Greater Sage-grouse:

A Symbol of the Prairies

By Ruiping Luo, *AWA Conservation Specialist*

Every year, as the snow melts and the air warms, a vibrant landscape is revealed. In the prairies, the soils thaw, grasses grow, and slowly the wildflowers begin to bloom. The buzz of bees and other insects returns, and bird calls fill the air. In the southeast of the province, in the few remaining areas of intact sagebrush habitat, a lucky few might also hear the sounds of popping and whistling as the greater sage-grouse begin their courtship rituals.

What are greater sage-grouse?

The greater sage-grouse is a species of mottled brown-grey bird found only in the Great Plains of North America. They are the largest grouse in North America, with females averaging 56 cm long and the larger males averaging 75 cm, making them only slightly smaller than wild turkeys. The males, aside from being bigger than the females, are much more striking in appearance. Male greater sage-grouse present a ruff of white feathers around their neck and chest, and contained within their breast feathers are two large yellow air sacs that can be inflated and deflated during courtship.

Greater sage-grouse are a federally and provincially Endangered species found in the sagebrush flats of Southeastern Alberta. The male, pictured left, is larger and more striking than the female, pictured right. Bulbous yellow sacs hidden within the white breast feathers of the male are inflated during courtship.
Photo © C. Olson.

Sage-grouse habitat requirements are complex, with subtly different environments needed for displaying, nesting, chick-rearing and over-wintering. From March to May, sage-grouse gather at display grounds, or leks. These are usually open areas surrounded by sagebrush, with sage-grouse often returning to the same grounds year after year. On these sites, males will strut, fanning their tail feathers and inflating their yellow throat sacs with the aim of attracting females. The inflation and deflation of their throat sacs creates the famous popping, booming and whistling noises, a sound that can travel for up to three kilometres. Competition between males is fierce, as most females will select the same few males, and males fight for the best position on the lek.

While male sage-grouse will continue their displays at leks for weeks, females only show up long enough to choose a mate. Once mating is completed, the females leave to nest in the surrounding area. Nesting occurs in areas of high sagebrush canopy cover, with grass and forbs as an understory. Nests are scraped into soft soils, usually under the cover of sagebrush plants, and lined with leaves, grasses, twigs and feathers. Grass and shrub cover is important for shielding the nest from predation and providing warmth, and an availability of nearby forbs is needed to provide hens with food during brooding.

The eggs hatch after 25 to 29 days, releasing downy, brown- or grey-spotted chicks. Chicks are able to feed themselves within a few minutes of hatching, and readily consume the forbs and protein-rich insects nearby. Within 10 days they are able to fly, albeit weakly. At first, the chicks and hens often stay close to nest sites, although some may move to other areas. Hens select for areas with a diversity of plants and insects, usually in sagebrush stands with lower canopy cover. In late summer, as both plants and chicks mature, sage-grouse move to areas with more succulent vegetation, often meadows and occasionally croplands. The presence of wet areas and riparian zones are especially important for chicks in late summer.

As the weather cools, the chicks of a brood begin to disperse, and sage-grouse gather in flocks. Although they can use a variety of habitats during this time, their diet becomes more and more dependent on sagebrush leaves and buds as other types of vegetation become dry and brittle. By winter, sage-grouse are reliant on sagebrush, not only for food, but also for shelter. On cold nights, sage-grouse will burrow in the snow, and they may fly long distances between feeding and roosting sites. Sage-grouse do not migrate, though unlike many other birds, winter mortality is low, and most will survive the harsh season. In spring, male sage-grouse will return to leks, once more competing for the attention of females.

The importance of sagebrush

Greater sage-grouse are sagebrush 'obligates' in that they depend on sagebrush plants for food or cover in all stages of their life cycle. During the summer, sagebrush makes up 47 to 60 percent of adult sage-grouse diet, and this increases to 100 percent in the winter. Sage-grouse lack a muscular gizzard, and so cannot digest seeds or harder substances. Without the soft leaves of sagebrush, sage-grouse would not survive, especially through the colder months.

