MEMORANDUM

State of Alaska

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SUBJECT: GMU 2 Wolf Population Estimate Update, fall 2020

Since 2013, the Alaska Department of Fish and Game (ADF&G) has estimated the size of the fall Game Management Unit (GMU) 2 wolf population (Fig. 1) using a DNA-based mark-recapture technique (Roffler 2016, 2017, 2018; Roffler et al. 2016, Roffler et al. 2019). Each fall we collect wolf hair using an array of scented hair traps distributed throughout northcentral Prince of Wales Island (POW). Individual wolves are identified via genotyping DNA extracted from hair follicles. Those individual IDs along with dates and locations where individual wolves were detected are used to calculate a population estimate using a spatially-explicit capture-recapture model (SECR; Efford et al. 2004). This method requires detecting some individual wolves more than once in different locations (Fig. 2). Since 2016 the Hydaburg Cooperative Association (HCA) has collaborated with ADF&G and the U. S. Forest Service (USFS) to establish their own network of hair traps (Fig. 1). HCA donates samples they collect to ADF&G and those samples contribute toward ADF&G's annual GMU 2 wolf population estimates.

Fieldwork, lab work, and calculating each year's estimate takes 8-10 months, so each year's estimate is used to inform harvest management in the following year. For example, the estimate from fall 2020 is the most recent estimate and was used to inform GMU 2 wolf harvest management during the fall 2021 hunting and trapping seasons. Trapping and hunting season lengths are set to allow sufficient harvest opportunity to maintain the fall GMU 2 wolf population within the objective range of 150-200 wolves as set by the Alaska Board of Game.

Fall 2020 Wolf Density Estimate

In fall 2020 we established an array of 84 nodes consisting of 5 hair boards each for a total of 420 scented hair boards, throughout the POW study area used during 2014–2019 field seasons (Fig. 1). Nodes were monitored weekly from 28 September–11 December 2020 by ADF&G and USFS staff. HCA established 49 nodes with a total of 245 hair boards in the same area monitored from 2016–2019 south of the ADF&G study area (Fig. 1). HCA also monitored nodes weekly from 28 September–11 December 2020.

During fall 2020 ADF&G and HCA collected a total of 1,010 hair samples (Table 1). After removing 189 samples from species other than canid, we tested 827 samples for individual identification using a panel of 15 microsatellite loci. From the 827 samples tested, we obtained genotypes to identify individual wolves from 364 of the samples, 74 samples were mixtures of two or more individuals, and 389 failed to genotype. When initial testing indicates a mixed sample (hairs from two or more individuals), the lab selects single hairs for DNA extraction. We tested 144 single hair extractions and obtained an additional 34 individual genotypes. In addition to hair, we collected tissue samples from 64 wolves harvested and sealed in GMU 2. All produced individual identifications, and 16 of the harvested wolves were previously detected at hair boards during the 2013–2020 field seasons. In total during fall 2020 we detected 134 individual wolves a total of 210 times (Table 1). The fall 2020 GMU 2 wolf population estimate was calculated using those data.

We detected 88 fewer unique individual wolves in 2020 (134) than in 2019 (222). The number of unique wolves detected at hair boards was similar in both years, so this difference primarily resulted from the higher number of wolves detected through trapper harvest in 2019 (Table 1). More unique wolves were detected through trapping in 2019 because the trapping season was open for 2 months compared to only 3 weeks in 2020. Consequently, the lower number of unique wolves detected in 2020 does not suggest a population decline.

We used SECR models to estimate the density and population size of wolves in our area of analysis (6,843 km^2, 75% of GMU 2) and in GMU 2 (Fig. 1). The fall 2020 density estimate produced by the top-ranked SECR model was 44.0 ± 4.8 wolves/1,000 km^2, 95% CI [35.5–54.5 wolves/1,000 km^2], CV = 0.109. Using this density estimate to predict the number of wolves in the area of analysis resulted in an estimate of 301.5 ± 28.2 wolves, 95% CI [253.2–364.6], and a fall 2020 population estimate for GMU 2 of 385.6 ± 38.2 wolves, 95% CI [320.7–471.6] (Table 2, Fig. 3). The fall 2019 density estimate was 35.0 ± 4.1 wolves/1,000 km^2, 95% CI [27.7–44.1 wolves/1,000 km^2], which produced an estimated GMU 2 population size of 315.9 wolves, 95% CI [250.0–398.1] (Roffler 2018; Table 2, Fig. 3). The fall 2019 and fall 2020 population estimates are statistically indistinguishable suggesting that the GMU 2 wolf population is stable.

Ongoing and Future Research

ADF&G's research efforts will continue collecting tissue samples from harvested wolves for diet and genetic analyses. We have also requested that hunters and trappers donate wolf foreleg bones to document the age structure of the harvested wolves and continue to encourage hunters and trappers to provide precise dates and locations of harvest. ADF&G will continue to assess and improve our population estimation technique. Beginning in fall 2021 ADF&G and the University of Alaska Fairbanks Cooperative Wildlife Research Unit are collaborating to support a PhD student who will evaluate camera-based methods of estimating wolf abundance in GMU 2.

