



## MEMORANDUM

## State of Alaska

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SUBJECT: GMU 2 Wolf  
Population Estimate  
Update, autumn 2015

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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 the wolf population in Game Management Unit (GMU) 2 (Fig. 1) using a DNA-based technique. We collected DNA from hair follicles using hair traps in northcentral Prince of Wales Island (POW) during autumn 2012–2015. 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.

## **2015 Wolf Density Estimates**

We used SECR models to estimate the density and population size of wolves in our study area and in GMU 2 (Fig. 1). The density estimate from the autumn 2015 top-ranked SECR model was  $11.9 \pm 2.7$  wolves/1,000 km<sup>2</sup>, 95% CI [7.7–18.5 wolves/1,000 km<sup>2</sup>], CV = 0.228 (Table 1). Using this density estimate to predict the number of wolves in the study area (3,280 km<sup>2</sup>, representing 36% of the entire GMU 2) resulted in an estimate of  $42.5 \pm 6.3$  wolves, 95% CI [33.7–59.6], and an autumn 2015 population size for GMU 2 of  $107.5 \pm 24.5$  wolves, 95% CI [69–167]. This estimate is significantly higher than the autumn 2014 estimate of 9.9 wolves/1,000 km<sup>2</sup>, 95% CI [5.5–17.7], and a GMU 2 population size of 89 wolves, 95% CI [50–159] (ADF&G 2014), assessed by generating bootstrapped 95% confidence intervals of the difference between the 2014 and 2015 estimates on the original log scale using 5,000 replications.

We established an array of hair trap stations throughout the same study area used in 2014, but increased the total number by 10 for a total of 82 stations. Stations were monitored weekly during 26 October – 23 December 2015 by 4 field crew staff. Wolves visited and left hair at 27 (33%) of the 82 stations. We collected 232 hair samples, 80% of which successfully amplified. Of the samples identified to the species/genus level, 74% were from canids, and the remainder from black bears or other non-target species. Using a panel of 10 microsatellite loci and DNA from hair samples collected on our hair trap array, we identified 24 unique individual wolves (Table 2). Similar to the previous year, the proportion of females in the captures in 2015 was  $0.58 \pm 0.11$  (Table 1). We summarized the capture statistics (Table 2) and the number of detections (Table 3) for the 2015 survey.

## **Recommendations**

Current regulations require that harvest not exceed 20% of the most recent estimate. For the 2016-2017 harvest season, ADF&G and the U.S. Forest Service established the harvest quota at 20% of the 2015 autumn estimate minus a 50 percent reduction to account for any other human-caused mortality for a quota of 11 wolves. Future research efforts include collecting wolf samples for diet and genetic analyses, monitoring reproductive activity, and collaborating with the Hydaburg Cooperative Association to establish hair trap stations for wolf monitoring on POW during autumn 2016, effectively further expanding the study area. We are 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. Additional information concerning the GMU 2 wolf abundance estimates is available in a final wildlife research report WRR-2016-1 published in February 2016 (Roffler et al. 2016)

Figure 1. Game Management Unit 2 showing the wolf population research study area used in 2015 (3,280 km<sup>2</sup>), and the prediction area (9,025 km<sup>2</sup>).

