MONTANA FISH, WILDLIFE & PARKS

Montana Greater Sage-grouse Population Report

August 16, 2021

Montana Greater Sage-grouse population estimates and associated uncertainty, and the number of known breeding sites (called leks) are presented here in compliance with MCA 87-1-201(1)(11), as amended in 2017.

Montana Fish, Wildlife and Parks (FWP) biologists work with federal agency and non-governmental organization partners and volunteers to count the number of displaying males at lek sites across the state in spring of each year. These data are used to assess population trends for use in sage-grouse management decisions. They are also provided to the Montana Sage-grouse Habitat Conservation Program and the Bureau of Land Management for use in land use decisions and permitting. Counts are conducted at leks 1-3 times within a season; however, all leks are not monitored in every year. Each lek is also categorized based on activity status, such as confirmed active or confirmed inactive, according to established definitions (see below). FWP manages the sage-grouse lek count and activity status database for the State of Montana.

Population Estimates - Methods

Montana FWP is working with Dr. Paul Lukacs, University of Montana, to estimate sage-grouse population numbers based on counts of displaying males at leks using *N*-mixture models. This modeling approach is a robust analytical method for estimating population size and trend over time for species like sage-grouse that congregate at discrete breeding sites (McCaffrey et al. 2016). Although FWP maintains a database of male counts at leks that date back to 1952, only data from 2002 onward could be used in this approach.

It is important to recognize these models use algorithms that will estimate similar, but not precisely the same, population numbers each time the models are run. This means that population estimates may vary slightly from previous reports but are well within reported confidence limit bounds.

Population Estimates – Results and Discussion

Montana FWP and partners surveyed 1,063 leks at least once in spring 2021. The models estimate that there were approximately 70,583 (± 8,264) sage-grouse in Montana in spring 2021 (Figure 1, Table 1), which is slightly down from last year's estimate of 77,977 (± 17,979). Data from FWP's sage-grouse research project in central Montana suggests hen survival was relatively low in fall 2020 compared to fall 2019 (Berkeley et al. 2019). If these data are representative of statewide patterns, they could explain the slight decrease in the number of sage-grouse attending leks in spring 2021. The current drought conditions began in late summer and fall of 2020 with higher than average temperatures and below average precipitation in August and September 2020. This could have limited food resources during the critical late summer brood-rearing period.

Sage-grouse population numbers oscillate over a period of 8 – 10 years across large scales (Fedy and Doherty 2011). The variation in estimates among years in Montana's dataset may be due to natural fluctuations. It is important to consider long-term patterns over time and not make management decisions based on one or a few years of lek counts, especially at broad scales.

There are certain assumptions that were used in the development of these estimates, such as an assumed male to female ratio of 1:2.45. The 2018 and 2019 population reports list the main assumptions. There are also other analytical models that have utility for estimating population size and trends, such as Integrated Population Models. However, these models require additional demographic information, such as recruitment data, that are currently unavailable statewide. FWP may explore additional and/or improved modeling techniques in the future as new data become available.

