WISCONSIN GRAY WOLF MONITORING REPORT
15 APRIL 2019 THROUGH 14 APRIL 2020

Jane E. Wiedenhoeft, Scott Walter, Matt Gross, Nathan Kluge, Shannon McNamara,
Glenn Stauffer, Jennifer Price-Tack, and Randy Johnson

BUREAU OF WILDLIFE MANAGEMENT
Wisconsin Department of Natural Resources
P.O. Box 7921
Madison, Wisconsin 53707

Introduction

This report describes wolf management and monitoring activities conducted in Wisconsin during the wolf monitoring year, April 15th, 2019 to April 14th, 2020. Gray wolves (*Canis lupus*) have been in federally endangered status in the Western Great Lakes region for the entire monitoring period.

Wolf Population Monitoring

Wolf population monitoring was conducted using a territory mapping with telemetry technique, summer howl surveys, winter snow track surveys, recovery of dead wolves, depredation investigations, and collection of public observation reports. A full description of methods is provided by Wydeven et al. (2009). Data are reported by wolf management units (WMU's) established in 2012 (Figure 1). Wolf monitoring methods were similar to those used during the previous year.

In addition, this was the 3rd year of testing a patch occupancy model for estimating the Wisconsin wolf population. The model used and results are discussed in the following section.

Observation reports were collected from the public and agency staff. A total of 313 reports of wolf or wolf sign observations were recorded. This is an increase from the 231 reports recorded the previous year (Wiedenhoeft et.al. 2019). Additional reports were received but lacked sufficient information on date, location, or circumstances for recording. One hundred fourteen reports (36%) were verified as wolves by submitted evidence or field checks. One hundred five reports (34%) were considered to be "probable" wolves. Photos or videos were submitted for 9 of these reports and were inconclusive but considered to be probable wolves or wolf tracks. One report of wolf tracks was field checked by DNR personnel and was inconclusive but considered to be probable wolf tracks. Descriptions provided for the remainder of these reports supported a designation of probable wolf. Seventy-six reports (24%) lacked adequate evidence or descriptions to determine species and were designated as indeterminate. Some of these reports were likely mis-identifications. Photos were submitted for 6 of these reports but were inconclusive. Eighteen reports (6%) were confirmed as not wolves based on submitted evidence or the description being inconsistent with wolf. Photos or videos were submitted for 12 of these reports. Species found included coyotes (4), coyote tracks (1), domestic dogs (5), domestic dog tracks (1), and mustelid tracks (1). Verified, probable, and indeterminate wolf observations are summarized in Table 1, and verified and probable observations are shown in Figure 1. Reports of packs outside known occupied pack range were forwarded to the biologist responsible for the geographic area for further monitoring to attempt to verify pack presence. Reports from outside the winter count period were used to help direct winter tracking effort. Consistent with our historic methodology, verified and probable reports within the winter count period were incorporated into count data.

For the period December 2019 thru March 2020, 328 photo sequences from the Snapshot Wisconsin program were identified as wolves by participants. After photos were examined by wolf program personnel, 218 (66%) were verified to be wolves, 9 (3%) were considered probable wolves, 10 (3%) were considered possible wolves, and 91 (28%) were confirmed to be not wolves or were unidentifiable. Photos in this last category included 84 coyotes, 6 unidentifiable, and 1 with no visible animal. Verified and probable wolves from Snapshot Wisconsin photos are included in Figure 1.

During summer 2019, 121 howl surveys were conducted in 98 pack territories (Table 2). Sixty-seven packs (68%) were detected by howl responses. Pups were detected in 82% of the detected packs. This is the highest pup detection rate recorded since at least 2013 (Figure 2). Average pup response over the past 5 years has been 72%

During winter 2019-20, WDNR personnel, volunteers, and tribes conducted a total of at least 12,969 miles of track surveys. An average of 2.8 surveys were conducted per pack or area surveyed. Of the 164 active survey blocks, surveys were received for 158 (96%) (Figures 3 & 4). Of the 6 active blocks for which surveys were not received, packs in 2 blocks were counted in adjacent blocks, packs in 2 blocks were counted by observation reports, and 2 blocks were not tracked due to lack of time and adequate conditions. It's possible some wolves were missed in the last 2 blocks, but they are in marginal habitat and it's also possible that wolves did not persist in those blocks. A total of 256 packs were detected in Wisconsin (Figure 5), an increase of 13 packs from last winter. Of the 243 packs detected in winter 2018-19, 10 (4%) were either not detected at all or were considered to have combined with an adjacent pack in 2019-2020. Seven packs (3%) detected in 2018-19 were detected as loners in winter 2019-20. Thirty of the 256 packs detected in winter 2019-20 had not been detected the previous winter. Of these packs, 10 (3%) had been detected prior to the winter of 2018-2019, 10 (3%) had been detected as loners in 2018-19, and 10 (3%) had not been previously detected.

During the 2019-2020 monitoring period 76 wolves were monitored using a combination of aerial telemetry and GPS transmitted locations (Table 3). Average pack territory size was 63.0 mi^2 for 60 packs with ≥20 telemetry locations. This included 52 territories (87%) determined from satellite and VHF locations (avg. = 66.5 mi^2) and 8 territories (13%) determined from only VHF locations (avg. = 40.3 mi^2. Research trapping resulted in telemetry GPS/VHF collars being placed on 22 wolves during the monitoring period. One wolf that was trapped and moved from a deer farm was also collared, and 2 wolves that were incidentally captured by recreational trappers were collared by WDNR personnel (Table 4). GPS collars were deployed on a total of 25 wolves captured during the monitoring period including 4 adult and 7 yearling females, and 8 adult and 6 yearling males.

In April 2020 the statewide minimum wolf population count was 1034-1057 wolves, a 13.1% increase from the previous year (Table 3 & Figure 6). This included increases in 5 management units and a decrease in 1 unit, ranging from -3.4% in WMU 6 to +28.3% in WMU 3. The count included 1018-1041 wolves living in 256 packs, or an average of 4.0 - 4.1 wolves per pack. This is an increase from recent years when average pack size stabilized at 3.8 – 3.9 wolves per pack. An additional 16 non-pack associated wolves were detected. State wolf management is based on the minimum count off Native American reservations. The off reservation minimum count in April 2020 was 994-1015 wolves. More detailed information on the 2019-2020 wolf count can be found on the Wisconsin DNR website, https://widnr.widen.net/s/mr7zlkv4bg.