Sagebrush provides habitat for more than

sage-grouse. In the vast fields where it is common, sagebrush plays an important role in the broader ecosystem. The long tap roots allow the plant to survive dry summers and capture snow in the winter months, retaining more moisture during spring melt, and these roots also help keep soils intact. Sagebrush plants create conditions that support many other native plants, and act as shelter for several species of animals. They provide nutrition for a variety of birds and insects, as well as larger grazers such as rabbits, deer, elk, pronghorn, and sheep. Many of the species reliant on sagebrush serve as prey for predators, including hawks, eagles, foxes and coyotes. In total, conservation of sagebrush habitat has been estimated to help over 350 species of plants and animals throughout the North American Great Plains.

In Alberta, the silvery-green leaves of sagebrush can be found in the Grasslands Region, and are most abundant in the southeast, near the borders with Saskatchewan and the United States. Historically, sagebrush was prominent throughout the Great Plains and, in Canada, habitat supporting greater sage-grouse covered around 100,000 km^2. Since then, sagebrush ecosystems have been fragmented by agricultural conversion, industrial development and urban expansion.

Sage-grouse decline

Greater sage-grouse are highly sensitive to habitat disturbance, and their decline is closely linked to sagebrush loss. Between the 17th and 19th centuries, European settlement destroyed vast amounts of native grassland to build roads, houses and farms. Many prairie lands were converted to seeded pastures or cropland, and settlers introduced several non-native species, some intentionally as crops or livestock. Overgrazing in the remaining grasslands devastated native prairie, and in some areas, introduced species began to displace native plants. Simultaneously, annihilation of bison and suppression of fires – major disturbances that once shaped the North American Great Plains – allowed woody shrubs to encroach on the remaining sagebrush and transform the grassland ecosystem. More than half of the sagebrush habitat in North America is estimated to have been lost since European settlement, with a reduction of 94 percent in Canada.

In the 20th century, new settlement and conversion of native prairie began to slow, although another threat was already emerging: the growing global interest in oil and gas. In the 1880s, natural gas was discovered near Medicine Hat. By the 1900s, several natural gas wells had been drilled, and oil exploration in Alberta began in earnest. Oil and gas prospecting further fractured and degraded the shrinking sagebrush habitat, contaminated waters and soils, and displaced many wildlife species, including greater sage-grouse. Noise, produced by drilling and other human activities, disrupted leks from as far as six kilometres away, and sage-grouse survival dropped as oil well density increased. Periods of extensive petroleum activity in the late 1970s and 1990s coincided with dramatic sage-grouse population losses.

By the early 1900s, naturalists and hunters were already noticing the disappearance of these formerly abundant birds. In 1968, a count of sage-grouse on leks found only 613 males in Alberta, and by 1994, this number had declined to 70 males. In 1991, greater sage-grouse were listed as a *species of concern* in Alberta, although hunting remained open until 1996, when sage-grouse were acknowledged as a *species that may be at risk*.

Sage-grouse are reliant on rapidly diminishing sagebrush habitat. Sagebrush, with its distinctive silvery-green leaves, also helps soils retain moisture, supports several native plants, and acts as habitat for a variety of grassland species. Photo © C. Olson.

Sage-grouse conservation

Federally, the greater sage-grouse was first listed as *Endangered* in 1998. The same year, the Alberta government published a report on sage-grouse acknowledging "an 80 percent decline over the past few decades" and that the species was "at risk of declining to nonviable population levels in Alberta," although it would take another two years for sage-grouse to be listed as *Endangered* under the *Wildlife Act* in Alberta. When the federal *Species at Risk Act* (SARA) came into force in 2002, it provided protections against the "killing, harming, harassing, capturing, taking, possessing, collecting, buying, selling or trading" of listed species in Canada, and aimed "to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity."

