

April 26, 2019

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 15th, and April 18th, 2019. 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 previously identified by CPW, STG Production Areas, and STG Lek Sites, (Figure 1).

STG surveys were conducted April 15nd, and April 18th, 2019, 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 April 15th, 2019 STG survey began at Survey Point 10, following the CPW prescribed survey protocol. The Quandary observer listened for STG booming for 3-minutes, and proceeded along the survey route (Figure 1), again stopping for 3-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 15th, 2019 survey.

The April 18th, 2019 STG survey began at Survey Point 1, following the CPW prescribed survey protocol. The Quandary observer listened for STG booming for 3-minutes, and proceeded along the survey route (Figure 1), again stopping for 3-minutes at each Survey Point until the end of the route at Survey Point 10. The Quandary observed, then re-traced the survey back to Survey point 1. No STG sounds or leks were observed, during the April 18th, 2019 survey.

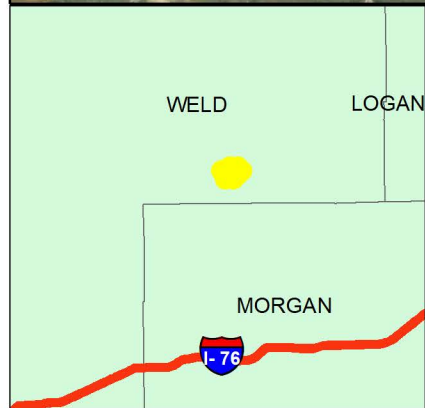
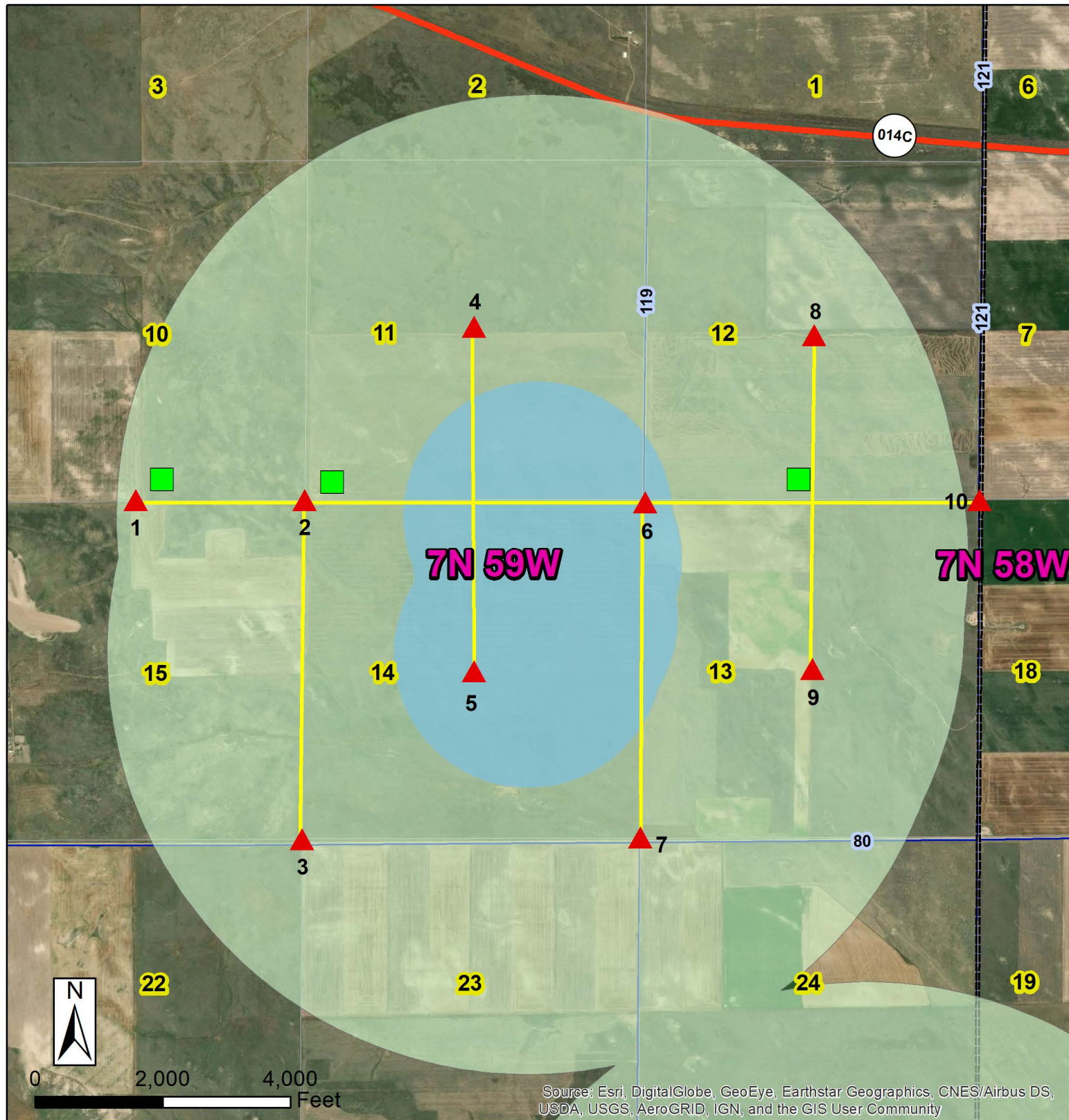
Once the STG survey route had been initially surveyed for leks, the leks (if identified) would be surveyed for the number of males, females, and total birds on each lek on subsequent days. Leks will be counted if three or more birds are identified on a site. This is similar to the criteria used by Schroeder and Braun (1992). No leks were identified during both the April 15th and April 18th, 2019 STG surveys.

