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Utah's 2020 Sage-Grouse Lek Counts and Population Trends

By David Dahlgren, Utah State University

As most of you are aware, we largely keep track of sage-grouse populations using male lek counts in the spring. Males make themselves conspicuous by gathering on lekking grounds, the location of which remains relatively consistent over time, and displaying in the open to compete for female attention (Figure 1). This reproductive strategy enables biologists to count males on an annual basis and assess population change over time. We also know from previous research in Utah that changes in the number of males tends to represent changes in the number of females in the population as well.

Figure 1. Photo of male sage-grouse on a lek, courtesy of Todd Black.

Sage-grouse lek counts began in most states and provinces in the mid-20th Century and have continued to present. Although there are many issues with how data has been collected, overall these efforts have provided an understanding of population changes and status for sage-grouse across their range, including Utah. In 2020, over 350 leks were visited by biologists across Utah's sage-grouse habitat. The number of leks being monitored has been increasing since the early 2000s, not because populations have been increasing but largely due to increased efforts to locate previously unknown leks. The vast majority of leks occur within Utah's Sage-Grouse Management Areas (SGMAs) as defined by Utah's Conservation Plan for Greater Sage-Grouse.

Lek counts in Utah are conducted and overseen by the Utah Division of Wildlife Resources (UDWR) and are grouped and summarized by individual SGMAs which are likened to distinct populations. Additionally, leks outside SGMA boundaries, or non-SGMA leks, are grouped together regardless of location. In cooperation with federal land management agencies (i.e., Bureau of Land Management [BLM] and U.S. Forest Service [USFS]) and Utah State University (USU), the UDWR evaluates population trends following the collection and analysis of lek data each year.

When combining all of Utah's 2020 sage-grouse lek counts, Utah's sage-grouse population remained generally the same as 2019. However, since 2016 Utah sage-grouse have been on the downward part of a ~ 10-year cycle, a pattern that has been evident since lek counts first began in the 1950s. With lek counts remaining the same as the previous year, we are likely looking at the trough of Utah's 10-year cycle and can expect counts to increase again in the coming few years. Because sage-grouse populations tend to cycle on a decennial basis, it is important to look at more than one cycle when considering the long-term status of sage-grouse populations. Utah's 20-year trend is sloping down, which is cause for concern as we manage sage-grouse habitat and populations into the future.

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In This Issue

Tracking the Green Wave Using NASA Satellites to Shed Light on Sage-grouse Evolution and Solidarity with Livestock Grazing

By Dave Stoner, Utah State University

For most animals, spring is the birthing season - why? The seasonal arrival of green grass, the appearance of flowers (forbs), and the buzz of insects means that valuable food resources are finally available. For sage-grouse that have survived the winter feeding on sagebrush, this is a time to recoup energy reserves and enhance nutrition for the demands associated with egg production and nesting. Newly hatched sage grouse chicks are highly vulnerable to predation, and as such, they require high protein foods to grow and rapidly develop flight abilities. A diet of just sagebrush is not adequate to achieve these goals. The ready availability of animal proteins, such as crickets, spiders, and ants, support chicks through these critical first weeks of life.

Effective sage-grouse conservation depends on successful nesting and brooding. Minimizing disturbances while maximizing access to resources at this time is important for sage-grouse production. To shed some light on these processes, we used satellite imagery from NASA to map the green wave by measuring the timing, magnitude, and duration of the growing season. Satellites orbit the planet on a daily basis, measuring light reflecting the surface of the Earth. Vegetation reflects red and near-infrared, and so the amount of light measured in these wavelengths provides good index of plant growth.

Imagine, if you will, the time-lapse photography you may have seen in elementary school: a green stalk emerging from the moist earth, leaves sprouting, and ultimately a flower emerging, blooming, and wilting. This is essentially what satellite imagery provides for entire ecosystems. A means of watching a plant community emerge, reach a peak, and decline in response to seasonal changes in temperature (Fig. 1A).