Still, sage-grouse continued to decline. Populations showed a slight increase to 124 males in 1998 before declining further to a low of 13 males by 2012. Nationally, a population of nearly 2500 individuals in the 1980s had declined to only an estimated 93 to 138 individuals by 2012. Habitat loss due to human activity was agreed to be the greatest threat to sage-grouse populations, yet exploitation of the prairies continued, driven by a soaring international demand for oil.

The first federal sage-grouse recovery strategy, *Recovery Strategy for the Greater Sage-Grouse* (Centrocercus urophasianus urophasianus) *in Canada*, was published in January 2008. Its stated goals were to halt the loss of leks, improve population status and productivity by 2012, and achieve a stable or increasing sage-grouse population by 2026. However, while the report acknowledged the importance of sagebrush and the threat presented by habitat degradation and fragmentation, it concluded "Critical habitat cannot be identified for the Sage-Grouse at this time." Without the identification and protection of critical habitat, improving the sage-grouse populations and reaching the recovery strategy's goals would be nearly impossible.

In response, AWA worked with four other environmental non-government organizations and retained the services of Ecojustice, an environmental law charity, to file a lawsuit against Environment Canada. The lawsuit protested that, contrary to the claims in the recovery strategy, there was ample scientific evidence to identify critical habitat, and Environmental Canada had failed to uphold the requirements for SARA. On July 9, 2009, in a landmark decision, a judge ruled in favour of Ecojustice and the environmental groups, making it clear that designating critical habitat was a requirement of recovery planning. It was a small but important victory towards the protection of sage-grouse.

The Emergency Protection Order

Even with growing awareness of sage-grouse peril, the species continued to slide towards extinction. Environment Canada modified the recovery strategy and identified a limited amount of critical habitat as a result of the federal court ruling. Still, the majority of lands considered critical habitat continued to be managed as before, and although there were assurances that activities damaging critical habitat would be restricted, industrial development persisted in many areas.

On September 7 and 8, 2011, with no sign of sage-grouse recovery, AWA hosted an Emergency Sage-Grouse Summit. The summit gathered together leading international sage-grouse scientists, environmentalists and landowners to determine the actions needed to prevent sage-grouse extinction. A communique resulting from the summit summarized that "current efforts are failing to prevent the extirpation of the greater sage-grouse" and "there is an urgent need for immediate action and substantive measures," and laid out recommendations for the identification, protection and restoration of critical habitat. This communique was posted on the AWA website and sent to the governments of Alberta, Saskatchewan, and Canada, urging immediate action.

Over the next few months, supporters of sage-grouse wrote letters demanding action from the federal and provincial governments. These letters came from across Canada, from numerous concerned individuals and groups, and from a diversity of sectors, including biologists, nature clubs, and an eight-year-old child worried about the loss of a beautiful species. They pointed to the diminishing population and range across the prairies and questioned the lack of government response and protection for native grassland habitats.

In replies to AWA, the Alberta government provided assurances that they were "working with oil and gas industry and other stakeholders to minimize the footprint of new land uses." Work was underway to translocate sage-grouse from Montana, a solution that could only be temporary without suitable habitat for the birds to establish in. The Government of Canada similarly provided assurances of "working with provincial governments, industry and landowners to ensure that regulatory and other conservation measures are in place" and claimed Environment Canada was working to identify additional critical habitat. Neither government took any meaningful action in protection of critical sage-grouse habitat.

In November 2011, roughly two months after the summit, AWA and 11 other environmental groups retained Ecojustice to submit a legal petition on their behalf, demanding federal Environment Minister Peter Kent take necessary action to prevent the imminent extinction of sage-grouse in Canada. Under SARA, a minister can recommend an "Emergency Order" if "he or she is of the opinion that the species faces imminent threats to its survival or recovery," and the petition called for this legislation to protect greater sage-grouse. The petition demanded a response by January 16, 2012.