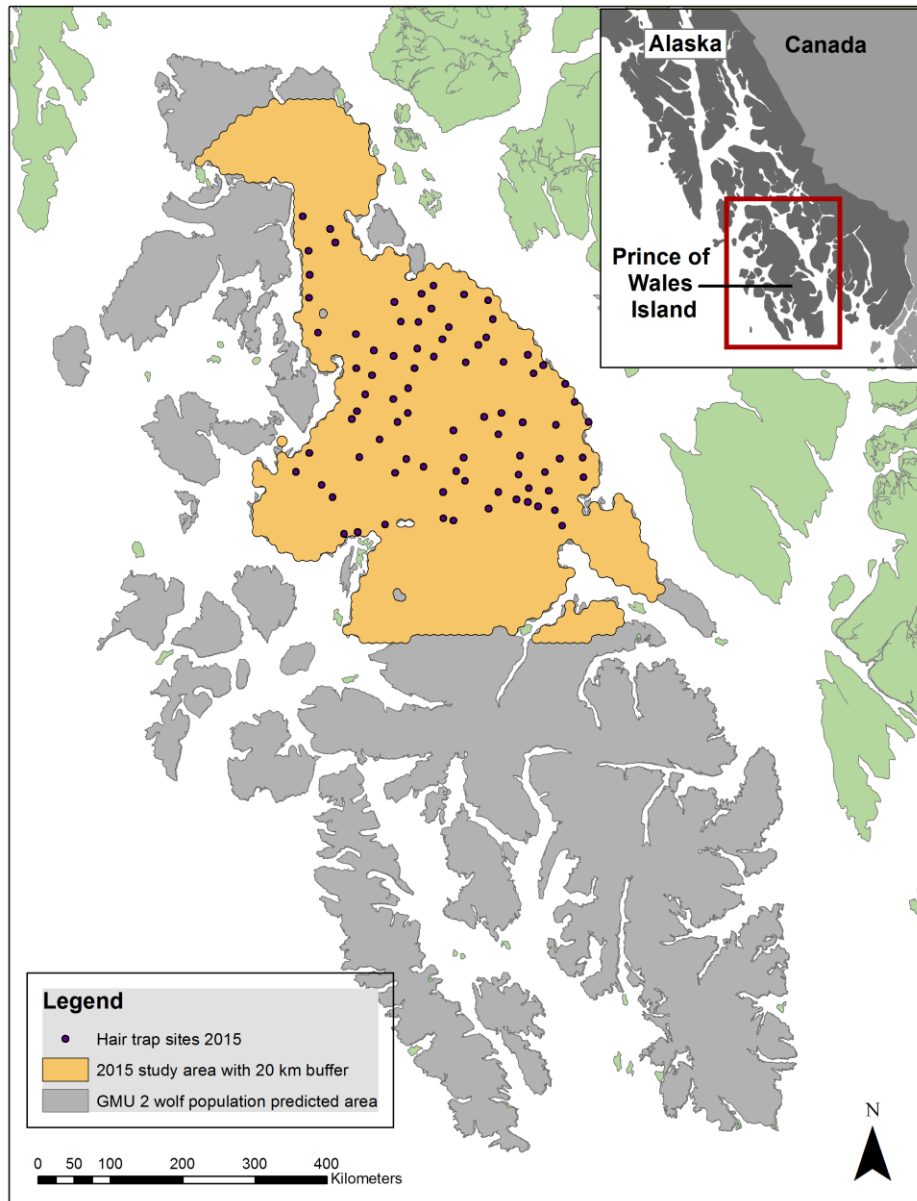


Table 1. Population density and size estimates for wolves on northcentral Prince of Wales study area in autumn 2015. These estimates are based on spatially-explicit, capture-recapture procedures (SECR) within a study area defined by a 20-km buffer around all 2015 node locations. Values are presented  $\pm$  SE (95% CI). The top 4 models that total 100% of the AICc weight are presented in addition to the null model (ranked 18). The top model was selected based on small-sample Akaike's Information Criterion (AICc) and used for determining the wolf estimate. Sex ratio is the proportion of females measured in the population.

Rank	$g_0^a$	$\sigma^a$	AICc	$\Delta$ AICc	AICc <sub>wt</sub>	Density (per 1000 km <sup>2</sup> )	Expected N <sup>b</sup>	Sex ratio
1	bk	sex	622.0	0	0.54	11.7 $\pm$ 2.7 (7.5, 18.2)	38.6 $\pm$ 8.9 (24.7, 60.4)	0.58 $\pm$ 0.11
2	bk	1	622.8	0.8	0.37	11.5 $\pm$ 2.6 (7.4, 17.8)	37.9 $\pm$ 8.7 (24.4, 59.1)	0.50 $\pm$ 0.10
3	bk + sex	sex	626.0	4.0	0.07	11.7 $\pm$ 2.7 (7.5, 18.1)	38.4 $\pm$ 8.9 (24.6, 60.0)	0.58 $\pm$ 0.11
4	k	sex	629.6	7.6	0.01	13.6 $\pm$ 3.5 (8.3, 22.4)	44.9 $\pm$ 11.8 (27.1, 74.3)	0.62 $\pm$ 0.10
18	1	1	656.7	34.7	0	10.4 $\pm$ 2.2 (6.9, 15.7)	34.3 $\pm$ 7.3 (22.7, 51.9)	0.50 $\pm$ 0.10

<sup>a</sup> An explanation of the symbols used for  $g_0$  (baseline detection probability) and  $\sigma$  (range parameter): b = learned response, global response, step change after first detection; bk = animal  $\times$  site response, site-specific step change; k = site learned response, site effectiveness changes once any animal caught; sex = sex of the animal.

<sup>b</sup> The expected number of wolves in the study area predicted from the study area's density.

Table 2. Summary of 2015 capture effort (full data set).

Occasion	1	2	3	4	5	6	7	8	9	10	11	Total	Mean $\pm$ SD
Animals detected	8	4	1	0	3	4	11	9	10	0	0	50	4.5 $\pm$ 4.3
Unique animals detected	8	4	0	0	1	1	5	2	3	0	0	24	2.2 $\pm$ 2.6
Repeat detection frequency	10	7	4	2	0	1	0	0	0	0	0	24	2.1 $\pm$ 1.3
Cumulative detections	8	12	12	12	13	14	19	21	24	24	24	24	
Total detections	8	4	2	0	4	7	11	11	11	0	0	58	5.3 $\pm$ 4.5
Detectors visited	5	3	2	0	4	5	9	9	8	0	0	45	4.1 $\pm$ 3.5
Detectors used	82	82	81	80	80	79	75	66	47	9	1	682	62.0 $\pm$ 30.1

Table 3. Summary of 2015 detection rate (full data set).

Occasion	1	2	3	4	5	6	7	8	9	10	11	Mean $\pm$ SD
Detection rate (detections/trap/100 trap days)	1.19	0.65	0.31	0	0.62	1.15	2.26	2.51	2.88	0	0	1.05 $\pm$ 1.06
Detection rate (unique animals/trap/100 trap days)	1.19	0.65	0	0	0.16	0.16	1.03	0.46	0.79	0	0	0.40 $\pm$ 0.45

## **Literature Cited**

- ADF&G (Alaska Department of Fish and Game). 2014. Density estimates of wolves on Prince of Wales during 2013–2014 using hair-snare trapping data. Douglas, Alaska.
- Efford, M. G, D. K. Dawson, 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.