Model-based estimates of wolf population size in Wisconsin

WDNR scientists used a recently developed occupancy modelling approach to estimate total wolf abundance from 2019 – 2020 track survey data. The approach divided the surveyed area into a hexagonal grid of sample units, and then estimated abundance as $N = \sum_i^K \psi_i A_i \bar{x}/\bar{h}$, where ψ_i was the probability of occupancy in sample unit i, A_i was the area of sample unit i, $\bar{h}$ was the mean home range size during the sampling period, $\bar{x}$ was the mean pack size, and K was the total number of sample units. The approach does not rely on subjective pack assignments and accounts for the fact that wolves may be present, but undetected, in a sample unit. The final

estimate also accounts for the uncertainty in all model parameters, including mean home range size and pack size. Landscape covariates (forest, agriculture/developed land, and road density) were used as predictors for ψ_i, and detection probability was a function of survey effort. The resulting posterior mode (the most likely value) for total wolf abundance for the 2019 – 2020 overwintering period was 1195 wolves, and the credible interval with the highest probability density was 957 – 1573, which includes the statewide minimum count described previously. Credible intervals for the 2017 – 2018 and 2018 – 2019 estimates also compared favorably with the corresponding minimum counts (Figure 7). Further details of the occupancy approach can be found in Stauffer et al. (in prep).

Statewide Wolf Distribution

Contiguous wolf pack range was estimated to be 23,313 mi^2 (Figure 1). Using the 2020 minimum population count of 1034-1057 wolves, wolf density is estimated to be 1 wolf per 22.0 to 22.5 mi^2 of wolf pack range, calculated by dividing probable wolf pack range by the minimum population count range.

Wolf Mortality

Mortality was monitored through field observation and mandatory reporting of control mortalities. Cause of death for wolves reported dead in the field was determined through field investigation or by necropsy when illegal activity was suspected or where cause of death was not evident during field investigation. A total of 52 wolf mortalities were detected during the monitoring period (Table 5, Figure 1). Detected mortalities represented 5-6% of the minimum 2018-2019 late winter count of 914-978 wolves (Wiedenhoeft et.al. 2019).

Cause of death could not be determined for 8 wolves (15%). For 44 known cause mortalities, 38 (86%) were human caused and 6 (14%) were due to natural causes. This is an increase in natural mortality from 6% in 2018-2019. Vehicle collisions (40%) and illegal kills (31%) were the leading causes of death for detected mortalities. One wolf was euthanized due to health and safety concerns.

Seventeen collared wolves died during the monitoring period, of which 16 were being actively monitored at the time of death (Table 5). Cause of death could not be determined for 2 actively monitored collared wolves. For the 14 where cause of death could be determined, 9 (64%) were illegally killed, 1 (7%) was killed by vehicle collision, 2 (14%) were killed by other wolves, and 2 (14%) died from unknown natural causes. For an analysis of estimated rates of undetected mortality in Wisconsin wolves see Stenglein et al. 2015.

Disease / Parasite Occurrence in Wolves & Body Condition

General body condition was reported for 25 wolves that were captured during the monitoring period (Table 4). Twenty-two (88%) were reported to be in good, very good, or excellent body condition, and 3 (12%) were reported to be in thin condition. Average weight of 7 live-captured adult males was 78 lbs. (range 73 to 85 lbs.), and average weight of 3 adult females was 71 lbs. (range 65 to 77 lbs.). Monitoring for mange was conducted by inspection of 25 wolves live-captured for research monitoring, and inspection of 52 wolf mortalities (Table 4). Symptoms

consistent with mange were not noted for any of the wolves inspected. Ticks were monitored by inspection of live-captured wolves. Ticks were noted on 18 (72%) captured wolves.

Necropsy reports were received for 5 wolves that died in Wisconsin during the monitoring period. Other reports are still pending. Body condition noted on necropsy were as follows – 1 ideal nutritional condition, 2 good nutritional condition, 1 lean, and 1 thin. Heartworms were detected in 2 necropsied wolves, though neither died as a result of the infestation. One necropsied wolf pup that had been euthanized due to behavioral abnormality was found to have several health issues including bronchopneumonia, pulmonary edema, and focal hepatitis. Possible bronchopneumonia was also detected in another necropsied wolf, though cause of death could not be determined. One necropsied wolf tested strongly positive for canine distemper and, though cause of death could not be definitively determined, distemper was considered a possible cause of death. The other 2 necropsied wolves died as a result of illegal shooting.

Wolf Depredation Management

Wisconsin DNR contracts with the United States Department of Agriculture – Wildlife Services to investigate wildlife damage complaints, including wolf depredation complaints. During the monitoring period, Wildlife Services confirmed 92 wolf complaints of the 134 investigated (Figure 8). Unconfirmed complaints were either confirmed to be due to causes other than wolves or lacked sufficient evidence to attribute a cause.

Forty-eight incidents of wolf depredation to livestock and 10 incidents of wolf threat to livestock were confirmed on 34 different farms during the monitoring period (Table 6). This is an increase in the number of confirmed livestock depredations and the number of farms affected compared to 2018-2019 (Figure 9). Farms with confirmed incidents in 2019-2020 included 14 of 28 farms classified as chronic wolf depredation farms (50%). Livestock depredations included 26 cattle killed and 12 injured, 4 captive deer killed and 1 injured, 32 sheep killed and 2 injured, 7 goats killed, 2 alpacas killed and 1 injured, 1 pot-bellied pig killed, and 4 horses injured. Most wolf depredations on livestock occur during the months of May, July, August, and September.

Thirty-one incidents of non-livestock depredation and 3 incidents of non-livestock threats were confirmed during the monitoring period (Table 6). This included 24 dogs killed and 1 injured while actively engaged in hunting activities, and 4 dogs killed and 5 injured outside of hunting situations (Figure 10). In 2018-2019 a total of 32 dogs were confirmed killed or injured by wolves. Thirteen of twenty-three (57%) hunting dog incidents occurred while training dogs on bear in July and August. Seven incidents (30%) occurred while hunting bear with dogs in September. One incident occurred in November while hunting grouse, 1 occurred in December while hunting bobcat, and 1 occurred in February while hunting coyote (4% each). The 11 confirmed pet dog incidents occurred in 9 different months and have not shown a noticeable seasonal pattern.