When Minister Kent failed to respond before the deadline, the conservation groups pursued legal action and filed for judicial review. In reaction, a Minister's Certification and Objection was issued, claiming Cabinet confidence under the *Canada Evidence Act* and stating "it is not possible to reveal whether the Minister has made or will make a recommendation to the Governor in Council for an emergency order to be issued." Ecojustice brought a motion challenging the application of Cabinet confidence, stating its use obstructed the right to a judicial review, and countered with a demand that the Minister reveal whether a decision for an emergency order had been made. Though the motion was initially dismissed, AWA and the conservation groups were given a favourable decision on appeal, and the Court required the federal government to reveal the Minister's decision. It was August 2013, over a year since the petition was first submitted.

Meanwhile, back in late 2012, AWA had initiated meetings with Medicine Hat Gas and Alberta Environment and Sustainable Resource Development (AESRD), the precursor to Alberta Environment and Parks (AEP), to discuss sage-grouse protection and recovery efforts, and the formation of a Sage-grouse Partnership. AWA continued to contact any parties of interest, including Chinook Energy, Alberta Minister of Environment Diana McQueen, Assistant Deputy Minister Matt Machielse, Northern Plains Conservation Network, Nature Canada and Canadian Energy Pipeline Association. On March 4, 2013, AWA met with 34 landowners and leaseholders near Manyberries to share knowledge and discuss concerns about grasslands and the future of prairie species. This meeting was the beginning of the Sage-grouse Partnership, a partnership between landowners, leaseholders, interested individuals, oil and gas industry, conservationists and government aimed at accelerating the progress for sage-grouse recovery.

On September 17, 2013, nearly two whole years since the petition, the federal government at last announced the intent to introduce an Emergency Protection Order (EPO) for sage-grouse and an expansion of identified sage-grouse critical habitat. The promised order was published December 4, and prohibited destruction of sagebrush, construction of roads, poles and loud machinery, and noise disruptions on protected public lands. AWA and other conservation groups welcomed the hard-won order, although they still had concerns over some of the terms. In February 2014, AWA and the Sage-grouse Partnership wrote appealing against unnecessary restrictions for fencing or grazing, which the government accepted.

However, poor communication and a lack of clarity on the implementation of the EPO led to misinformation and resentment. In January 2014, the City of Medicine Hat and LGX Oil and Gas filed a court application to revoke or suspend the EPO, claiming the federal environment minister failed to consult with industry and other stakeholders. AWA responded that any further delays could cause the greater sage-grouse to become extirpated from Canada, though agreed that

Concerned for the declining sage-grouse population, AWA hosted an Emergency Sage-Grouse Summit in 2011. The summit invited leading experts and collaborators to speak on preventing sage-grouse extirpation, and resulted in a communique which urged immediate action. Photo © C. Olson

the government needed to place appropriate resourcing behind the protection order and not penalize energy companies or ranchers assisting with recovery efforts. The EPO went into effect on February 18, 2014.

In June 2016, marginal increases in sage-grouse numbers were confirmed. The Canadian population was estimated at 340 individuals, higher than the 2014 estimate of 100 birds, and Alberta's lek count yielded 46 males compared to only 8 in 2013. For the first time in years, there appeared to be a glimmer of hope for greater sage-grouse recovery.

Conservation projects

In 2013, with the understanding that populations were facing extirpation in the wild, Minister McQueen approached the Wilder Institute/Calgary Zoo (WICZ) to request their aid in the breeding and release of greater sage-grouse. WICZ responded with a proposal for a 10-year project to establish a sage-grouse breeding flock, breed chicks, and release young birds in an attempt to bolster the wild population. The program is supported provincially by Alberta Environment and Parks and federally by Environment and Climate Change Canada, with each government committing $2.1 million, and another $1.1 million raised from donors and visitors.

This would become the first program for greater sage-grouse reproduction in human care, and the only program to breed sage-grouse in Canada. To learn more about the program, I spoke with Steven Ross, WICZ's Chief Development Officer, and Dr. Axel Moehrenschlager, Director of Conservation and Science.

