



Moose Survey App

Hunters as Citizen Scientists

By Mark S. Boyce

Photos by Vince Crichton, M.S. Boyce,
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It has long been true that hunters and anglers contribute more to wildlife conservation than any other segment of the public. The modest fees we pay for hunting and fishing licenses support management activities that help ensure the future of the resources we enjoy. In addition, many hunters and anglers volunteer through their local fish and game clubs to work on enhancement projects for fish and wildlife.

This fall moose hunters in Alberta were invited to participate in a pilot project to monitor moose populations by recording all moose seen while hunting into a smartphone app.



When we report our harvest data to state or provincial wildlife agencies, we all assist an important management activity—population monitoring. Examples include fishing creel surveys, filling in big game harvest reports, or reporting leg bands from ducks and geese that we have shot. Such opportunities have expanded in recent years, under the label “citizen science.” One of the most successful citizen science programs in North America is the Breeding Bird Survey (BBS), involving thousands of bird watchers across North America who drive along designated survey routes and follow a strict protocol to record numbers of each bird species observed during the spring breeding season. These BBS surveys have provided crucial data documenting population trends for a long list of birds. For example, one documented pattern is a decline in multiple species of grassland birds. This data is managed by Environment Canada and the U.S. Geological Survey under the supervision of John Sauer, a former graduate student of mine.

Scandinavian Innovation

Last year while on sabbatical leave, I travelled to Sweden and Norway with my wife Evelyn Merrill, a Professional Member of the Boone and Crockett Club. There we learned about the Scandinavian citizen science program for monitoring moose populations. At the end of each hunting day, participants reported their moose sightings while in the field. Studies by Swedish and Norwegian biologists have shown that the number of moose seen by hunters in the field is highly correlated with actual moose abundance. Likewise, hunter observations of the number of bulls, cows, and calves were found to yield reliable estimates of herd composition. In fact, these counts are so reliable that wildlife agencies in Norway, Sweden, and Finland use hunter observations exclusively for monitoring of moose populations. Most hunters are happy to participate because this information is used to enhance moose management.

We can learn from these three Scandinavian countries because they have the most

successful moose management programs in the world. Why do I say that? Let's compare their moose abundance and harvest with that in Alberta (661,848 km²), where we have a population of approximately 118,000 moose and harvest about 8,500 moose each year. The entire country of Sweden is considerably smaller than Alberta at only 450,259 km², but it hosts a staggering population of 350,000 moose and harvest 100,000 moose each year! Finland (338,424 km²) is about half the size of Alberta, but it supports more than twice as many moose with an estimated population of 264,000 and an annual harvest of 75,000. My ancestors came from Norway (385,242 km²) where the total population of moose is about the same as Alberta, yet Norskes kill nearly five times as many—about 40,000 moose each year. Moose numbers are much higher in each of these countries today than they were 50 years ago due to changes in forestry and improved moose harvest management.

Our moose harvests in Alberta are low, relative to those in Scandinavia, because of wolf predation and unregulated harvest by First Nations people. The estimated wolf population in Alberta is roughly 7,000; whereas Norway has about 30, and Sweden has a management target of only 200 wolves. First Nations people in Alberta harvest moose throughout the year, and they often kill cow moose that have much greater consequence to sustainability of harvest than does the harvest of bulls and calves. In most of Scandinavia the harvest is restricted to bulls and calves, while cow moose are protected. Although unmonitored, wolf predation and First Nations harvests are recognized to be major sources of moose mortality in Alberta. To compensate, harvest regulations allow only bulls to be taken in most wildlife management units (WMUs). Only 10 WMUs had calf seasons during the 2012 season in Alberta.

Alberta Hunters Get Connected

I was intrigued by the success of the Scandinavian moose hunter observation system, and I puzzled over how we might monitor moose observations by hunters in Alberta. Scandinavian moose



Moose Survey
University of Alberta

Use Information

WIN number

Confirm WIN number

WMU

Confirm WMU

OK

Enter how many of each kind of moose you saw today,
Sunday, Aug 5, 2012

Bulls

Cows

Calves

Unidentified

Hours out

Submit

hunters are organized by local hunting organizations, making it easier to compile daily records of moose seen while hunting. But in Alberta, many hunters head to the bush for a week and have little contact while moose hunting. While puzzling over how to engage hunters in monitoring in Alberta, a friend suggested that a smart phone app might be developed to record hunter observations.

