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MEMORANDUM

State of Alaska

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SUBJECT: GMU 2 Wolf Population Estimate Update, autumn 2016

Since 2012, the Alaska Department of Fish and Game (ADF&G) and the U.S. Forest Service (USFS) have collaborated on new procedures for estimating abundance of the wolf population in Game Management Unit (GMU) 2 (Figure 1) using a DNA-based technique (ADF&G 2014, Flynn et al. 2014, Roffler et al. 2015, Roffler 2016, Roffler et al. 2016). We collected DNA from hair follicles using hair traps in northcentral Prince of Wales Island (POW) during autumn 2012–2016. Individual wolves were identified via genotyping which enables the estimation of wolf densities using a spatially-explicit capture-recapture technique (SECR; Efford et al. 2004). This method requires multiple recaptures of individual wolves in different locations.

Since the pilot study year in 2012, we have made improvements to the hair sampling method including reducing the time interval between station checks, monitoring the stations for a longer period of time, improving field equipment and procedures, implementing a genotyping screening protocol, increasing the density of hair trap stations in the study area, and increasing the overall size of the area sampled. During autumn 2016, we collaborated with the Hydaburg Cooperative Association (HCA) to establish hair trap stations for wolf monitoring on POW, effectively further expanding the study area (Figure 1).

2016 Wolf Density Estimates

We used SECR models to estimate the density and population size of wolves in our study area and in GMU 2 (Figure 1). The density estimate from the autumn 2016 top-ranked SECR model was 25.5 ± 3.1 wolves/1,000 km^2, 95% CI [20.2–32.3 wolves/1,000 km^2], CV = 0.12. Using this density estimate to predict the number of wolves in the study area (5,425 km^2, representing 60% of the entire GMU 2) resulted in an estimate of 141.9 ± 11.6 wolves, 95% CI [123.0–169.2], CV = 0.08 and an autumn 2016 population size for GMU 2 of 231.3 ± 23.5 wolves, 95% CI [191.8–284.7], CV = 0.10 (Table 1, Figure 2). Based on the non-overlapping 95% confidence intervals for the 2015 and 2016 estimates on the original log scale, this estimate is significantly higher than the autumn 2015 density estimate of 11.9 ± 2.7 wolves/1,000 km^2, 95% CI [7.7–18.5], and a GMU 2 population size of 107.5 wolves, 95% CI [69–167] (Roffler 2016; Table 1, Figure 2).

In autumn 2016 we established an array of hair trap stations throughout the expanded northcentral POW study area used during 2014–2015, adding one additional station for a total of 83 stations. Stations were monitored weekly during 17 October–23 December 2016 by 5 ADF&G, USFS, and Nature Conservancy (TNC) field crew staff. We collected 909 hair samples at 73 (88%) of the 83 stations. The HCA established 61 stations to the south of the 2012–2015 study area (Fig. 1). Stations were monitored weekly by 3 HCA field crew staff during 24 October–24 December 2016. They collected 171 hair samples at 49 (80%) of the 61 stations. In addition, 5 hair snare stations were established and monitored by citizen science volunteers (POW public school teachers, students, and other community members) in an area adjacent to the northcentral POW study area, and overlapping with the HCA study area. They collected 17 hair samples at 4 (80%) of the 5 stations.

After removing hair samples identified as originating from black bears, DNA from 956 hair samples was extracted. Of these, 296 standard hair extracts (≥10 hairs) and 18 single-hair extracts were suitable for individual identification. A total of 306 hair sample extracts (288 standard hair extracts and 18 single-hair extracts) amplified with wolf alleles, providing individual genotypes of 80 wolves (39 females, 39 males, and 2 undetermined sex). Fifty-eight individual wolves were detected at the hair trap stations monitored by ADF&G, USFS, and TNC, and 24 individual wolves were detected at the stations monitored by the HCA. Two individual wolves were detected at hair trap stations monitored by citizen science volunteers. Of these wolves, 3 were detected in multiple monitoring areas during the study period, bringing the total number of unique wolves identified across the study area to 80. Similar to the previous years, the proportion of females in the 2016 captures was 0.44 ± 0.06. We summarized the capture statistics (Table 2) and the number of detections (Table 3) for the 2016 survey. Eight wolves detected from hair collected at hair traps were subsequently harvested during the study period. One trapper declined to provide tissue samples from 9 wolves that he trapped during the study period, so it is unknown whether any of those wolves were detected at hair snare stations.

Recommendations

The current guideline harvest level (GHL) in ADF&G regulation requires that harvest of Unit 2 wolves not exceed 20% of the most recent population estimate. This conservative GHL was

adopted by the Alaska Board of Game prior to the RY2015 season with the goal of reversing a decline in this population. To account for potential unreported human-caused mortality, during RY2015 and RY2016, 50% of the GHL was withheld from the harvest quotas. Because the population has substantially grown, during the RY2017 season we believe it can support harvest of the full GHL.