Figure 1. The wolf population area of analysis (6,843 km^2) and hair trap stations used during fall 2020 in Game Management Unit 2.

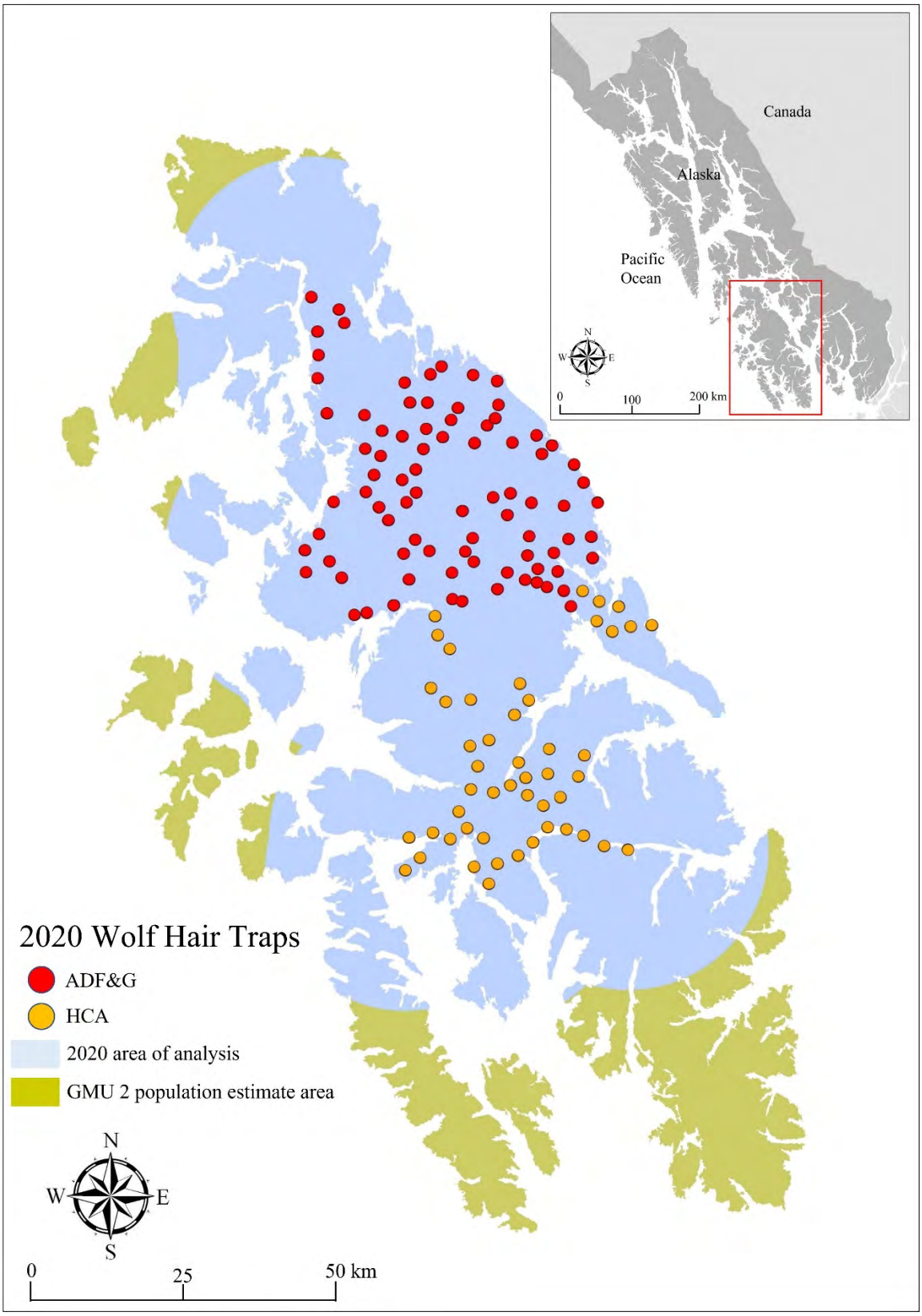

Figure 2. Number of times an individual wolf was detected at either a hair board or from harvest during fall 2020 in Game Management Unit 2. For example, 76 wolves were detected once, 18 wolves twice, and so on.

