

May 6, 2020

Morning Gun Exploration
1601 Arapahoe Street
Daniels and Fisher Tower, Box 1
Denver, CO 80202

Re: Sharp-tailed Grouse Survey Results

Quandary Consultants, LLC (Quandary) conducted Sharp-tailed Grouse (STG) surveys, on behalf of Morning Gun Exploration (Morning Gun) on April 9th, and April 20th, 2020. The STG surveys were conducted for the area surrounding Morning Gun's three proposed locations, as identified on the Sharp-tailed Grouse Proposed Survey Route (Figure 1). STG surveys followed Colorado Parks and Wildlife's (CPW) STG survey protocol and the pre-approved survey points and route for the area (Figure 1). Morning Gun's proposed locations are within Sections 10, 11, and 12, Township 7N, Range 59W. The STG survey and route was within sections 10-15, Township 7N, Range 59W, Weld County, Colorado. The STG survey and route were located within STG Production Areas and STG Lek Sites, which were previously identified by CPW.

STG surveys were conducted April 9th and April 20th, 2020, which corresponded with the peak of STG male and hen attendance, which is April 1st through April 20th (Miller 1984, Schroeder and Braun 1992) and were conducted from 30 minutes prior to sunrise to 2 hours after sunrise. That period during the day is when STG are most active on leks (Schroeder and Braun 1992). The STG surveys were conducted on calm, clear mornings, as the booming sound produced by STG males can be audible for nearly 3-kilometers (km) (Hamerstrom and Hamerstrom 1973, Miller 1984, Schroeder and Braun 1992). If wind speeds exceeded 7-km/hour, surveys would have been discontinued and rerun on the next available day. For each STG survey route, the observer determined the presence of active lek sites by listening at the survey points along the route (Figure 1) and if detected would record compass directions for all audible leks. In order to compensate for potential "quiet" periods, and the influences of time-of-day upon booming, the route was completed in two directions. The STG survey results are presented in Table 1.

The April 9th, 2020 STG survey began at Survey Point 10, following the CPW prescribed survey protocol. The Quandary observer listened for STG booming for three minutes and proceeded along the survey route, again stopping for three minutes at each Survey Point until the end of the route at Survey Point 1. The Quandary observed, then re-traced the survey back to Survey point 10. No STG sounds or leks were observed, during the April 9th, 2019 survey.

The April 20th, 2020 STG survey began at Survey Point 10, following the CPW prescribed survey protocol. The Quandary observer listened for STG booming for three minutes and proceeded along the survey route, again stopping for three minutes at each Survey Point until the end of the route at Survey Point 1. The Quandary observer then re-traced the survey back to Survey point 10. STG calls were heard coming from the south while listening at Survey Point 4. One female and one male STG were observed as the observer was headed south along the survey route returning to the main transect

line. Once the survey was completed, the observer returned to the location where the STG were observed to confirm sexes and location. A second female STG was observed flying toward the first two STG, but landed on the other side of a hill and was not observed again. The two STG were observed for an hour following the survey to confirm observations. Display behavior was observed from the male STG. According to CPW protocol, leks are counted if three or more birds are detected on a site and display behavior is observed. In this situation, observations indicate the presence of a lek. Location of the lek is included in Figure 1.