Ongoing and Future Research

ADF&G's research efforts will include collecting wolf tissue samples for diet and genetic analyses and monitoring reproductive activity. We are also continuing to assess the effectiveness of our population estimation technique and refine our approach for continued monitoring of wolves in GMU 2 and in other Southeast Alaskan locations.

Figure 1. The wolf population estimation study area (5,423 km^2, shown in gray) used during autumn, 2016 in Game Management Unit 2. Hair snare stations in the 2014–2015 study area are shown as black triangles, new hair snare stations established in the extended 2016 study area are shown as green circles, and citizen science hair snare stations are shown as red diamonds.

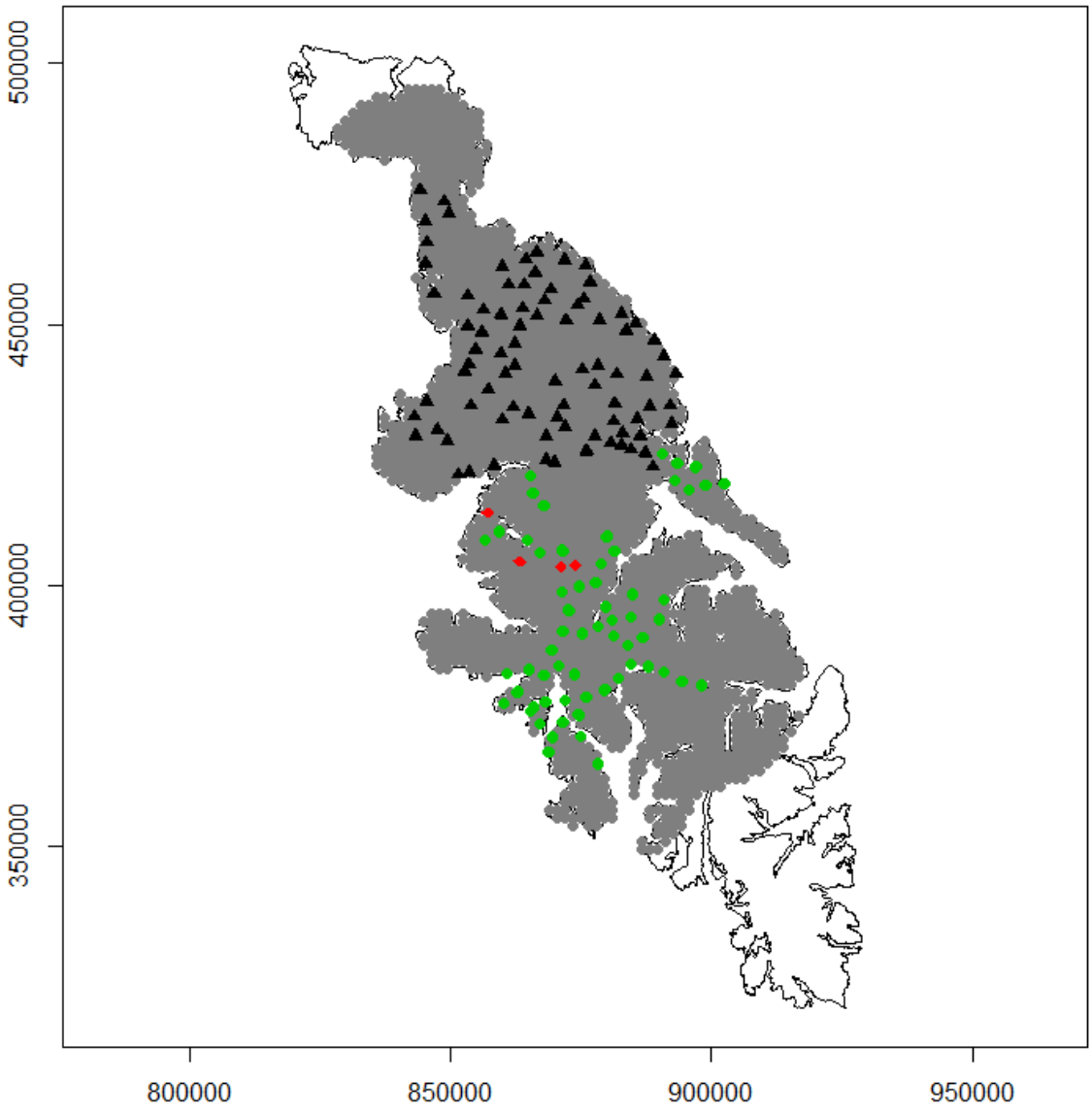

Figure 2. Violin plot of autumn wolf population estimates during 2013–2016 for Game Management Unit 2. White dots represent the point estimates used for managing harvest, black bars represent the 95% confidence intervals, and violin plots (grey shapes) represent the probability density of the population estimates. Wider horizontal ranges are associated with more likely values of the population estimate. The point estimates for each year are located at the widest portion of their respective violin plot.