Regulatory Changes Affecting Wolf Management

The most significant potential regulatory change during the monitoring period was a proposed rule published by the U.S. Fish & Wildlife Service in the Federal Register which would have removed the gray wolf from the federal list of endangered species across the lower 48 states. The original 60-day comment period was extended to 120 days, allowing public input until July 15th, 2019. A final ruling

was expected to be published by March 15th, 2020 but was not yet available at the end of the monitoring period.

In addition, several pieces of federal legislation were introduced which would affect wolf status in the Western Great Lakes region:

1) The Gray Wolf State Management Act of 2019 (HR 4494) was introduced by the 116th Congress on September 25th, 2019. This bill would have removed federal protections for wolves in the Western Great Lakes region within 60 days of enactment. The bill was referred to subcommittee and remained there through the end of the monitoring period.

2) A pair of companion bills entitled The American Wild Game and Livestock Protection Act (S3140 and HR 6035) were introduced by the 116th Congress on December 19, 2019 and February 28, 2020, respectively. These bills would have directed the Secretary of the Interior to issue as a final rule the proposed rule (above) removing gray wolves from the list of endangered species across the lower 48 states and exempt the rule from judicial review. Both bills were referred to subcommittee and remained there through the end of the monitoring period.

Law Enforcement

Law enforcement efforts detected 1 vehicle killed wolf within the monitoring period. Law enforcement staff conducted 1 wolf related investigation and issued 1 citation (Table 7).

Information on Wolf Prey Species

White-tailed deer are the primary prey species for wolves in Wisconsin. Units used for monitoring Wisconsin deer are counties, or in some cases, partial counties. Counties were assigned to the wolf management unit that the majority of the county falls in to compare deer density changes in the wolf management units (Table 8). White-tailed deer density estimates decreased 13% statewide from the previous year estimate (Stenglein, 2020). Wolf management units 1, 2, and 5, considered to be primary wolf range, contained 78% of the minimum winter wolf count. Deer density estimates decreased by 23% from 25.3 deer / square mile to 19.6 deer / square mile of deer range in primary wolf range from post hunt 2018 to post hunt 2019. The increase in the wolf population following the decrease in deer density indicates deer were not a limiting factor for wolves in Wisconsin during the monitoring period. Recommendations from the County Deer Advisory Councils for deer population objectives were approved by the Natural Resources Board in 2018. The current recommendations are primarily to increase or maintain the deer population in each of the 6 wolf management units.

Literature Cited

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Stenglein, J.L., Van Deelen, T.R., Wydeven, A.P., Mladenoff, D.J., Wiedenhoeft, J.E., Businga, N.K., Langenberg, J.A., Thomas, N.J., and D.M. Heisey. 2015. Mortality patterns and detection bias from carcass data: An example from wolf recovery in Wisconsin. The Journal of Wildlife Management. doi: 10.1002/jwmg.922.

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Wydeven, A.P., Wiedenhoeft, J.E., Schultz, R.N., Thiel, R.P., Jurewicz, R.L., Kohn, B.E., and T.R. Van Deelen. 2009. History, population growth, and management of wolves in Wisconsin. Pp. 87-105 *in* Wydeven, A.P., Van Deelen, T.R., and E.J. Heske. Recovery of Gray Wolves in the Great Lakes Region of the United States: An Endangered Species Success Story. Springer, New York, NY, USA. 350 pp.

Table 1. Verified, probable and indeterminate wolf observations reported by natural resource agency personnel and private citizens in Wisconsin, 15 April 2019 to 14 April 2020.

Wolf Mgmt. Unit	Number of Sightings	Wolves Seen	Track or Sign Observations	Total Wolf Observations
1	47	87	54	101
2	40	84	14	54
3	11	21	9	20
4	10	23	1	11
5	21	48	5	26
6	75	101	8	83
Statewide	**204**	**364**	**91**	**295**

Table 2. 2019 Wisconsin wolf howl survey data.

Wolf Mgmt. Unit	Howl Surveys	Packs Surveyed	Packs Detected	Detected Packs with Pups	% Detected Packs with Pups
UNIT 1	45	36	27	21	78
UNIT 2	22	19	14	10	77
UNIT 3	13	12	8	7	88
UNIT 4	3	3	0	-	-
UNIT 5	33	24	18	16	89
UNIT 6	5	4	1	1	100
TOTAL	**121**	**98**	**67**	**55**	**82**

Table 3. Pack and lone wolf summaries for Wisconsin in winter 2019-2020.

Wolf Mgmt. Unit		# of Packs	# of Wolves in Packs	Loners	Total # of Wolves	Change from 2018-2019	# of Telemetry Monitored Wolves[a]	Average Annual Pack Territory[b] (mi^2)
1	Off Reservations	*93*	*402-408*	*1*	*403-409*		41	
	On Reservations	5	21	0	21		1	
	Total	98	423-429	1	424-430	17.8%	42	59.1 (n=31)
2	Off Reservations	*53*	*221-226*	*3*	*224-229*		18	
	On Reservations	6	19-21	0	19-21		0	
	Total	59	240-247	3	243-250	10.5%	18	73.8 (n=15)
3	*Off Reservations*	*33*	*133-136*	*3*	*136-139*		6	
	On Reservations	0	0	0	0		0	
	Total	33	133-136	3	136-139	28.3%	6	87.2 (n=6)
4	Off Reservations	*11*	*35*	*1*	*36*		2	
	On Reservations	0	0	0	0		0	
	Total	11	35	1	36	2.9%	2	32.4 (n=1)
5	Off Reservations	*37*	*137-143*	*1*	*138-144*		7	
	On Reservations	0	0	0	0		0	
	Total	37	137-143	1	138-144	3.0%	7	42.4 (n=6)
6	Off Reservations	*18*	*50-51*	*7*	*57-58*		1	
	On Reservations	0	0	0	0		0	
	Total	18	50-51	7	57-58	-3.4%	1	29.5 (n=1)
Statewide	Off Reservations	***245***	***978-999***	***16***	***994-1015***		75	
	On Reservations	11	40-42	0	40-42		1	
	Total	256	1018-1041	16	1034-1057	13.1%	76	63.0 (n=60)
Out of State				3				

[a]Wolves are counted in the primary WMU they were monitored in, though they may have been monitored in multiple WMUs.