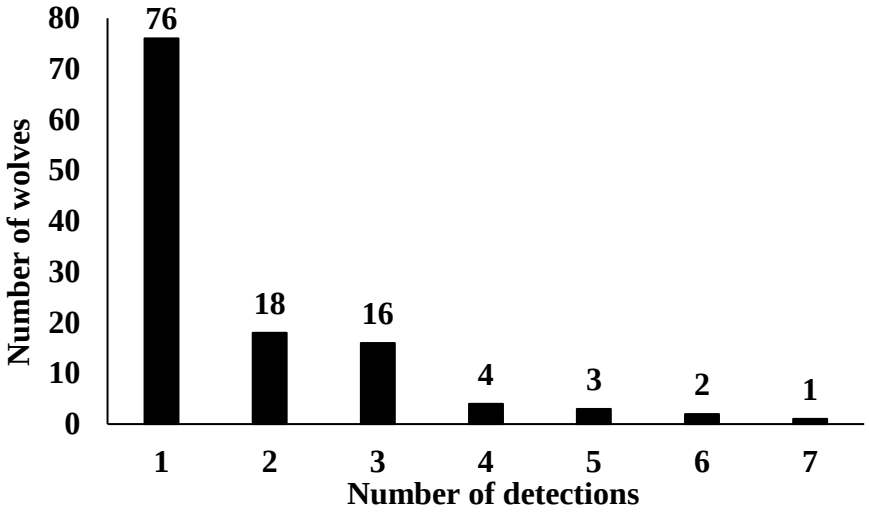

Figure 3. Violin plot of fall wolf population estimates during 2013–2020 for Game Management Unit 2. White dots represent the point estimates used for managing harvest, black bars represent the 95% confidence intervals, and violin plots (grey shapes) represent the probability density of the population 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.

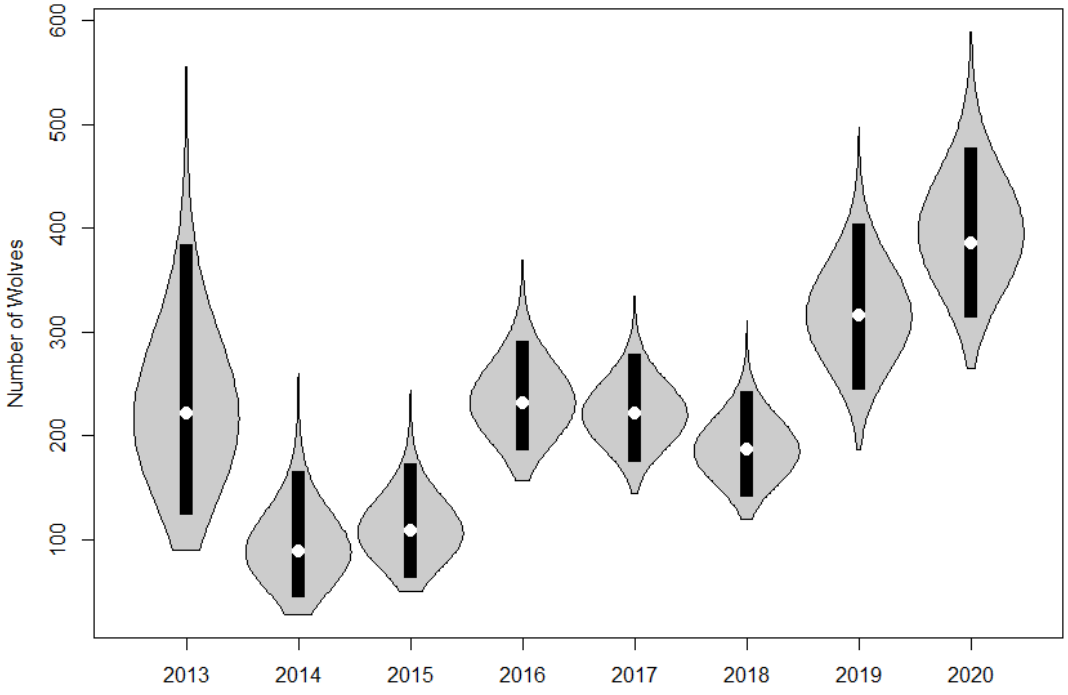

Table 1. Samples collected and genotyped for fall 2019 and 2020 Game Management Unit 2 wolf population estimates.

Samples	2019	2020
Hair collected from hair boards	807	1,010
Hair identified as canid	584	827
Hair successfully genotyped	385	398
Individual wolves identified from hair	93	86
Tissue collected from individual harvested wolves	164	64
Individual genotypes identified from harvested wolves	163[a]	64[a]
Harvested wolves detected during previous seasons	34	16
New wolves detected through harvest	129	48
Total individual wolves detected	222[a]	134[a]

[a] The high number of unique individual wolves detected in 2019 compared to 2020 primarily resulted from a longer 2019 trapping season (8 weeks) and greater trapper harvest than in 2020 (3 weeks).

Table 2. Fall wolf population estimate and 95% confidence intervals (CIs) during 2013–2020 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
2017	225	198–264
2018	187	147–236
2019	316	250–398
2020	386	321–472

Literature Cited

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This and earlier GMU 2 wolf survey memos can be found on ADF&G's website at: https://www.adfg.alaska.gov/index.cfm?adfg=wolf.resources