MEMORANDUM

State of Alaska
Department of Fish and Game
Division of Wildlife Conservation

TO: Tom Schumacher
Regional Supervisor
Division of Wildlife Conservation
Douglas

DATE: 11 October 2023
TELEPHONE: 465-4265
FAX: 465-4272

FROM: Ross Dorendorf
Area Management Biologist
Division of Wildlife Conservation
Ketchikan

SUBJECT: GMU 2 Wolf Population Estimate and Management Update

---

Since 2013, the Alaska Department of Fish and Game (ADF&G) has estimated the size of the fall preharvest Game Management Unit (GMU) 2 wolf population (Fig. 1) using a DNA-based spatially-explicit capture-recapture technique (SECR; Efford et al. 2004, Roffler et al. 2016, Roffler et al. 2019). Each fall (late September – mid-December) ADF&G and cooperators collect wolf hair using an array of scented hair boards distributed throughout northern and central Prince of Wales Island and two outer islands (Sukkwan and Goat). Individual wolves are identified via genotyping DNA extracted from hair follicles. Because fieldwork coincides with wolf hunting and trapping seasons, samples from harvested wolves also contribute to the population estimate. Individual wolf IDs along with dates and locations where each wolf was detected or harvested are used to calculate the estimate. This method requires detecting some individual wolves more than once in different locations. The U. S. Forest Service (USFS) has collaborated on this project since 2013. In 2016 the Hydaburg Cooperative Association (HCA) joined the effort and began operating their own hair board lines, expanding the total study area by 42% (Fig. 1).

Fieldwork, lab work, and calculating each year's population estimate takes about 10 months, so each year's estimate is used to inform harvest management in the following year. For example, the fall 2022 estimate is the most recent estimate and informs GMU 2 wolf harvest management during the fall 2023 hunting and trapping seasons. Each year ADF&G and USFS, which manages federal subsistence seasons, establish hunting and trapping season closure dates that allow significant harvest opportunity while ensuring the population remains sustainable.

Fall 2022 Wolf Density Estimate

In fall 2022 ADF&G established an array of 83 nodes consisting of 5 hair boards each for a total of 415 hair boards throughout the same POW study area used during 2014–2021 field seasons (Fig. 1). Nodes were monitored weekly from 26 September–9 December 2022 by ADF&G and USFS staff. HCA established 57 additional nodes with a total of 285 hair boards in the same area monitored from 2016–

2022 south of the ADF&G study area (Fig. 1). HCA monitored nodes weekly from 1 October to 15 December 2022.

During fall 2022 ADF&G, HCA, and the USFS collected a total of 837 hair samples (Table 1). After removing 324 non-canid samples, we tested 513 samples for individual identification using a panel of 15 microsatellite loci. From the 513 samples tested, we obtained genotypes to identify individual wolves from 244 of the samples, 91 samples were mixtures of two or more individuals, and 178 failed to genotype. When initial testing indicates a mixed sample (hairs from two or more individuals), the lab geneticists select single hairs for DNA extraction. We conducted 181 single hair extractions and obtained an additional 74 individual genotypes. Thirty-one individuals were previously identified through initial genotyping, and 6 new individuals were detected. In addition to hair, we collected tissue samples from 62 wolves harvested and sealed in GMU 2. All produced individual identifications, and 9 of the harvested wolves were previously detected at hair boards during the 2013–2022 field seasons. In total during fall 2022 we detected 123 individual wolves (Table 1). The fall 2022 GMU 2 wolf population estimate was calculated using those data.

We used SECR models to estimate the preharvest density and population size of wolves in our area of analysis (7,782 km^2, 86% of GMU 2) and for all of GMU 2 (9,025 km^2) (Fig. 1). The fall 2022 density estimate produced by the top-ranked SECR model was 28.7 ± 3.6 wolves/1,000 km^2, 95% CI [22.5–36.6 wolves/1,000 km^2], CV = 0.125. Using this density estimate to predict the number of wolves in GMU 2 resulted in a fall 2022 unit-wide population estimate of 259.0 ± 32.5 wolves, 95% CI [203.1–330.3] (Table 2, Fig. 2). For comparison, the fall 2021 density estimate was 29.9 ± 3.3 wolves/1,000 km^2, 95% CI [26.6–33.2 wolves/1,000 km^2], which produced an estimated GMU 2 population size of 268.0 wolves, 95% CI [216.2–332.3] (Table 2, Fig. 2). The fall 2021 and fall 2022 population estimates are not statistically different.