[b] Pack territory size is only calculated for packs with ≥20 radiolocations for the period 15 April 2019 to 14 April 2020.

Table 4. Research capture summary, body condition, and detection of ectoparasites in captured wolves and mortalities in Wisconsin from 15 April 2019 to 14 April 2020.

	n	Body Condition			# (%) w/Mange	# (%) w/Ticks
		Good	Fair	Poor		
Unit 1						
Research Captures	14	12 (86%)		2 (14%)	0	9 (64%)
Mortalities	18				0	
Unit 2						
Research Captures	7	6 (86%)		1 (14%)	0	5 (71%)
Mortalities	13				0	
Unit 3						
Research Captures	2	2 (100%)			0	2 (100%)
Mortalities	5				0	
Unit 4						
Research Captures	0					
Mortalities	3				0	
Unit 5						
Research Captures	2	2 (100%)			0	2 (100%)
Mortalities	5				0	
Unit 6						
Research Captures	0					
Mortalities	8				0	
STATEWIDE						
Research Captures	**25**	**22 (88%)**		**3 (12%)**	**0**	**18 (72%)**
Mortalities	**52**				**0**	

Table 5. Detected wolf mortality in Wisconsin 15 April 2019 to 14 April 2020.

Cause of Death	Wolf Management Unit						State Total	% of Total
	1	2	3	4	5	6		
Human Caused Mortality								
Agency Control			1				1	2%
Vehicle Collision	7	6[a]	1	2	1	4[ae]	21	40%
Illegally Killed	5[d]	3[c]	2[a]	1	3[a]	2	16	31%
Capture Related							0	
Unknown Human Caused							0	
Total Human Caused	*12*	*9*	*4*	*3*	*4*	*6*	***38***	***73%***
Natural Mortality								
Disease / Injury	1						1	2%
Intra-specific Aggression	2[b]						2	4%
Euthanized (non-control)							0	
Unknown Natural Causes	2[b]					1	3	6%
Total Natural Causes	*5*	*0*	*0*	*0*	*0*	*1*	***6***	***12%***
Unknown Causes	*1[a]*	*4[a]*	*1*	*0*	*1*	*1*	***8***	***15%***
Total Detected Mortality	**18**	**13**	**5**	**3**	**5**	**8**	**52**	

[a]Includes 1 radio collared wolf
[b]Includes 2 radio collared wolves
[c]Includes 3 radio collared wolves
[d]Includes 4 radio collared wolves
[e]Not monitored at time of death
17 radio collared wolf mortalities, 16 being monitored at time of death

Table 6. Wolf depredation management in Wisconsin, 15 April 2019 to 14 April 2020.

	Wolf Management Unit						State
	1	**2**	**3**	**4**	**5**	**6**	**Total**
Livestock Cases							
Confirmed Depredation Incidents	24	5	10	1	6	2	**48**
Confirmed Threat Incidents	4	0	1	0	2	3	**10**
Chronic Farms Affected	6	1	2	0	2	3	**14 of 28** (50%)
Total Farms Affected	16	1	4	1	7	5	**34**
Cattle Killed	16		5	1	3	1	**26**
Cattle Injured	11					1	**12**
Deer Killed		4					**4**
Deer Injured		1					**1**
Sheep Killed	13		3		16		**32**
Sheep Injured	2						**2**
Goats Killed	1		6				**7**
Alpacas Killed	1		1				**2**
Alpacas Injured	1						**1**
Pigs Killed			1				**1**
Horses Injured	4						**4**
Non-Livestock Cases							
Confirmed Depredation Incidents	10	11	6	0	1	3	**31**
Confirmed Threat Incidents	1	1	0	0	1	0	**3**
Dogs Killed While Actively Engaged in Hunting Activities	9	10	5				**24**
Dogs Injured While Actively Engaged in Hunting Activities						1	**1**
Dogs Killed While Not Engaged in Hunting Activities	1		1		1	1	**4**
Dogs Injured While Not Engaged in Hunting Activities	1	1	1			2	**5**

Table 7. Summary of law enforcement activity 15 April 2019 to 14 April 2020

# of wolf hunting related complaints received:	0
# of wolf trapping related complaints received:	0
# of wolf related investigations conducted:	1
# of car killed wolves	1
# of hunting related citations issued:	1
# of trapping related citations issued:	0
# of verbal warnings issued:	0
# of incidentally trapped wolves recovered:	0
# of Illegally harvested wolves recovered:	0
# of shot & unrecovered wolves:	0
# of unknown cause of death wolves found:	0
# of other dead/injured wolves recovered:	0
Total Wolves Recovered	**1**

Table 8. White-tailed deer post-hunt density estimates in wolf management units in 2018 & 2019.

Wolf Mgmt. Unit	# of Deer Mgmt. Zones	Deer Range (mi^2)	2018 Post-Hunt Mean Deer Density (Deer/mi^2)	2019 Post-Hunt Mean Deer Density (Deer/mi^2)	% Change	% Deer Range in each 2018-20 Deer Population Objective
1	7	6,477	22.2	16.6	-25%	43% Increase 36% Maintain 22% Decrease
2	6	4,401	25.5	20.2	-21%	49% Increase 51% Maintain
3	5	3,439	31.5	26.8	-15%	26% Increase 74% Maintain
4	4	2,596	38.1	32.8	-14%	67% Maintain 33% Decrease
5	7	2,162	33.9	27.4	-19%	69% Increase 31% Maintain
6	53	17,592	55.3	49.9	-10%	3% Increase 68% Maintain 30% Decrease
TOTAL	**82**	**36,667**	**41.2**	**35.8**	**-13%**	

Deer range and post-hunt deer estimates based on Jennifer Stenglein, 2020, Deer Population Estimates 2019, WDNR unpublished data.

Deer population objectives from County Deer Advisory Council, NRB Approved Population Objectives, DMU and Zone Boundaries 2018-2020, https://dnr.wi.gov/topic/hunt/documents/NRBApprovedobjectives.pdf.

