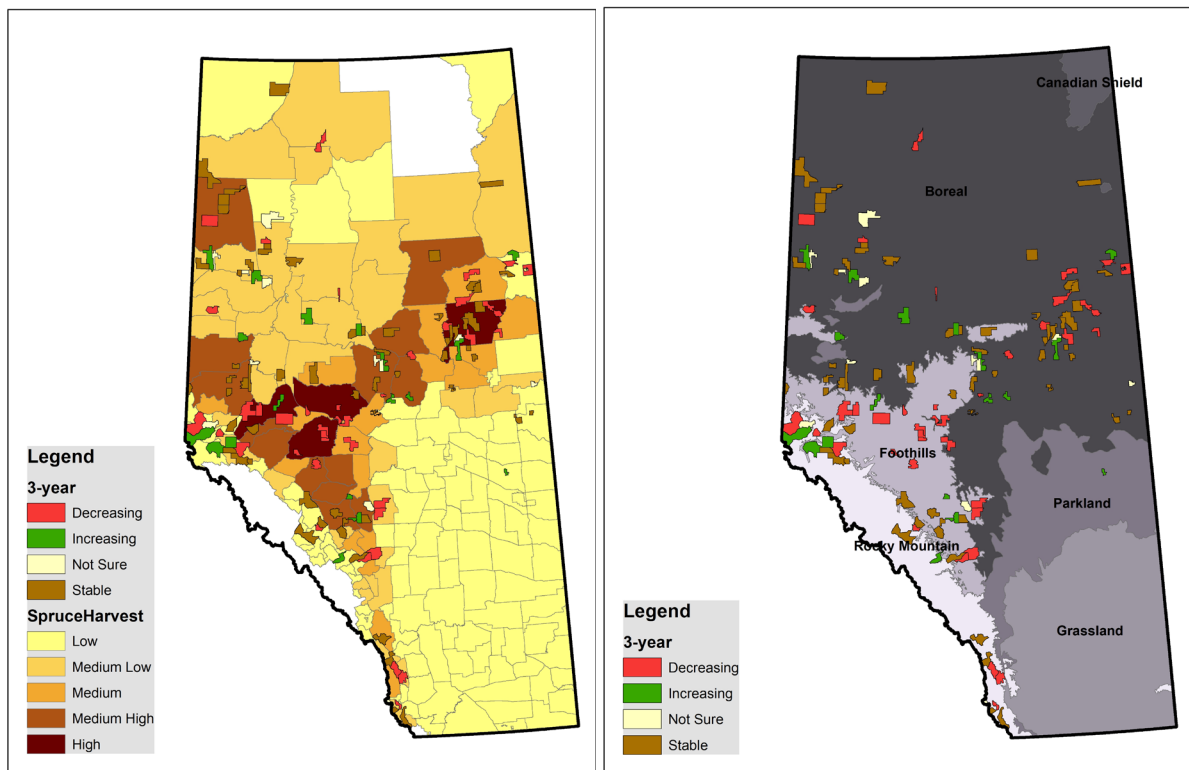
Figure 2. Total spruce grouse harvest summed for each WMU from 2015 to 2020. These data were voluntarily provided by a portion of hunters and do not necessarily reflect all those that hunted spruce grouse during this period.

The average annual harvest of spruce grouse reported was 6,123 (range 4,888 – 8,856) over six years (2015 through 2020) and were taken by an average of 2,657 (range 2,216 – 4,301) hunters that were willing to voluntarily report this information through the online process. We do not know the actual number of hunters that pursued spruce grouse each year nor the actual total harvest figure. The aggregate number of days hunting spruce grouse each year averaged 18,467 days, which is approximately 7 days per hunter per season. WMUs with the greatest harvest counts ranged from 300 to 500 spruce grouse taken per season. We recognize that the harvest

data contain errors and we do not know actual harvest of spruce grouse in any given year. Moreover, hunters volunteering this information may not be consistent from year to year and fluctuations in harvest may not reflect actual trends.

### *Grouse Survey Responses*

Since trappers spend a significant amount of time on their traplines, we asked for their opinion on forest grouse (spruce and ruffed grouse) populations trends on these areas that they know very well (Figures 3 and 4). A total of 131 RFMA holders provided forest grouse questionnaire data while submitting their 2020–21 furbearer logbook information.



Figures 3 and 4. The three-year trend of spruce grouse based on the opinion of trappers on their traplines for 2018 to 2020. Trapline (RFMA) trends are overlying WMUs that were categorized by level of spruce grouse harvest (Figure 3) and natural regions (Figure 4), 2021.