Interpreting Estimates for Harvest Management

For fall 2022 ADF&G estimated the preharvest GMU 2 population to be 259 wolves with high confidence that the true population size was within the range of 203 to 330 wolves (95% confidence interval). The point estimate (259) is the value most likely to be correct given the data collected that year. However, the true number of wolves is likely to be somewhat higher or lower than each year's point estimate, so ADF&G encourages the public to focus on trends over several years, rather than on year-to-year changes in point estimates. Recent estimates indicate the population is stable and that harvest is sustainably managed (Fig. 2).

In GMU 2 most wolves are harvested by trapping, so harvest management focuses on annually varying trapping opportunity. Determining an amount of trapping opportunity that will result in sustainable harvest involves considering recent population estimates, trends in trapper participation, documented harvest rates, public observations, and regulatory guidance. Harvest rate, the number of wolves harvested per day of trapping season, is related to trapping effort, trapping conditions, and wolf abundance. Since initiating the current harvest management strategy in 2019, harvest rate for GMU 2 wolves has ranged from 2.0 to 3.2 wolves/day and averaged 2.5 wolves/day. Assuming an average harvest rate in 2023, managers predict that one month (31 days) of trapping opportunity is likely to result in harvest of about 78 wolves (31 days × 2.5 wolves/day = 78). However, managers recognize that the range of harvest rates documented in GMU 2 could also produce a harvest ranging from 62 to 99

wolves. Sustainability of the population is unlikely to be affected by harvest in a single year, so for 2023 managers consider harvest within that range acceptable.

ESA Decision Summary

A 2020 petition submitted to the U.S. Fish and Wildlife Service (USFWS) by the Center for Biological Diversity, Alaska Rainforest Defenders, and Defenders of Wildlife proposed listing wolves in Southeast Alaska (GMUs 1, 2, 3, and 5A) under the Endangered Species Act (ESA) and designating critical habitat for the population. This was the third petition in the last 30 years to list wolves in Southeast Alaska as threatened or endangered. Specifically, this petition asked the USFWS to designate Southeast wolves as a Distinct Population Segment (DPS) separate from wolves in coastal British Columbia and to consider the Alaska DPS for listing. Alternatively, the petition asked that Southeast wolves be evaluated for listing, where Southeast Alaska constitutes a significant portion of the total range. Threats to wolves listed in the petition included logging and road development; legal and illegal trapping and hunting; the effects of climate change; and loss of genetic diversity and inbreeding depression.

In August 2023 the USFWS determined that the Alaska portion of the Alexander Archipelago wolf population qualified as a DPS but that no portion of the Alaska DPS warranted listing at this time. However, the decision specifically noted that while some of the identified threats to wolves were present in other parts of Southeast, all threats are present in GMU 2.

GMU 2 Wolf Population Objective

The current fall population objective of 150-200 wolves was set by the Alaska Board of Game at their January 2019 meeting. The purpose of the objective is to provide ADF&G with a sustainable management goal for the population. When setting the objective, the Board referenced population estimates from 2013-2017. Several indicators now suggest estimates from 2014 and 2015 may have been biased low. If those estimates were biased low, the population objective may need to be reassessed for long-term sustainability. ADF&G is investigating this question.

Recent findings also indicate the GMU 2 population is mostly reproductively isolated from adjacent wolf populations and has low genetic diversity, which potentially elevates the risk of inbreeding depression (Zarn 2019). ADF&G plans to use data from ongoing and planned research to model the effects of varying population size and gene flow to evaluate whether the current population objective is likely to maintain a sustainably harvestable population or if changes are needed. Until more is known, particularly about the degree of isolation and potential for inbreeding depression, ADF&G is managing for sustainable harvest opportunity while conserving existing genetic diversity by maintaining a population somewhat higher than the objective in regulation. At their January 2023 meeting in Ketchikan the Board of Game concurred with this approach.