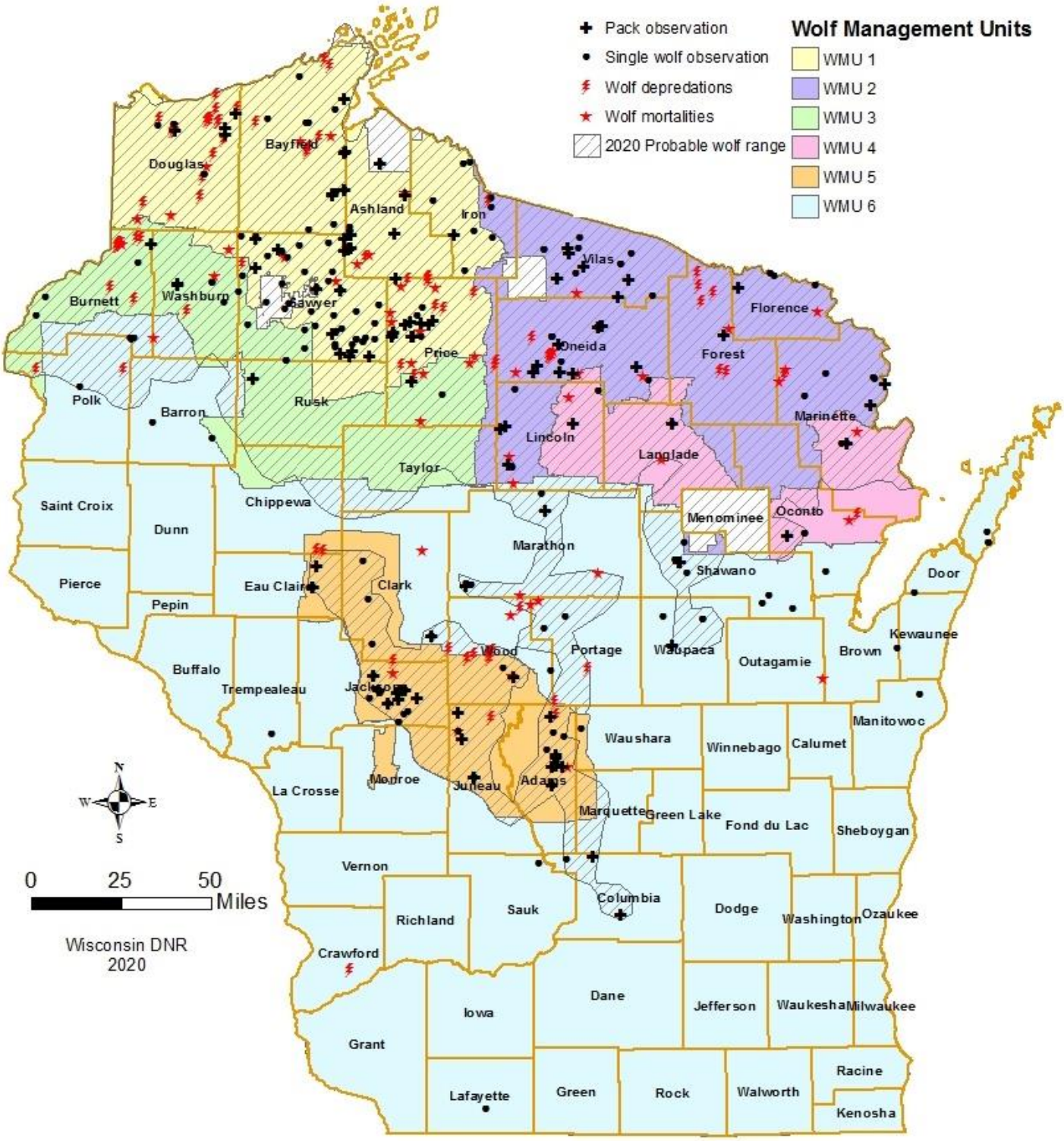

Figure 1. Probable wolf pack range, wolf mortalities, and verified and probable wolf depredations, wolf observation reports and Snapshot Wisconsin wolf photos in Wisconsin 15 April 2019 to 14 April 2020.

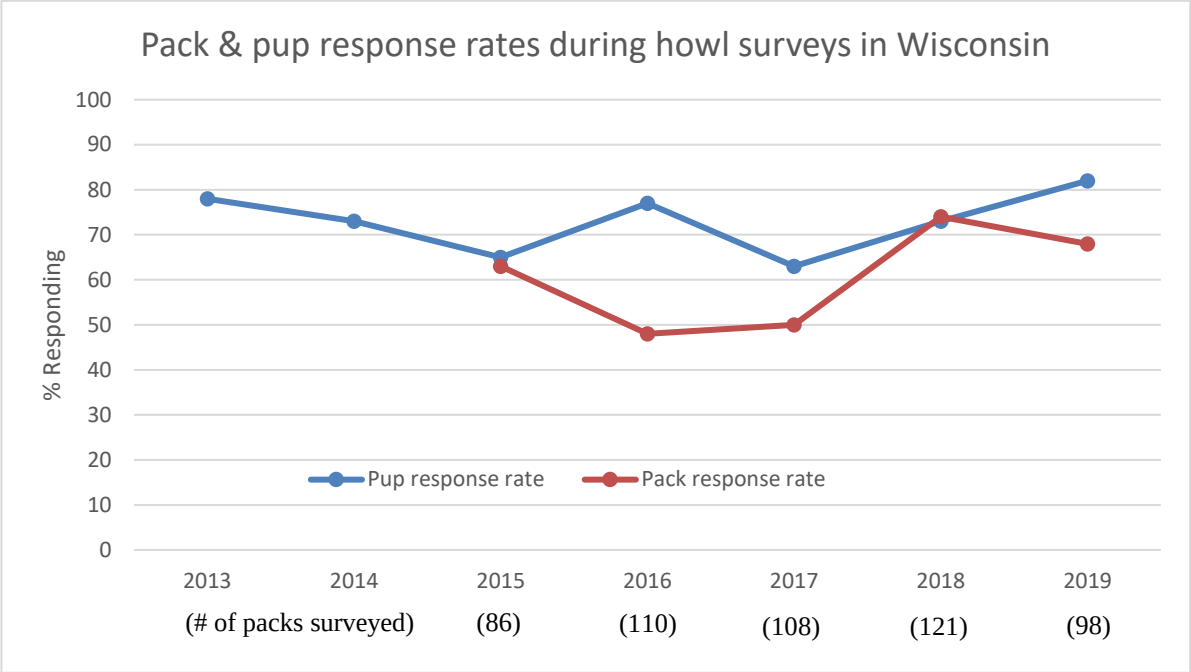

Figure 2. Percentage of packs responding and percentage of responding packs with pups during howl surveys in Wisconsin from 2013 to 2019.