Trappers in 16 boreal and 15 foothills RFMAs reported a decline in grouse (both spruce and ruffed grouse) numbers from 2018 to 2020, while those in ten boreal and five foothills RFMAs

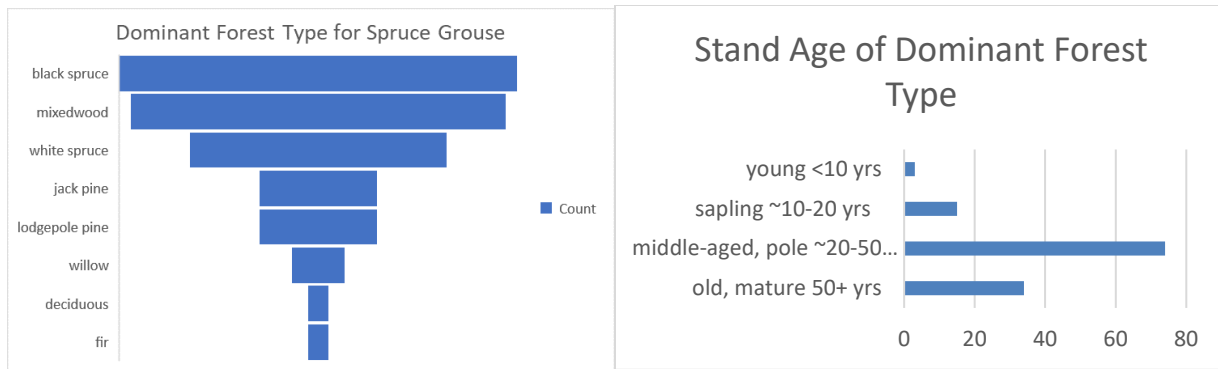


reported increasing grouse numbers. Another 40 boreal and 14 foothills RFMAs reported having stable grouse populations. Almost half (48%) of the survey respondents believed that the three-year trend from 2018 to 2020 held stable for forest grouse, while 29% believed numbers were decreasing (Figures 5 and 6). We recognize that grouse often fluctuate in numbers among years and do not speculate as to whether these suggested decreases are within normal interannual fluctuations or a trend for concern. More years of observation will be required to weigh the evidence. We did, however, ask trappers to speculate about the factors that they thought may be associated with fluctuations in spruce grouse numbers on their lines. Of those that suspected a decline in grouse numbers over 3 years (2018 to 2020), roughly 22% speculated that this may be associated with cool and wet springs, 16% said forest harvest, 13% hunter harvest, and 12% to unusually high predation. Opinions were split on whether grouse numbers followed a cyclic pattern, but those that did feel grouse populations cycled, half believed the cycle occurred about every four to seven years.



Figures 5 and 6. Trapper-observed short-term (2018 to 2020) and long-term (5+ years) forest grouse trends, 2021.

Half of the respondents thought spruce grouse were common on their RFMAs, while the other half identified them as being scarce. Spruce grouse did not occupy 18 of the 131 RFMAs (those were primarily identified as having ruffed grouse only). The majority of RFMAs had both ruffed and spruce grouse, and in many cases, other species of grouse. Sharp-tailed grouse occupied 27% of the RFMAs, while ptarmigan occupied 15%. Spruce grouse were most often associated with black spruce (30%), mixedwood (28%), and white spruce (19%) stands in the 20- to 50-year class (Figures 7 and 8).



Figures 7 and 8. Dominant forest type and stand age in which trappers primarily observe spruce grouse on their RFMA based on a questionnaire completed in 2021. Bars represent count – number of responses for a given answer.

RFMAs that identified forest grouse as noticeably decreasing in the Lac La Biche area (one of the high spruce grouse hunter harvest areas) noted unusually high predation, forest harvest, and hunter harvest as the main factors likely affecting grouse numbers. RFMAs with decreasing grouse numbers in the Fox Creek, Edson, Whitecourt, and Swan Hills regions (other high spruce grouse hunter harvest areas) identified forest harvest (and herbicide spraying associated with forest harvest) and hunter harvest as the primary factors believed to impact grouse. Surprisingly, even though the number of people recreating outdoors has increased more recently, fewer hunters reported hunting spruce grouse in these high harvest WMUs in 2020 when compared to 2019.