So with the assistance of Daniel Chui, an undergraduate IT technician, we programmed a smart phone app that prompts each moose hunter daily at about 8:00 p.m. to record the number of moose seen during that day. The ring-tone prompt that we've programmed into the app is the bellowing call of a cow moose in heat! Recording moose sightings on the same day is very important because it is easy to forget what one saw in days past. We ask hunters to record the number of hours spent hunting that day and the number of bulls, cows, and calves observed. We also included a space for reporting unclassified moose because sometimes a moose is seen but conditions do not allow accurate classification as bull, cow, or calf. When within range of a cell-phone tower, the recorded observations of moose are instantly beamed to a spreadsheet on our server. What if a hunter is in a remote area with no cell phone service? No problem. Data is stored on the smart phone and transmitted during the drive home or whenever the phone comes within range of a tower.

We established the following rules for volunteer participants to ensure that data collected from hunters are statistically valid:

1. Record the number of hours spent in the WMU when moose might be seen, whether in a vehicle or on foot.
2. Only record moose seen on that day.
3. Do not record observations of tracks, spoor, or moose beds. Only report moose actually seen.
4. Only record moose observed within the WMU for which a hunting license was issued. Do not report moose observations in other WMUs.
5. Record the number of bulls, cows, and calves observed during the day as well as any moose for which age/sex classification was not possible. If uncertain whether the moose was a cow or a calf, report "unidentified" on the App Form.
6. Record moose observations even if outside the range of cellular communication. The date-stamped observations will be transmitted when the hunter returns to an area with mobile phone or WiFi coverage.

BELOW: In observations like this one, classification of cows and calves is easy. But when moose are by themselves in dense bush, classification can be difficult. If uncertain, simply record "unidentified" on the App form (above).



Remarkably, in 2012 about 40 percent of Albertans (and 46 percent of Americans) own smart phones, so this system could sample a substantial fraction of Alberta's 18,500 licensed moose hunters. It should yield large enough sample sizes from each WMU to secure a reasonable index of abundance throughout the province. Currently we have programmed the app for iPhones and for Android-based smart phones, making it widely accessible. After purchasing a hunting license this fall, moose hunters were sent a letter that contained a link where they can download the moose-hunter app. In the case of iPhones the "Moose Survey" app can be downloaded for free from the App Store. You will be able to submit data through the Moose Survey only if you have a moose license for 2012.

Granted some hunters may attempt to cheat the system by recording more or fewer moose than they actually saw. But the experience in Scandinavia is that most hunters recognize it is in their best interests to be honest in reporting, thus providing



Methods for aerial survey of moose populations have been refined to the “gold standard” for population estimation. But these surveys are very expensive. Helicopters are commonly used to conduct aerial surveys of moose during winter when snow cover makes the animals easier to detect.

wildlife managers with the best possible information for making management decisions. Yes there are cheaters, but these are counterbalanced by conscientious participants in the citizen-science scheme. I believe that most Alberta hunters will support active participation in moose population monitoring.

The Bottom Line: Affordable Monitoring

Currently aerial ungulate surveys are among the most expensive and dangerous tasks conducted by wildlife biologists. In Alberta, a helicopter survey costs on average \$60,000 per WMU, and only about 10 surveys are conducted each winter. We have over 100 WMUs in which moose hunting occurs each fall. This means that fewer than 10 percent of the WMUs are surveyed in a given year, and any particular WMU is monitored only once every 10 years. This certainly is insufficient to monitor the efficacy of the moose harvesting program—a moose population could crash in 10 years! Using our smart phone system, we would be able to monitor moose populations every year and managers will be able to detect the consequences of changes in harvest regulations, winter kill, winter tick outbreaks, excessive aboriginal harvests, and so on.

Naturally we wish to have as much data as possible for making harvest management decisions. However monitoring can be extremely expensive, competing for scarce dollars with other conservation and management investments. The bottom line for hunter-assisted monitoring is that we can have improved moose harvest management and an additional \$600,000 each year to invest in habitat acquisition and other conservation programs.



Moose Survey App

Our Moose Survey App is experimental in 2012, and we might need a few years to iron out bugs in the sampling scheme. But technology continues to advance. That’s why we’re optimistic about providing better information for wildlife managers, which should translate into more opportunities for hunters. ■

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