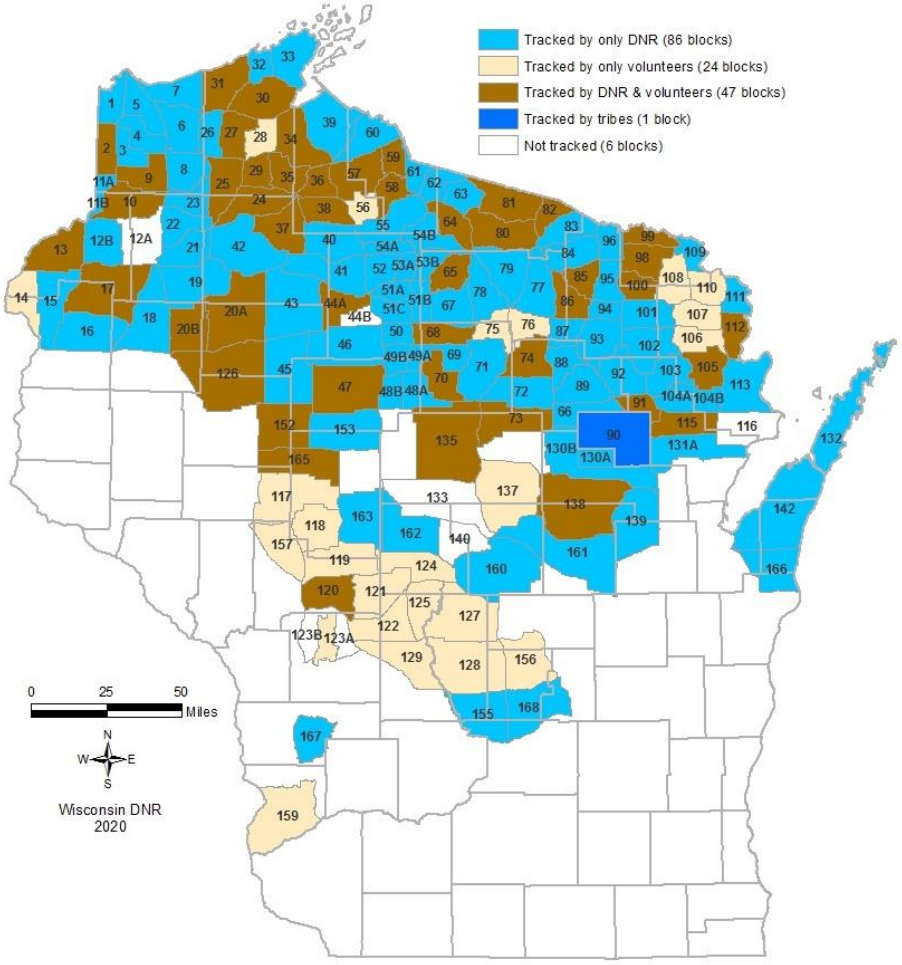

Figure 3. Wisconsin carnivore survey blocks tracked: winter 2019-2020.