Prior to WICZ's Program, I was told by Dr. Moehrenschlager, there was no history of sage-grouse in captivity. There was no knowledge of how to raise the animals, and no network to acquire birds or eggs. The Wilder Institute/Calgary Zoo has worked to develop an innovative approach to breed and rear sage-grouse that could be introduced into wild populations.

The program began with eggs. Sage-grouse translocation from Montana was ongoing, and eggs laid during transportation and from nests established in the wild were obtained to begin a breeding flock. The first eggs were hatched in 2014, and in 2017 the birds were successfully bred in captivity. They have since achieved a breeding population with 53 hens and 29 males.

While the breeding of sage-grouse has been effective, there remain challenges in their release. Mainly, these challenges have been in the survival of birds on degraded habitat. Since 2018, 187 juvenile birds have been released in Alberta and Saskatchewan, on land determined to be the most suitable and near where sage-grouse populations are already present. However, as I was told by Dr. Moehrenschlager, the amount of sagebrush is essential to sage-grouse survival, and the prairie landscape has seen vast changes over the last few years. Without addressing the habitat loss that drove the decline of sage-grouse, releasing captive-bred birds is not a viable solution.

While WICZ focuses on preserving the species, the Alberta Riparian Habitat Management Society, known more commonly as Cows and Fish, has been working with MULTISAR on improving the habitat. Their focus is on riparian areas, important for sage-grouse chicks in late summer.

The work on sage-grouse habitat only began recently, Emily Purvis and Levi Williams-Whitney from Cows and Fish informed me, funded through the Species At Risk Partnership on Agricultural Lands (SARPAL) initiative from Environment and Climate Change Canada (ECCC). They work with ranchers, farmers, landowners, and local groups on a voluntary basis, with much of their work focused on cattle distribution and grazing practices. Although the work in sage-grouse habitat is more recent, Cows and Fish have experience in riparian health and management, and have already reported preliminary successes in their projects to protect a part of sage-grouse habitat.

In response to the question of what is needed to recover sage-grouse, Purvis told me not to underestimate the value of these riparian areas, with Williams-Whitney adding "ensuring the pastures and rangelands are healthy." Both riparian areas and uplands are important to sage-grouse, as is the maintenance of native, uncultivated pastures. In addition, reclamation of degraded areas and the absence of fragmentation is highly important to sage-grouse survival.

The importance of well-functioning native habitat for sage-grouse was echoed by Pat Fargey, Species at Risk Specialist at Alberta Environment and Parks (AEP), with Joel Nicholson, Senior Wildlife Biologist at AEP, agreeing the "long-term solution must be habitat-based." AEP, along with other groups such as the Alberta Conservation Association (ACA), have also contributed to habitat improvement projects benefitting sage-grouse. Among these projects is an adjustment to fencing, including marking fences to reduce the risk of sage-grouse collisions and the removal or replacement of wildlife-unfriendly fencing. These changes benefit not only sage-grouse, but allow easier passage for other wildlife including pronghorn, while still outlining

boundaries and containing cattle.

Another habitat improvement in sage-grouse country has been the removal of trees and old structures where predators can perch and roost. Predation, while a natural process, can become a concern when a species like the sage-grouse becomes critically imperilled. Removing old structures or adding perch preventers on fence posts and power poles in important sage-grouse areas can reduce sage-grouse vulnerability to avian predators. Artificial roosting structures, including abandoned buildings, can be particularly important for predators during winter, and may allow great-horned owls, racoons, or other predatory species to achieve higher densities.

Finally, both Pat Fargey and Joel Nicholson spoke optimistically of the unprecedented and accelerated levels of remediation in sage-grouse country. In partnership with Nature Conservancy Canada, ACA, Alberta Fish and Game, and Pheasants Forever, properties have been acquired where cultivated vegetation can be converted back to native perennials. Protective Notations (PNT), which "identify land and resources that are managed to achieve particular land-use or conservation objectives," have been applied rigorously to crown lands in sage-grouse habitat, as well as lands historically occupied by sage-grouse.