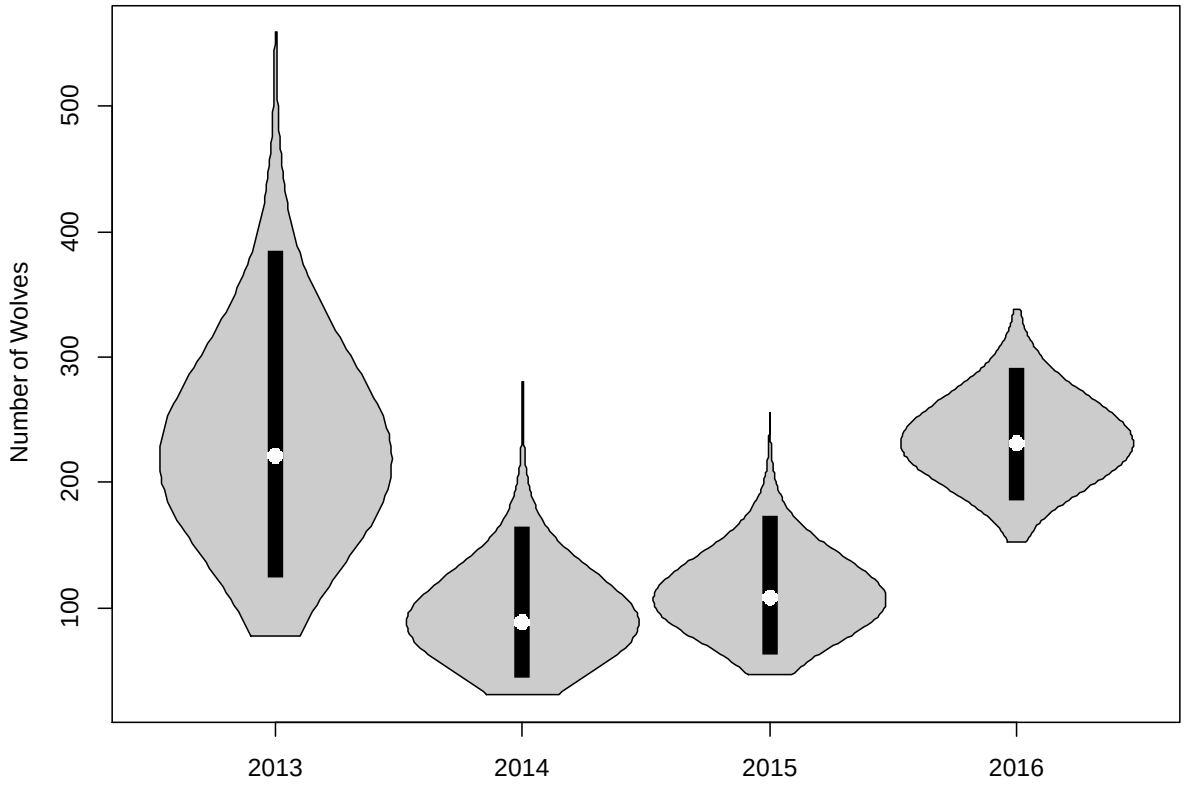

Table 1. Autumn wolf population estimate and 95% confidence intervals (CIs) during 2013–2016 for Game Management Unit 2.

Year	Population estimate	95% CIs
2013	221	130–378
2014	89	50–159
2015	108	69–167
2016	231	192–285

Table 2. Summary of 2016 capture effort.

Occasion	1	2	3	4	5	6	7	8	9	10	Total	Mean per occasion ± SD
Animals detected	17	15	13	17	8	15	12	13	22	13	145	14.5 ± 4.3
Unique animals detected	17	11	6	9	4	7	5	10	10	1	80	8.0 ± 2.6
Repeat detection frequency	48	13	10	5	3	1	0	0	0	0	80	
Cumulative detections	17	28	34	43	47	54	59	69	79	80	80	
Total detections	39	33	31	35	9	34	23	24	42	33	303	30.3 ± 4.5
Detectors visited	12	12	8	8	8	13	10	6	16	13	106	10.6 ± 3.1
Detectors used	82	144	141	145	146	144	146	132	144	121	1345	134.5 ± 6.0

Table 3**.** Summary of 2016 detection rate.

Occasion	1	2	3	4	5	6	7	8	9	10	Mean ± SD
Detection rate (detections/trap/100 trap days)	1.73	0.58	0.64	0.67	0.18	0.68	0.43	0.63	0.74	0.94	0.72 ± 0.41
Detection rate (unique animals/trap/100 trap days)	0.76	0.19	0.12	0.17	0.08	0.14	0.09	0.26	0.18	0.03	0.20 ± 0.21

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