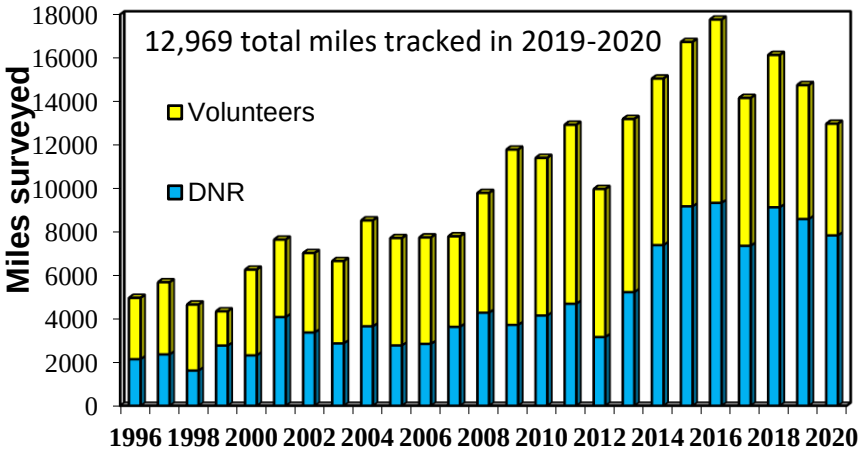

Figure 4. Carnivore track surveys in Wisconsin by WDNR & volunteers 1996-2020

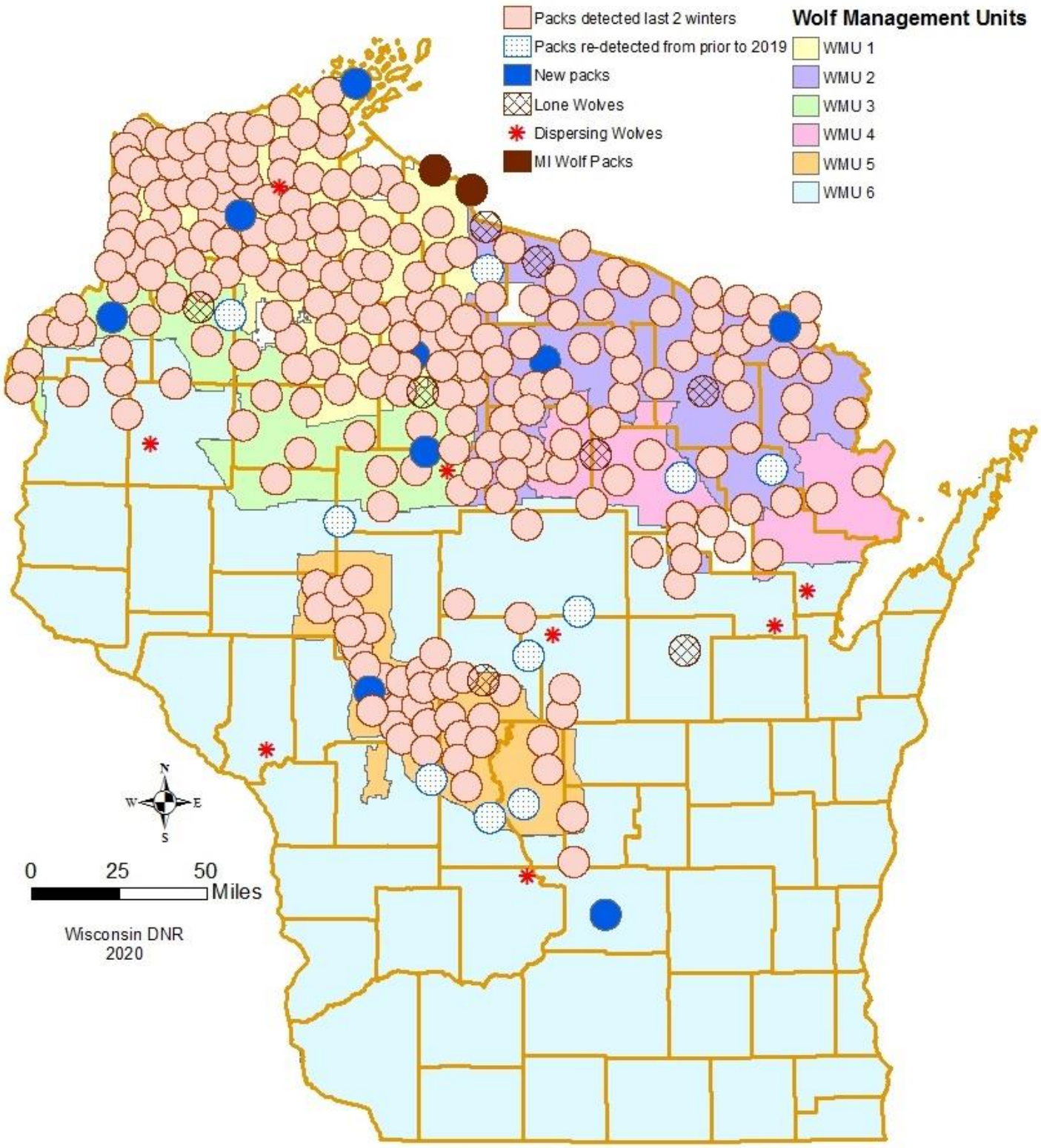

Figure 5. Wolves detected in Wisconsin in winter 2019-2020

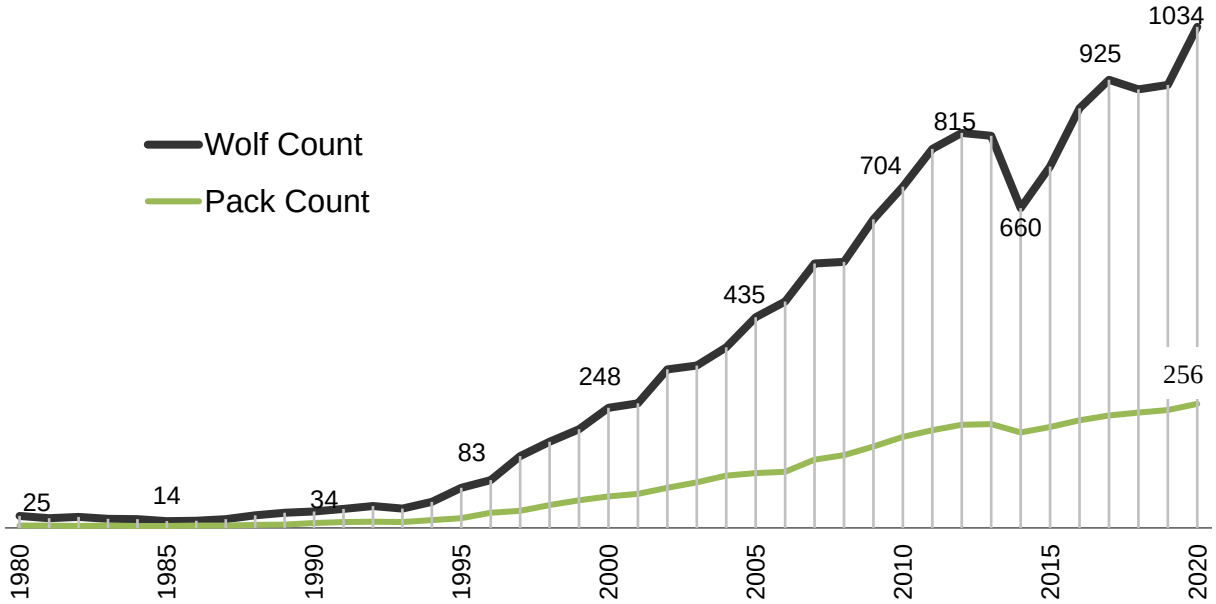

Figure 6. Changes in Wisconsin Gray Wolf Population: 1980-2020.

