MEMORANDUM

State of Alaska

Department of Fish and Game
Division of Wildlife Conservation

TO: Anthony Crupi
Regional Supervisor
Division of Wildlife Conservation
Douglas

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TELEPHONE: 465-4348

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 (POW) Island and two outer islands (Sukkwan and Goat). Individual wolves are identified via DNA genotyping extracted from wolf 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, and 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 the annual estimate is used to inform harvest management in the following year. For example, the fall 2024 estimate is the most recent estimate and informs GMU 2 wolf harvest management during the fall 2025 hunting and trapping seasons. Each year ADF&G and USFS, which manages federal subsistence seasons, establish hunting and trapping season dates that allow significant harvest opportunity while ensuring the population remains sustainable.

Fall 2024 Wolf Density and Population Estimate

In fall 2024 ADF&G and USFS established an array of 97 nodes consisting of 5 hair boards each for a total of 485 hair boards throughout the same POW study area used during 2014–2023 field seasons (Fig. 1). HCA placed an additional 44 node array with 220 hair boards for a total of 141 nodes and 705 hair boards. Nodes were monitored weekly from 25 September–8 December 2024.

During fall 2024 ADF&G, USFS, HCA, and a volunteer collected a total of 1057 hair samples (Table 1). After removing 554 non-canid samples, we tested 503 samples for individual identification using a panel

of 15 microsatellite loci. From the 503 samples tested, we obtained genotypes to identify individual wolves from 416 of the samples. In addition to hair, we collected tissue samples from 74 wolves harvested and sealed in GMU 2. Of those, 71 produced individual wolf identifications, 22 of the harvested wolves were detected at hair boards, and 14 wolves were detected during the 2023 sampling session. In total, during fall 2024 we detected 104 individual wolves, 55 wolf genotypes collected at hair boards and 49 new wolf genotypes identified from harvested samples (Table 1). The fall 2024 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 (9,025 km^2, 100% of GMU 2) (Fig. 1). The fall 2024 density estimate produced by the weighted average SECR model was 27.1 ± 3.2 wolves/1,000 km^2, 95% CI [21.5–34.2 wolves/1,000 km^2], CV = 0.12. Using this density estimate to predict the number of wolves in GMU 2 resulted in a fall 2024 unit-wide population estimate of 244.9 ± 29.2 wolves, 95% CI [194.0–309.0] (Table 2, Fig. 2). For comparison, the fall 2023 density estimate was 26.3 ± 3.5 wolves/1,000 km^2, 95% CI [20.3–34.0 wolves/1,000 km^2], which produced an estimated GMU 2 population size of 237.7 wolves, 95% CI [183.7–307.5] (Table 2, Fig. 2).

Interpreting Estimates for Harvest Management

For fall 2024 ADF&G estimated the preharvest GMU 2 population to be 245 wolves with high confidence that the true population size was within the range of 194 to 309 wolves (95% confidence interval). The point estimate (245) is the value most likely to be correct given the data collected that year. Population estimates were similar from 2021–2024, suggesting a stable population of wolves in GMU 2. Stable estimates indicate that harvest is sustainable and the adaptive management strategy is working (Figure 2).

In GMU 2 most wolves are harvested by trapping, so harvest management focuses on annually regulating trapping opportunity. Determining an amount of trapping opportunity that will result in sustainable harvest involves considering recent population estimates, trends in trapper effort, documented harvest rates, 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 2.4 wolves/day. Assuming an average harvest rate in 2025, managers predict that one month (31 days) of trapping opportunity is likely to result in a harvest of 74 wolves. GMU 2 wolf management history suggests this level of harvest is sustainable.

GMU 2 Wolf Population Objective

At the 2026 Alaska Board of Game meeting, the board set the population objective for GMU 2 to 200–300 wolves. The purpose of the population objective is to provide ADF&G with a sustainable management goal for the population.