### *Pellet survey*

Minnesota has been conducting a state-wide spruce grouse survey on an annual basis since 2018 using pellet surveys. They anticipate the resolution to detect meaningful patterns will become more evident over longer time frames (e.g., 10 years) with repeated annual pellet surveys. The researchers in Minnesota rely on multi-agency and volunteer participation to complete these surveys each year, and they are testing whether a single-visit survey (once in a season) is enough to determine trend over time (Roy et al. 2018, 2019, 2020; Roy and Giudice 2021).

We observed ruffed grouse pellets at four of five transects (n = 5) surveyed in the Southern Region although no evidence of spruce grouse pellets was detected. Pellets were not detected on transects (n = 3) in the Central Region; however, a spruce grouse was flushed, and grouse

remains (feathers) were observed nearby. Spruce grouse sign was detected at three of five transects (n = 5) surveyed in the Northwest Region, which were situated in mature spruce forest stands. An adult male spruce grouse was also observed.

## **Conclusions**

Understanding forest grouse population trends is quite complex and voluntary harvest numbers on their own can be misleading if not calibrated with other data sources. Several factors can influence harvest data, such as the number of hunters in each WMU, the number of days hunted, the total area covered, the proximity to an urban centre, or even a hunter's experience in hunting grouse. Moreover, if harvest commonly occurs while a hunter is primarily pursuing a different species (e.g., ruffed grouse or big game), then annual differences in the aggregate harvest and the total number of hunters engaged with spruce grouse may be more influenced by the availability of the primary species being hunted. In the case of spruce grouse, areas with greater harvest may be driven by the number of big game hunters on the landscape. Do many hunters target spruce grouse as their primary purpose on a given day? Possible, but it may be just as likely that most spruce grouse are harvested as opportunistic events while hunting big game or targeting ruffed grouse. In 2020, about 6,900 spruce grouse harvests were voluntarily reported by 3,300 hunters. In comparison, approximately 61,000 ruffed grouse were harvested by 18,700 hunters in 2020.

For WMUs with low spruce grouse harvest, it is difficult to tease apart if this reflects sub-optimal habitat or if numbers are kept low from continuous hunting pressure year to year. We also find it difficult to assess if lower harvest reflects actual grouse numbers or the time spent pursuing big game. The average effort to harvest a spruce grouse is near 3 days and hunters are spending an average of 7 days hunting spruce grouse in total, which seems to suggest that hunters are not pursuing spruce grouse as their primary target species. Harvest rates of spruce grouse would be more meaningful if the effort spent by hunters targeting spruce grouse as their primary species was known.

The number of people participating in the voluntary survey displayed an increasing trend from 2015 through 2020, although it is not possible to determine if this reflects more hunters pursuing spruce grouse, or simply a greater proportion of hunters filling out the survey in latter years.

The same can be said of aggregate harvest levels year to year. As such, a harvest rate (harvest

divided by hunter days) calculated for each WMU and compared spatially and over time may be the most meaningful and comparable metric at this time with these voluntary data.

Trappers across many Alberta WMUs reported variable population trends for forest grouse. There are several localized and large-scale factors that can affect grouse populations such as habitat loss due to climate change (Roy et al. 2020), timber harvest activities (Lycke et al. 2011) or an increase in small predators (Ludwig 2007). Some spruce grouse populations at the outer extent of their range may already be at risk of local extinction (Gilbert and Blomberg 2019) as conifer forests become impacted by warming global temperatures (Swanston et al. 2018).

In Alberta, Smyth and Boag (1984) reported poor spruce grouse productivity during years when June weather was wet and cool during the egg incubation period. Redmond et al. (1982) reported low nest success rates in Alberta due to high predation rates likely linked to poorly concealed nests in areas lacking in ground cover.

Creating a provincial-scale grouse monitoring program using the pellet survey method would require a long-term, collaborative effort between several stakeholder groups, organizations, and volunteers to produce meaningful trends. This survey technique proved to be simple and effective; however, conducting the surveys across broad spatial areas would be logistically challenging and require substantial effort to coordinate. Survey timing (choosing an optimal survey window) would be the main challenge for surveyors, as conditions, particularly snowpack, will vary considerably across regions and among years. Access to backcountry roads is also an obstacle that surveyors would have to contend with and ultimately would limit areas that could be part of an annual survey. Piecing together local observations made by trappers or game bird hunters and comparing these with observations gained through the online harvest data on an annual basis is a good first step toward understanding regional spruce grouse trends.

## **Communications**

- A few grouse-related slides were presented at the ATA AGM with logbook highlights from 2021.
- A Conservation Works article was published in the fall issue of the Conservation magazine.