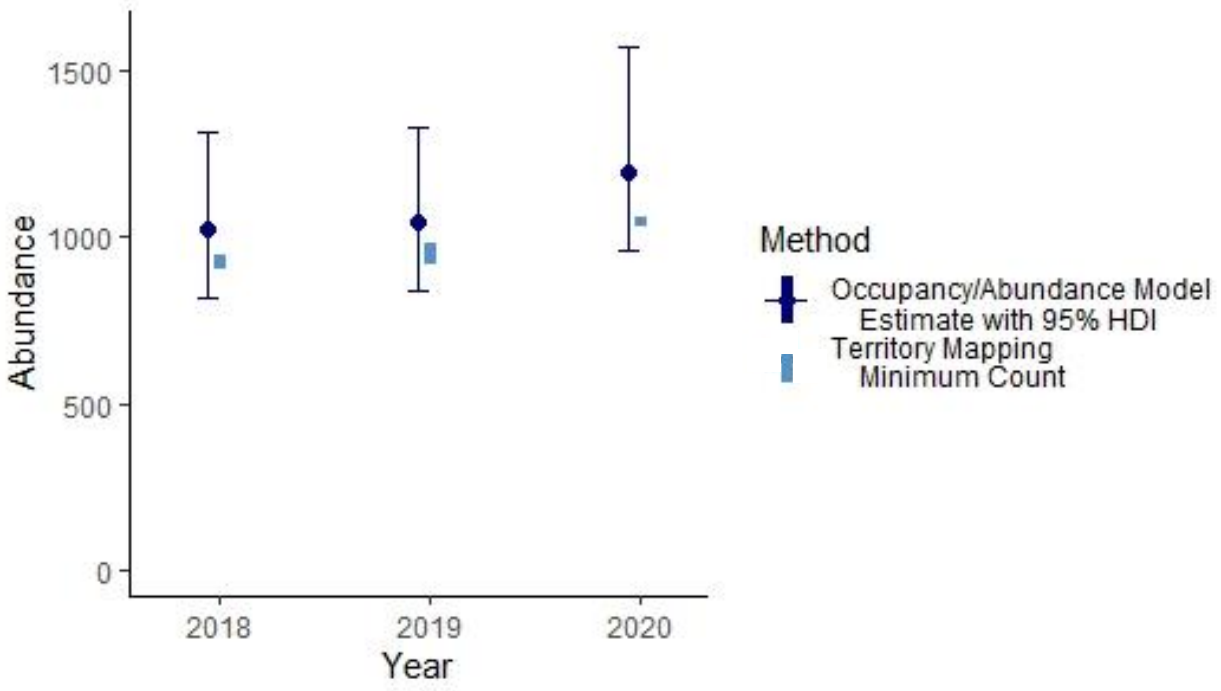

Figure 7. Comparison of occupancy model estimates and minimum counts: 2018-2020.

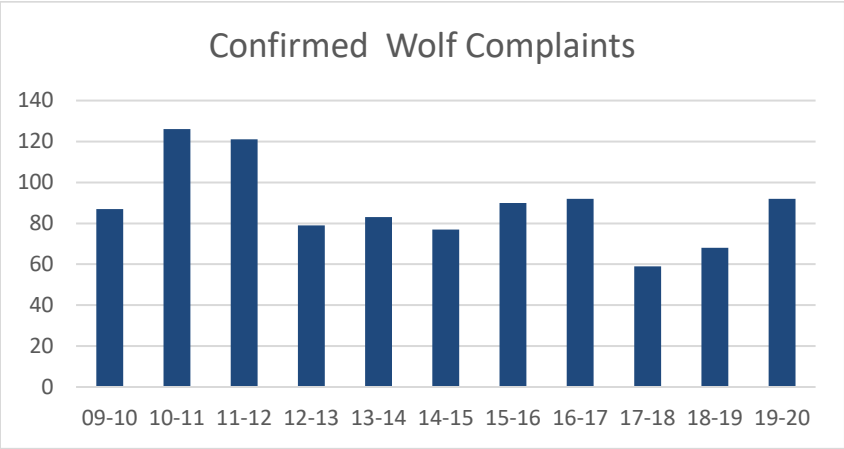

Figure 8. Total number of confirmed wolf complaints, 2009-2019 wolf monitoring years

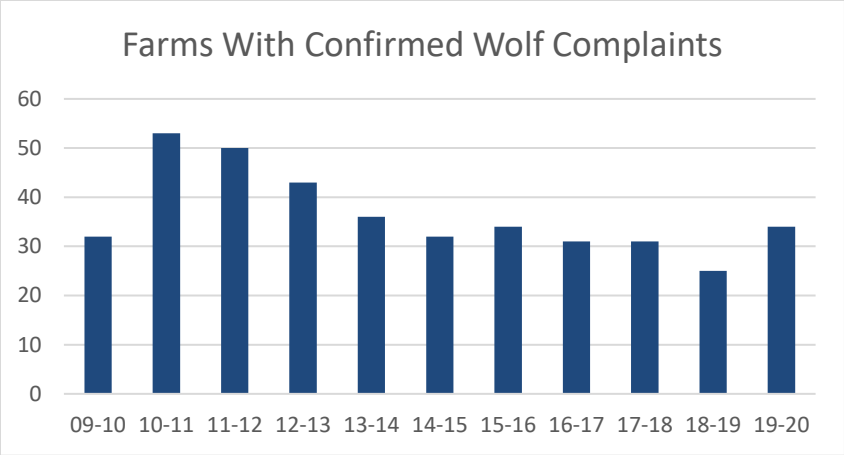

Figure 9. Farms with confirmed wolf complaints, 2009-2019 wolf monitoring years

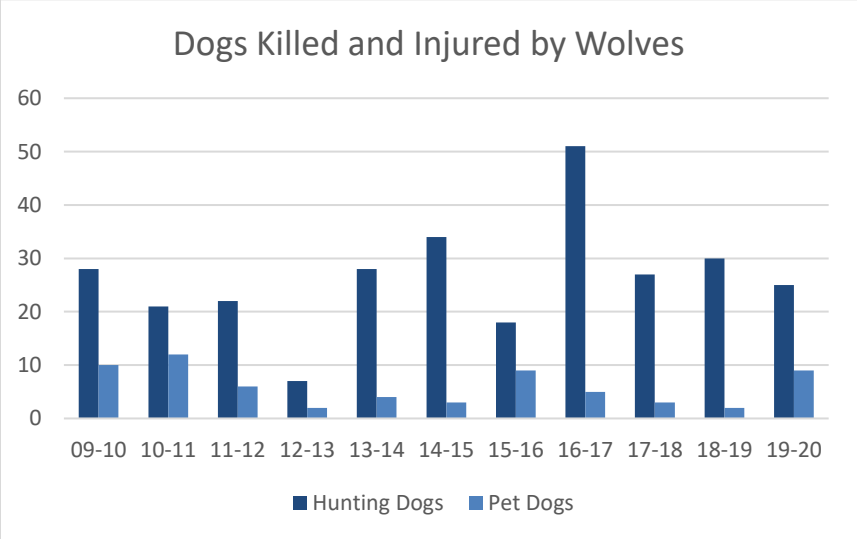

Figure 10. Dogs killed & injured by wolves, 2009-2019 wolf monitoring years