We used these data to map the timing of sage-grouse nesting based on local growing seasons, statewide. What we found astounded us. Even given all the variability in weather, land-use, and disturbances, sage-grouse initiated nesting precisely half way between the start and peak of the growing season. This window captures the period when food resources are increasing and diversifying on a daily basis. This phenomenon is called the "green wave" and sage-grouse were able to hit this date regardless of which Utah Sage-grouse Management Area (SGMA) they occupied. Nest initiation dates ranged from late March on low elevation sites, to mid-May at higher elevations (Fig. 1B). We also found that higher sites were more climatically stable and had longer growing seasons. This surprised us, as SGMAs such as Parker Mountain and Strawberry Valley are subject to early frosts. However, it turns out that lower SGMAs, such as the West Box Elder and Sheeprock Mountain are limited not by temperature, but by evapotranspiration, with the growing season ending in the middle of August, rather than late September. Because of this, birds on high elevation sites have longer access to succulent forbs and nutritious insects, giving them a distinct advantage over low populations. These results were reported in a paper recently published in the scientific journal Ecology and Evolution. This paper is posted on the Utah Community-based Conservation Program website at http://utahcbcp.org/ou-files/Stoner_etal_2020.pdf.

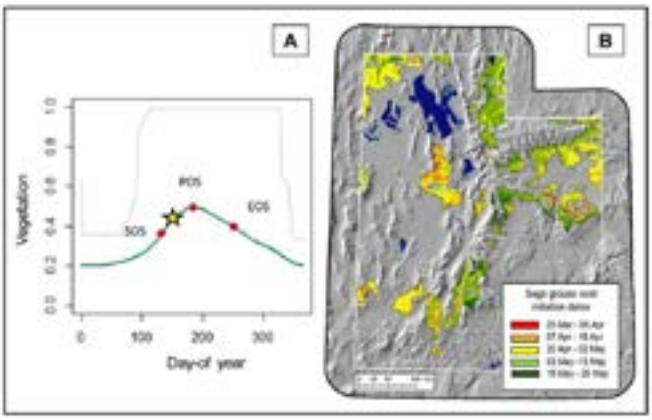

Figure 1. (A) the growing season for the Rich County SGMA. In this graph SOS, POS, and EOS represent the start, peak, and end of the growing season as measured by satellite imagery. The yellow star marks the point when sage grouse initiate nesting. (B) this map illustrates nest initiation dates based on when the window between the start and peak of the season occurs on all sage-grouse management areas in Utah.

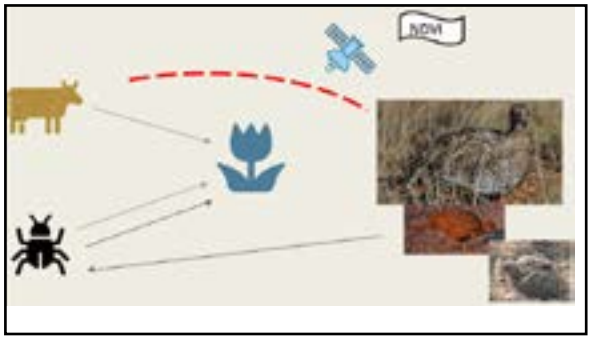

Figure 2. We are now assessing if changes in vegetation quality or, "the green wave," as estimated by NDVI satellite data, can be enhanced with livestock grazing to benefit sage-grouse nest initiation rates, and nest and brood success in Rich County, Utah.

So what does this mean for sage-grouse?

Nature is a ruthless taskmaster, and for birds that have only a few nesting seasons during their lifetime, those that are most attuned to these highly dynamic environments are the ones that survive. Birds that are able to establish home ranges in good habitat and time their hatches to these brief windows when food is most plentiful will be those that persist. Unfortunately, the arid ecosystems of the West are changing, and we hope that these results can be used to predict periods of relative sensitivity to habitat disturbance for sage-grouse. Additionally, we are exploring the idea that surgical use of livestock grazing can be used to stimulate production and extend nutritional value of green wave (Fig. 2). Given that over 80% of sage-grouse range is actively grazed by livestock, a better understanding of how climate, herbivory, and nest success are related would be beneficial to agriculture and wildlife.