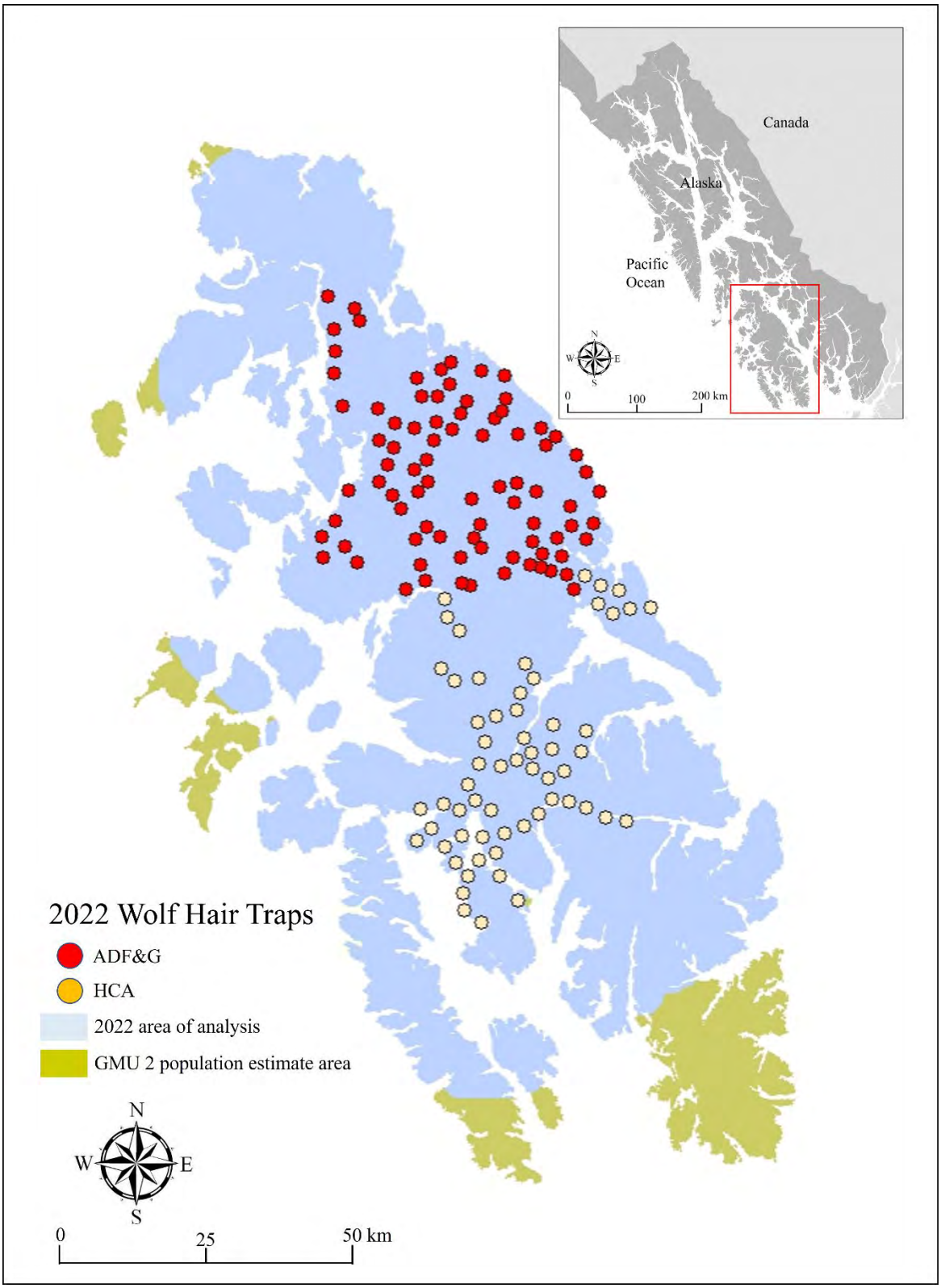

Figure 1. The wolf population area of analysis (7,782 km^2) and hair board stations used during fall 2022 in Game Management Unit 2 (9,025 km^2).