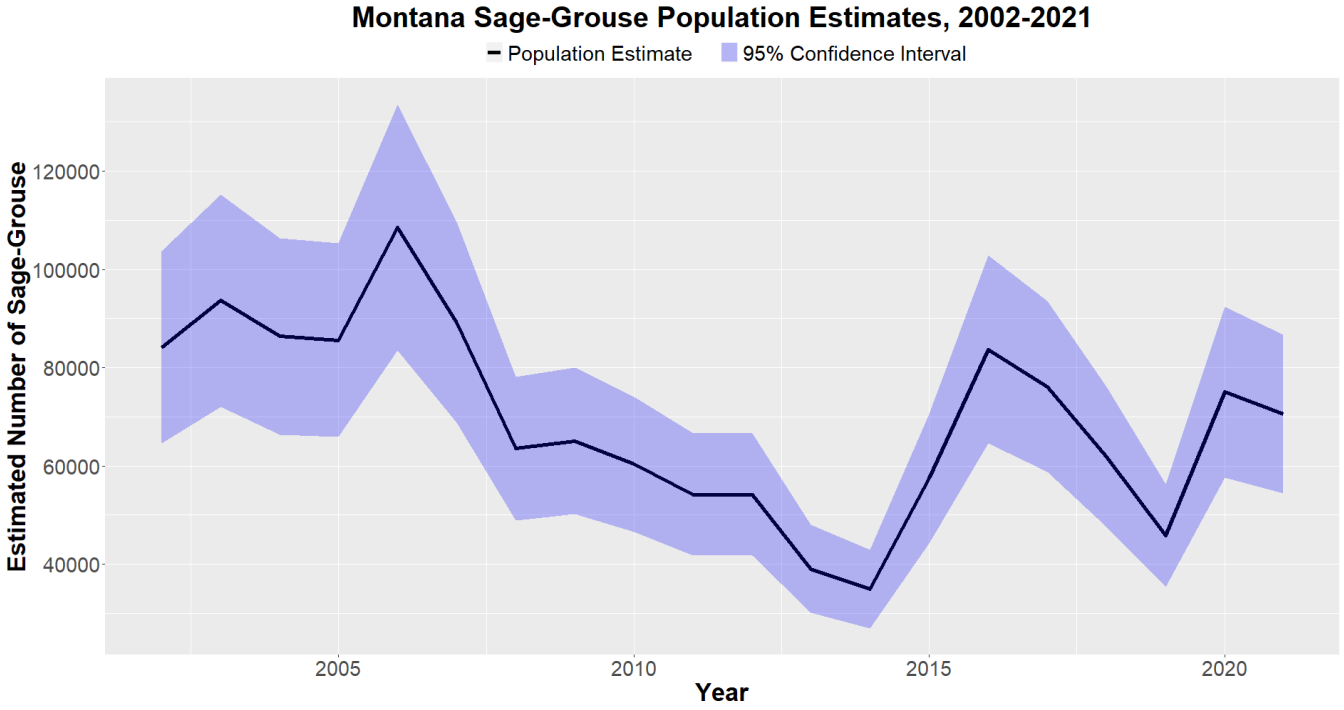

Figure 1. Graphical representation of Greater Sage-grouse population estimates and associated uncertainty from *N*-mixture models in Montana, 2002-2021. In general terms, confidence intervals are the range of values that describe the uncertainty around the population estimate.

Table 1. Numerical estimates of Greater Sage-grouse population numbers and associated uncertainty from *N*-mixture models in Montana, 2002-2021.

Year	Population Estimate	Standard Error	Confidence Interval	
			Lower Bound	*Upper Bound*
2002	84161	9364	64622	103700
2003	93677	10346	72095	115259
2004	86382	9563	66415	106349
2005	85619	9409	65958	105280
2006	108569	11806	83581	133557
2007	89241	9768	68847	109635
2008	63519	6964	48924	78114
2009	65067	7165	50155	79979
2010	60331	6644	46529	74133
2011	54190	6050	41709	66671
2012	54146	6090	41694	66598
2013	39061	4360	30097	48025
2014	34936	3762	26885	42987
2015	57459	6322	44281	70637
2016	83676	9395	64555	102797
2017	76113	8430	58743	93483
2018	61854	7050	47656	76052
2019	45871	5188	35357	56385
2020	75025	9173	57683	92367
2021	70583	8264	54386	86780

Number of Leks

FWP maintains a spatial database of Greater Sage-grouse leks, summarized by activity status in Table 2. FWP staff are continually working to confirm and record new lek locations and update lek status. In 2018, FWP added a new status category, *Provisionally Active*, to alert the Montana Sage Grouse Habitat Conservation Program, the Bureau of Land Management, and industry proponents of newly discovered leks immediately. Two survey years are required to meet the definition of a Confirmed Active lek; thus, without a Provisionally Active status option, there was a delay of over one year before resource agencies and industry were notified of newly discovered leks. Provisionally Active status is meant to be temporary. If data are not sufficient to meet the definition of Confirmed Active after a second year of surveys, a Provisionally Active lek will revert to Unconfirmed and would not be evaluated under state or federal assessments for new development. If data is sufficient in the second year of surveys, the lek will immediately be classified as Confirmed Active.