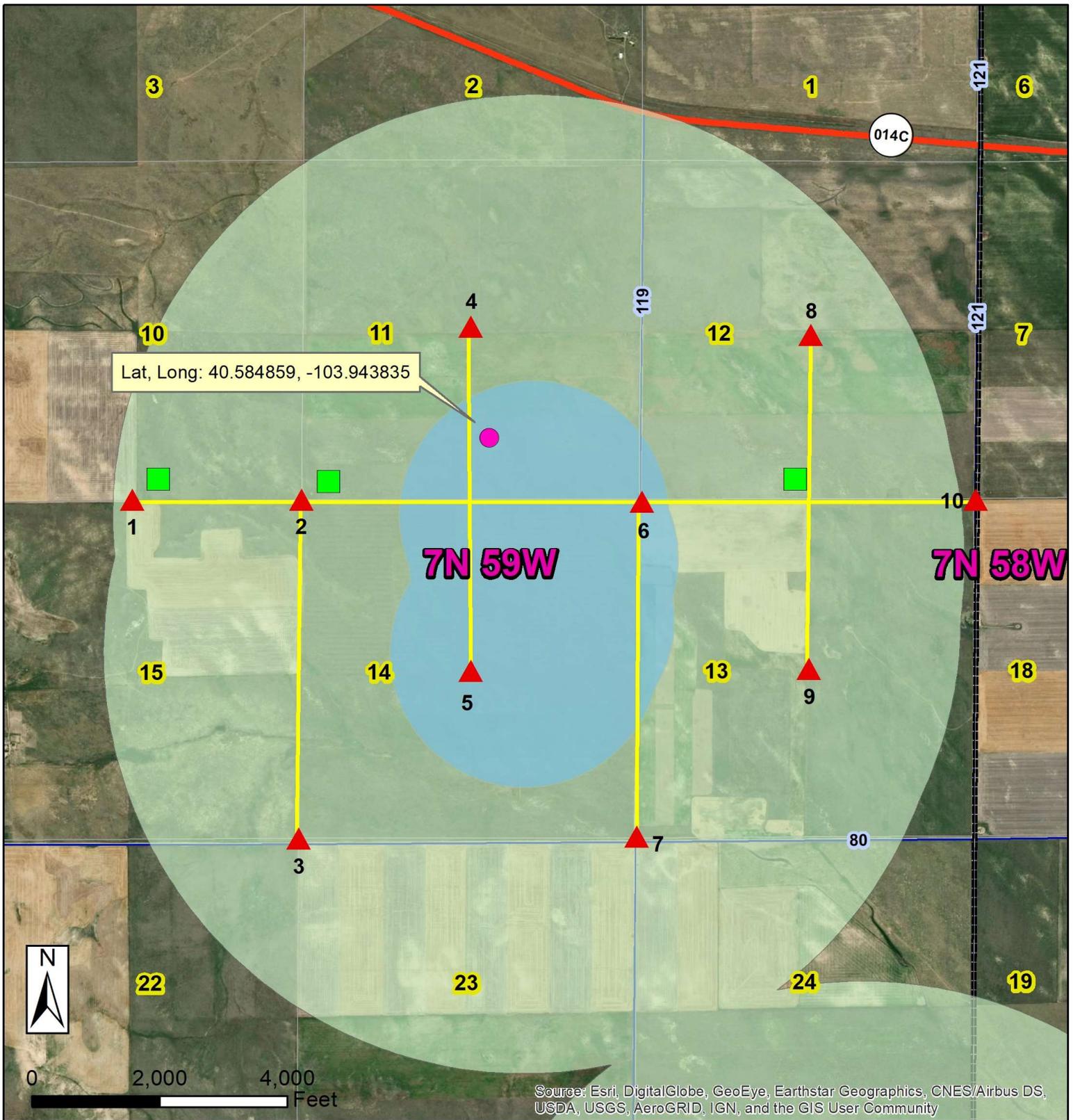
Table 1. Sharp-tailed Grouse Survey Results		
4/9/2020 STG Survey Results		
Survey Point	Survey Time (AM)	Survey Observation
1	6:57 and 7:01	No STG observed, no leks identified.
2	6:51 and 7:07	No STG observed, no leks identified.
3	6:45 and 7:13	No STG observed, no leks identified.
4	6:38 and 7:20	No STG observed, no leks identified.
5	6:32 and 7:26	No STG observed, no leks identified.
6	6:26 and 7:33	No STG observed, no leks identified.
7	6:19 and 7:40	No STG observed, no leks identified.
8	6:13 and 7:48	No STG observed, no leks identified.
9	6:06 and 7:55	No STG observed, no leks identified.
10	5:57 and 8:05	No STG observed, no leks identified.
4/20/2020 STG Survey Results		
Survey Point	Survey Time (AM)	Survey Observation
1	6:49 and 6:53	No STG observed, no leks identified.
2	6:42 and 6:59	No STG observed, no leks identified.
3	6:35 and 7:06	No STG observed, no leks identified.
4	6:27 and 7:12	One male and two females observed, lek identified.
5	6:20 and 7:23	No STG observed, no leks identified.
6	6:14 and 7:29	No STG observed, no leks identified.
7	6:07 and 7:35	No STG observed, no leks identified.
8	6:01 and 7:41	No STG observed, no leks identified.
9	5:55 and 7:48	No STG observed, no leks identified.
10	5:48 and 7:55	No STG observed, no leks identified.

In summary, one lek was identified during the survey that took place on the morning of April 20th, 2020. Quandary recommends coordinating with CPW regarding the presence of the lek and potential necessary actions. Additional surveys should be conducted prior to development to evaluate the presence of breeding STG. Please feel free to reach out with any questions you may have.

Thank you,



Erin Bailey
 Environmental Specialist
 Quandary Consultants, LLC



Lat, Long: 40.584859, -103.943835



0 2,000 4,000 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend	
●	Plains Sharp-tailed Grouse Lek Location 2020
■	Well Pad
▲	Survey Points
—	Plains Sharp-tailed Grouse Proposed Survey Route
■	Plains Sharp-tailed Grouse Production Areas
■	Plains Sharp-tailed Grouse Lek Sites
	PLSS Township/Range
	PLSS Sections
—	Highways
—	Local Roads

Sharp-tailed Grouse Proposed Survey Route	
Client: Morning Gun	
Author: Erin Bailey	Date 5/6/20
NAD 1983 UTM Zone 13N	
	QUANDARY CONSULTANTS