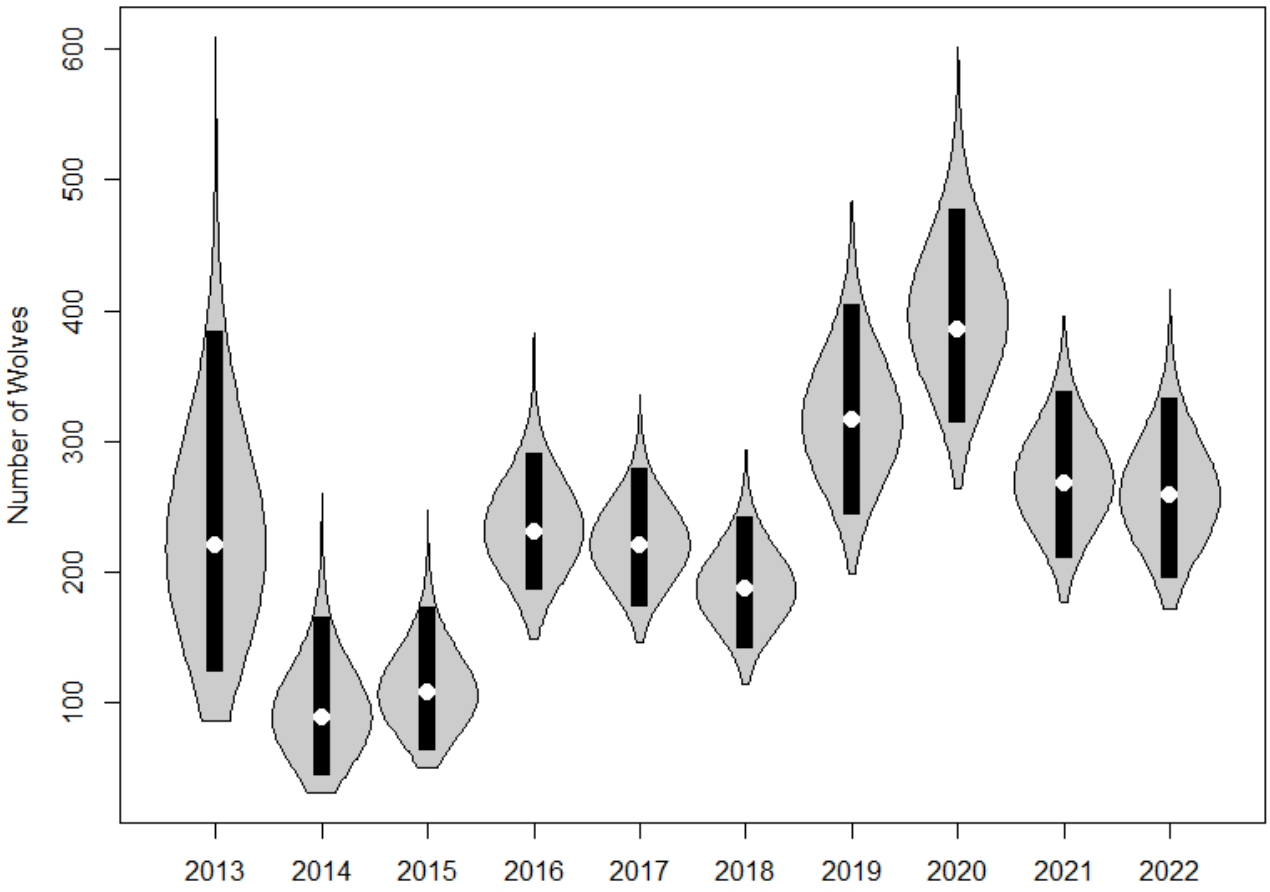

Figure 2. Violin plot of fall wolf population estimates during 2013–2022 for Game Management Unit 2. White dot = point estimate, black bar = 95% confidence interval, width of gray shaded area = likelihood a value is the true population size based on available data.

Table 1. Samples collected and genotyped for fall 2020, 2021, and 2022 Game Management Unit 2 wolf population estimates.

Samples	2020	2021	2022
Hair collected from hair boards	1,010	1,317	837
Hair identified as canid	827	804	487
Hair successfully genotyped	398	435	318
Individual wolves identified from hair	86	70	70
Tissue collected from individual harvested wolves	64	64	62
Individual genotypes identified from harvested wolves	64	64	62
Harvested wolves detected during previous seasons	16	12	9
New wolves detected through harvest	48	52	53
Total individual wolves detected	134	122	123

Table 2. Fall wolf population estimate and 95% confidence intervals (CIs) during 2013–2022 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
2021	268	216–332
2022	259	203–330

Literature Cited

Efford, M. G, D. K. Dawson, and C. S. Robbins. 2004. DENSITY: software for analysing capture-recapture data from passive detector arrays. Animal Biodiversity and Conservation 27:217–228.

Roffler, G. H., J. N. Waite, R. W. Flynn, K. R. Larson, and B. D. Logan. 2016. Wolf population estimation on Prince of Wales Island, Southeast Alaska: A comparison of methods. Alaska Department of Fish and Game, Final Wildlife Research Report ADF&G/DWC/WRR-2016-1, Juneau, Alaska.

Roffler, G. H., J. N. Waite, K. L. Pilgrim, K. E. Zarn, and M. K. Schwartz. 2019. Estimating abundance of a cryptic social carnivore using spatially explicit capture-recapture. Wildlife Society Bulletin 43:31-41.

Zarn, K. E. 2019. Genomic inference of inbreeding in Alexander Archipelago Wolves (Canis lupus ligoni) on Prince of Wales Island, Southeast Alaska. Master's Thesis, University of Montana.

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