Table 2. Number of known Greater Sage-grouse leks in Montana by classification status, 2002-2021.*

Year	Confirmed Active	Confirmed Inactive	Confirmed Extirpated	Provisionally Active^	Never Confirmed Active	Unconfirmed	Total
2002	548	79	17	.	29	511	1184
2003	613	84	17	.	47	517	1278
2004	650	88	19	.	56	527	1340
2005	675	94	19	.	64	541	1393
2006	718	96	19	.	67	600	1500
2007	753	98	20	.	72	625	1568
2008	809	100	22	.	75	586	1592
2009	852	104	25	.	92	544	1617
2010	945	110	40	.	118	442	1655
2011	968	125	50	.	149	380	1672
2012	976	133	50	.	179	350	1688
2013	974	144	59	.	200	329	1706
2014	981	154	65	.	228	290	1718
2015	984	172	65	.	243	270	1734
2016	990	184	66	.	258	272	1770
2017	1006	199	66	.	257	285	1813
2018	1008	221	66	.	266	268	1829
2019	1018	234	66	.	276	257	1851
2020	992	272	66	.	279	260	1869
2021	990	294	66	(5)	289	244	1888

*FWP's database is dynamic and the status of a lek can change retroactively based on new information entered at any time. Reviewers may notice small changes in classification numbers from previous reports. These are not errors; rather they are the most up-to-date numbers as of this report.
^New status created in 2018. See definition below. Provisionally Active status is only relevant for the current year; leks categorized as Provisionally Active in previous years have been moved to Confirmed Active or Unconfirmed status, as appropriate. The number of leks that meet the Provisionally Active criteria in the past two years is noted in parenthesis.

Lek Status Definitions

Confirmed Active - Data supports existence of lek. Supporting data defined as 1 year with 2 or more males lekking on site followed by evidence of lekking (Birds - male, female or unclassified; -OR- Sign - vegetation trampling, feathers, or droppings) within 10 years of that observation.

Confirmed Inactive - A Confirmed Active lek with no evidence of lekking (Birds - male, female or unclassified; -OR- Sign - vegetation trampling, feathers, or droppings) for the last 10 years. Requires a minimum of 3 survey

years with no evidence of lekking during a 10 year period. Reinstating Confirmed Active status requires meeting the supporting data requirements.

Confirmed Extirpated - Habitat changes have caused birds to permanently abandon a lek (e.g., plowing, urban development, overhead power line) as determined by the biologists monitoring the lek.

Never confirmed active – An Unconfirmed lek that was never confirmed active. Requires 3 or more survey years with no evidence of lekking (Birds - male, female or unclassified; -OR- Sign - vegetation trampling, feathers, or droppings) over any period of time.

Provisionally Active – Preliminary data supports existence of an active lek. This status can only apply during the first year of detection. Supporting data defined as 1 observation with 2 or more males lekking on site AND sign of lekking (vegetation trampling, feather, or droppings) or followed by a 2nd observation of 2 or more males lekking within the same survey year.

Unconfirmed - Possible lek. Grouse activity documented. Data insufficient to classify as Confirmed Active status.

References

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Fedy, B.C. and K.E. Doherty. 2010. Population cycles are highly correlated over long time series and large spatial scales in two unrelated species: greater sage-grouse and cottontail rabbits. Oecologia; DOI 10.1007/s00442-010-1768-0.

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