As for individual SGMAs, we saw continued declines in lek counts in 2020 for Box Elder, Hamlin Valley, Ibapah, Panguitch, Parker Mountain-Emery, and Strawberry Valley. The Bald Hills, Carbon, Rich-Morgan-Summit, Sheeprock Mountains, and Uintah SGMAs all saw stable or increasing lek counts in 2020. Declining long-term (i.e., 20-year) trends are most concerning for Box Elder and Rich-Morgan-Summit populations. For Parker and Emery population areas, as defined by the BLM, soft triggers were tripped for population declines due to 2020 lek counts (Figure 2). Because of this, the BLM, UDWR, USFS, and USU will work together to identify potential causal factors and develop an approach moving forward to avoid tripping a hard trigger for these populations. Refer to box on right for information about triggers.

Federal sage-grouse conservation plans incorporate adaptive management through the use of soft and hard triggers for population abundance and habitat acreages. Triggers were established through the federal planning process for the BLM and USFS, but were designed in cooperation with UDWR and USU biologists. Soft triggers were meant to provide a warning and initiate discussions among partners concerning reasons for population and/or habitat declines. Notably, soft triggers were not designed to automatically lead to policy or management changes. Hard triggers require actions on the part of federal land management agencies to address declines. For more information about population triggers go to the State of Utah Conservation Plan for Greater Sage-grouse (http://wildlife.utah.gov/sage-grouse/Utah_Greater_Sage-grouse_Plan.pdf).

Gamebird populations are known to go through up and down cycles, some of which can happen in just a few short years. While sage-grouse are gamebirds, they are one of the longest-lived and have comparatively low reproductive output. Because of these slower life-history traits, sage-grouse do not boom and bust as quickly, but, as mentioned previously, are more regularly cyclic. However, population changes are not simply influenced by the population's cycle. Environmental factors, such as timing and amount of precipitation, can also influence population change.

Certain factors can also contribute to how well lek count data represents the actual population. For example, male sage-grouse do not fully mature until their second breeding season and lek attendance for males during their first breeding season is generally less frequent, after peak lek activity, and with less location fidelity than older males. Therefore, a sage-grouse population can have a good reproduction year but lek counts do not fully reflect this increase until 1 or 2 years later. Other factors are the efforts and constraints experienced by the biologists counting leks. In heavy snowpack years, like 2019, many leks are higher in elevation and biologists have a difficult time accessing some leks due to severe road conditions. In these situations, if a lek is counted at all, the count is often past peak attendance for that specific lek. The above issues, and others, can influence and bias lek count data in certain years. Therefore, the long-term trend of male lek counts provides a more reliable representation of how populations are doing rather than year to year comparisons.

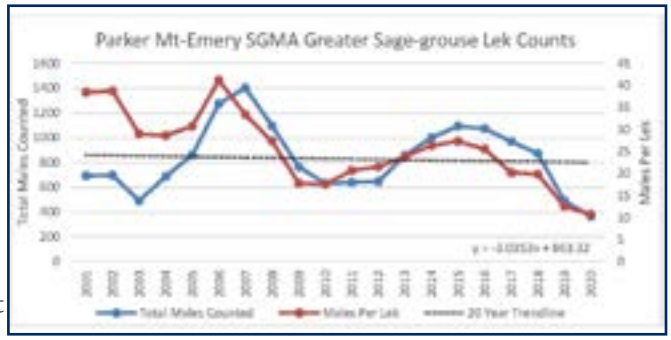

Figure 2. Average males per lek for all leks with at least one male counted and total number of males counted within the Parker Mountain-Emery Sage-grouse Management Area. Trend line represents a linear regression for total males counts from 2001 to 2020. Courtesy of Utah Division of Wildlife Resources.