Oil and gas infrastructure is also being strategically removed and the sites reclaimed, aided in part by the Site Rehabilitation Program, which is stated to provide funding for "abandonment and reclamation work on oil and gas sites in Alberta." The Orphan Well Association, an independent organization that works to "decommission Orphan oil and gas infrastructure and reclaim the land similar to its original state in a safe, principled, and cost-efficient manner," has been active in sagebrush habitat. Lars DePauw, president of the Orphan Well Association, confirmed that although sites within the EPO are still in the early stages of environmental assessment and reclamation, over 85% of sites have been decommissioned, and planning will ensure critical habitat for many of the species at risk (SAR) in the region. Recovery of sagebrush density at these sites will be essential to sage-grouse recovery.

Reintroduction of a species already extirpated would be significantly harder than recovering an endangered population, Joel Nicholson warned, which is why keeping the birds on the land is important. The translocation of birds from Montana and the introduction of captive sage-grouse through the WICZ breeding program both support this goal. However, some of the threats to recovering sage-grouse are the high nest failure rates and low juvenile survival, both of which can be linked to predation and habitat disturbance. The long-term persistence of the species will rely on sufficient healthy and well-functioning habitat.

Where are sage-grouse now?

While the EPO was a step forward in protecting greater sage-grouse, and conservation efforts have so far prevented the extirpation of the species, sage-grouse are still in danger. Populations of sage-grouse remain low, at an estimated 250 individuals in Canada. In 2022, Alberta counted 22 males on leks, indicating the species has once again declined. The species occupies just six percent of their historic range in Canada, with an estimated 4000 km^2 of habitat remaining in Alberta. The EPO protects only a portion of this habitat.

The story of the sage-grouse always comes back to habitat. Human development continues to present a major threat to sagebrush ecosystems, and as sagebrush is lost, so are the sage-grouse. On top of the usual threats of agriculture and oil and gas expansion, renewable energy projects are beginning to infringe on the remaining grasslands. Most recently, helium prospectors have turned their sights on southeast Alberta, placing crucial sage-grouse habitat at risk. Protection of sage-grouse and the sagebrush habitat they rely on is critical to preventing extirpation and extinction of this magnificent native species.

Once, millions of sage-grouse flocked across the Great Plains. Since then, sage-grouse populations have declined by over 95 percent. The Emergency Protection Order, along with recent conservation efforts, have slowed the species decline and offered hope for recovery. Now is the time to build on these actions, protect the remaining sage-brush, and return the sage-grouse to some of their former glory.

What can we do to help sage-grouse?

- **Don't intrude on leks.** Sage-grouse are highly sensitive to noise and disturbance, particularly during lekking. Reducing noise and staying away from leks allows sage-grouse the space to perform their mating rituals.
- **Write to the Environmental Ministers about sage-grouse.** Sage-grouse and sagebrush habitat remains under threat. The EPO protects only a portion of sage-grouse range, while cultivation and energy development continue to encroach on sagebrush habitat. To protect sage-grouse, the EPO should be expanded. Write to your Environmental Minister to make them aware of sage-grouse threats and argue for the expansion of the EPO area.
- **Protect sagebrush habitat.** Conversion and degradation of native grassland remains a major threat to sage-grouse habitat. Protecting the remaining landscape is vital. Encourage responsible land use by protesting against conversion of remaining native prairie, supporting responsible grazing management on rangelands, and promoting revegetation of cultivated and degraded areas.
- **Encourage reclamation and habitat improvement.** Infrastructure from abandoned oil and gas wells can fracture sage-grouse habitat and benefit predators. Continuing reclamation of orphaned wells and other abandoned structures can reduce the vulnerability of sage-grouse to predation. Conversely, actions such as adding fence markers can prevent sage-grouse collisions. Advocate for the continued reclamation of orphan wells and installation of wildlife-friendly fencing to reduce sage-grouse mortality.