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 et al. 2025). ADF&G is using previously collected wolf genomic samples to model the effects of varying population size and gene flow. ADF&G management objective is to maintain a sustainably harvestable wolf population while conserving existing genetic diversity by maintaining a population within the objective.
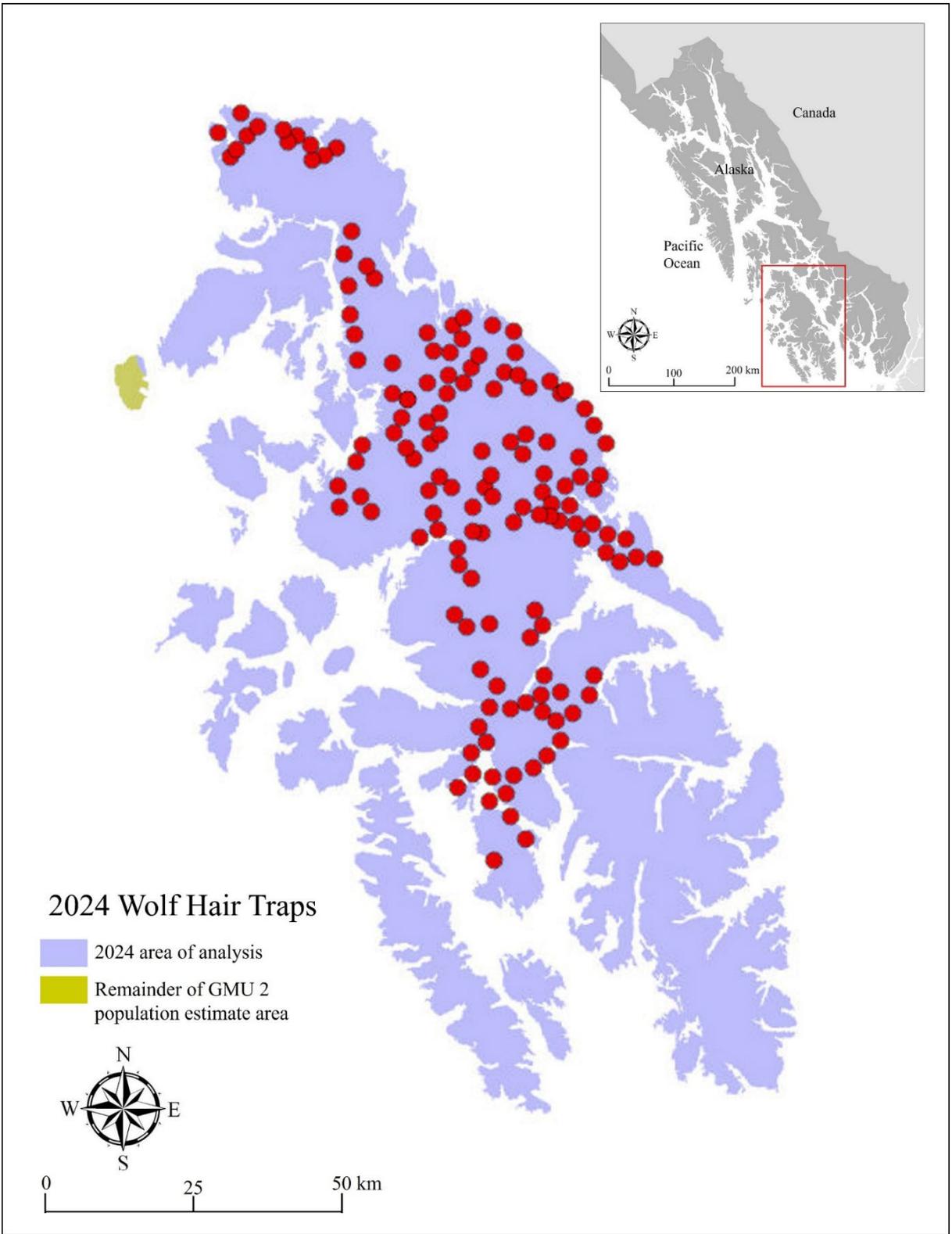
Figure 1. The wolf population area of analysis (9,025 km^2) and hair board stations used during fall 2024 in Game Management Unit 2 (9,025 km^2).
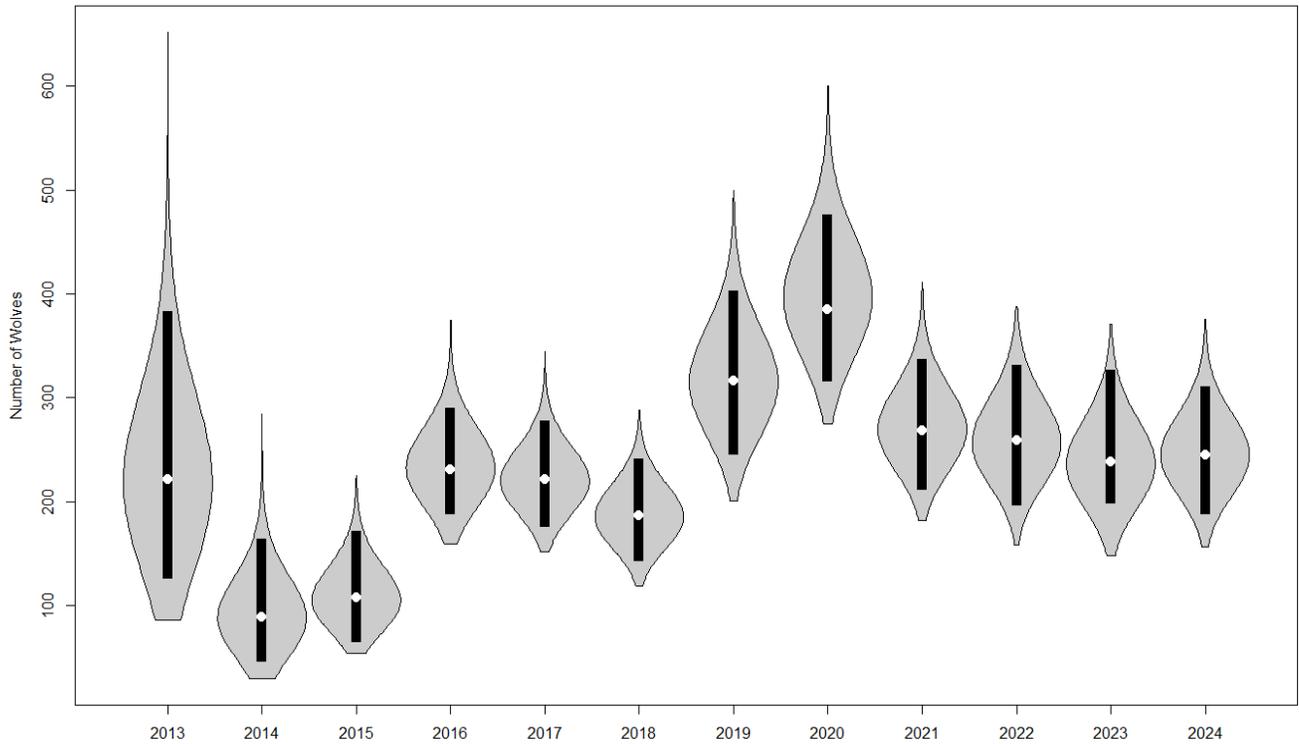
Figure 2. Violin plot of fall wolf population estimates during 2013–2024 for Game Management Unit 2. White dot = point estimate, black bar = 95% confidence interval, width of gray shaded area = likelihood a value is the true population size based on available data.

Table 1. Samples collected and genotyped for fall 2022, 2023, and 2024 Game Management Unit 2 wolf population estimates.

Samples	2022	2023	2024
Hair collected from hair boards	837	886	1,057
Hair identified as canid	487	419	503
Hair successfully genotyped	318	309	416
Individual wolves identified from hair	70	45	55
Tissue collected from individual harvested wolves	62	70	74
Individual genotypes identified from harvested wolves	62	68	71
Harvested wolves detected during previous season	9	14	14
New wolves detected through harvest	53	54	49
Total individual wolves detected	123	99	104

Table 2. Fall wolf population estimates and 95% confidence intervals (CIs) for Game Management Unit 2, 2013–2024.

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
2023	238	184–308
2024	245	194–309

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.

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Zarn, K. E., Roffler GH, Kardos M, Good JM, Vanderpool D, Wilcox T, and Schwartz MK. 2025. Genomic analysis reveals inbreeding in an island population of Alexander Archipelago wolves. Evolutionary Applications. DOI: 10.1111/eva.70144.

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