Based on Parker Mountain summer brood surveys conducted by USU and the Utah Chukar and Wildlife Foundation, the 2020 brooding season was very successful and more broods, and grouse in general, were detected than the previous 3 years. Although a soft trigger was tripped for this population when considering the 2020 spring lek counts, we have some evidence that the Parker Mountain population is on the increase and we anticipate increased lek counts in the future.

Utah sage-grouse populations have seen declines in recent years (Figure 3), which is similar to range-wide trends in other states. Although this is cause for concern, our state and federal conservation plans provide provisions for addressing these concerns as we move into the future. While there are reasons to be optimistic, if the trend of population-based lek counts decouples from the regular cycle and continue to decline in the future, managers and policy-makers will need to take steps to address these declines. However, barring catastrophic events, we anticipate an increase in future lek counts as we climb back up the 10-year cycle which Utah's sage-grouse populations have demonstrated since the first lek counts began over 6 decades ago.

Figure 3. Total high count for all Sage-grouse Management Areas within Utah over the past 20 years and males counted per lek for leks with males present. The trend line is fitted to total males counted and represents an overall annual change across two population cycles. Courtesy of Utah Division of Wildlife Resources.

For more information, please see http://utahcbcp.org/ou-files/2020UTDWRLekCountReport.pdf.

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If it's not good for communities, it's not good for wildlife.

Fall Resources for Habitat Managers

The Community-Based Conservation Program team will be hosting several presentations this fall designed to help members of sage-grouse local working groups around Utah get access to information and discussions of interest to multiple sage-grouse groups. Each topic will be presented during the initial meeting, then followed up as needed at local working groups around the state.

The first two presentations reflect research being done at Utah State University that can directly inform project design decisions in the sagebrush steppe landscape where projects for sage-grouse habitat improvement are done. Although these presentations will not be recorded, in order to encourage more active discussion and participation by those in attendance, we will be releasing a recording later of a similar presentation for those who are unable to attend at the scheduled times.

The first two presentations are:

October 15, 2020, at Noon Mountain Time

Considerations for Sagebrush Canopy Reduction Projects in Sage-grouse Country
Dr. Dave Dahlgren, Rangeland-Wildlife Specialist, USU Extension

Dr. Dahlgren will present information on landscape-scale considerations when dealing with sagebrush canopy reduction projects in sage-grouse habitat. When could the response be beneficial, detrimental, or neutral to sage-grouse? What factors should the project planner consider, and what data is available for decision support? What scales should we be thinking about when planning projects?

Zoom meeting ID: 881 6197 0988; Passcode: gu7=8X

November 10, 2020, at Noon Mountain Time

Pinyon-Juniper Treatment Cost-benefit Decision Support Tool
Dr. Simona Picardi and Justin Small

Our presenters will demonstrate a tool that can be used to compare the cost/benefit ratio of different proposed pinyon-juniper treatments. Mechanical removal of pinyon-juniper has been used as a management tool to counteract the negative effects of encroachment and restore sagebrush habitats. However, removal treatments are costly, and benefits can vary between treatment areas in ways that are difficult to predict. This decision-making tool predicts expected gains in sage-grouse habitat per unit cost resulting from PJ treatments, and it can help managers decide where to invest economic resources to maximize ecological returns.

Zoom meeting ID: 822 8798 4968; Passcode Qn7Ym2

For additional information, such as direct meeting links or call-in information, please contact lorien.belton@usu.edu. Links to the recorded versions will be posted later at www.utahcbcp.org, under the presentations tab.

Utah's Community-Based Conservation Program Mission

Utah's Community-Based Conservation Program is dedicated to promoting natural resource management education and facilitating cooperation between local communities and natural resource management organizations and agencies.