- Results from last year's online grouse survey communicated to the trapping community via the November furbearer newsletter.

## Literature Cited

- Alberta Biodiversity Monitoring Institute (ABMI) and Boreal Avian Modelling Project (BAM). 2019. Spruce Grouse (*Falcapennis canadensis*). Available online at <https://abmi.ca/home/data-analytics/biobrowser-home/species-profile?tsn=553896> (accessed September 8, 2020).
- Gilbert, C., and E. Blomberg. 2019. Changes in Occupancy and Relative Abundance of a Southern Population of Spruce Grouse Based on a 25-year Resurvey. *Northeastern Naturalist* 26(2): 275–286.
- Government of Alberta (GoA). 2017. *Alberta Wild Species General Status Listing - 2015*. Available online at: <https://open.alberta.ca/dataset/ad0cb45c-a885-4b5e-9479-52969f220663/resource/763740c0-122e-467b-a0f5-a04724a9ecb9/download/sar-2015wildspeciesgeneralstatuslist-mar2017.pdf> (accessed September 9, 2020).
- Gregg, L., B. Heeringa, and D. Eklund. 2004. *Conservation Assessment for Spruce Grouse* (*Falcapennis canadensis*). USDA Forest Service, Eastern Region. Parks Falls, Wisconsin, USA. 33 pp
- Ludwig, G. 2007. *Mechanisms of Population Declines in Boreal Forest Grouse*. Department of Biological and Environmental Science, University of Jyvaskyla, Finland.
- Lycke, A., L. Imbeau, and P. Drapeau. 2011. Effects of commercial thinning on site occupancy and habitat use by spruce grouse in boreal Quebec. *Canadian Journal of Forest Restoration* 41(3): 501–508.
- Redmond, G.W., D.M. Keppie, and P.W. Herzog. 1982. Vegetative structure, concealment, and success at nests of two races of spruce grouse. *Canadian Journal of Zoology* 60(4): 670–675.

- Roy, C.L., and J.H. Giudice. 2021. *2021 Minnesota Spruce Grouse Survey*. Forest Wildlife Populations and Research Group and Wildlife Biometrics Unit. Minnesota Department of Natural Resources. Grand Rapids, Minnesota, USA.
- Roy, C.L., J.H. Giudice, and C. Scharenbroich. 2020. Evaluation of cantus-call and pellet surveys for Spruce Grouse (*Falcapennis canadensis canace*) at the southern extent of their range. *Journal of Field Ornithology* 91(1): 44–63.
- Roy, C.L., J.H. Giudice, and C. Scharenbroich. 2019. *2019 Minnesota Spruce Grouse Survey*. Forest Wildlife Populations and Research Group. Minnesota Department of Natural Resources. Grand Rapids, Minnesota, USA.
- Roy, C.L., J.H. Giudice, and C. Scharenbroich. 2018. *2018 Minnesota Spruce Grouse Survey*. Forest Wildlife Populations and Research Group. Minnesota Department of Natural Resources. Grand Rapids, Minnesota, USA.
- Smyth, K.E., and D.A. Boag. 1984. Production in spruce grouse and its relationship to environmental factors and population parameters. *Canadian Journal of Zoology* 62(11): 2250–2257.
- Status of Birds in Canada. 2014. *Spruce Grouse* (*Falcapennis canadensis*). Government of Canada. Available online at <https://wildlife-species.canada.ca/bird-status/oiseau-bird-eng.aspx?sY=2014&sL=e&sB=SPGR&sM=p1#:~:text=The%20Spruce%20%20Grouse%20is%20a,large%20increase%20since%20about%201970> (accessed September 9, 2020).
- Swanston, C., L.A. Brandt, M.K. Janowiak, S.D. Handler, P. Butler-Leopold, L. Iverson, F.R. Thompson III, T.A. Ontl, and P.D. Shannon. 2018. Vulnerability of forests of the Midwest and Northeast United States to climate change. *Climate Change* 146: 103–116.

### **Personal Communications**

C. Roy, October 2020

## Photos



Photo 1. Spruce grouse hen. Photo: Mike Jokinen





Photo 2. Ruffed grouse pellets are shorter, thicker, and usually have a uric acid wash when compared to spruce grouse pellets. Photo: Mike Jokinen



Photo 3. Spruce grouse pellets are long, thin, and seldom have a uric acid appearance but are often dark green when they consume conifer needles in winter.  
Photo: Sarah Bradley





Photo 4. Example of spruce grouse winter habitat in Northwest Region. Photo: Sarah Bradley