The STG survey results are presented in Table 1. Sharp-tailed Grouse Survey Results.

Table 1. Sharp-tailed Grouse Survey Results		
4/15/2019 STG Survey Results		
Survey Point	Survey Time (AM)	Survey Observation
1	6:46 and 6:49	No STG observed, no leks identified.
2	6:40 and 6:54	No STG observed, no leks identified.
3	6:33 and 7:03	No STG observed, no leks identified.
4	6:25 and 7:10	No STG observed, no leks identified.
5	6:18 and 7:17	No STG observed, no leks identified.
6	6:12 and 7:23	No STG observed, no leks identified.
7	6:06 and 7:30	No STG observed, no leks identified.
8	5:58 and 7:38	No STG observed, no leks identified.
9	5:51 and 7:45	No STG observed, no leks identified.
10	5:45 and 7:53	No STG observed, no leks identified.
4/18/2019 STG Survey Results		
Survey Point	Survey Time (AM)	Survey Observation
1	5:50 and 8:08	No STG observed, no leks identified.
2	5:56 and 8:02	No STG observed, no leks identified.
3	6:05 and 7:54	No STG observed, no leks identified.
4	6:12 and 7:44	No STG observed, no leks identified.
5	6:18 and 7:37	No STG observed, no leks identified.
6	6:25 and 7:30	No STG observed, no leks identified.
7	6:34 and 7:24	No STG observed, no leks identified.
8	6:43 and 7:16	No STG observed, no leks identified.
9	6:52 and 7:10	No STG observed, no leks identified.
10	7:00 and 7:03	No STG observed, no leks identified.



Matt Harrison
Co-Founder
Quandary Consultants, LLC.



Legend

- Well Pad
- ▲ Survey Points
- Sharp-tailed Grouse Proposed Survey Route
- Plains Sharp Tailed Grouse Production Areas
- Plains SharpTailed Grouse Lek Sites
- Highways
- Local Roads
- PLSS Sections
- PLSS Township/Range

Sharp-tailed Grouse Proposed Survey Route

Client: Morning Gun

Author: Caroline Martin Date 4/3/19

NAD 1983 UTM Zone 13N

