

**WISCONSIN GRAY WOLF MONITORING REPORT
15 APRIL 2017 THROUGH 14 APRIL 2018**

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Introduction

This report describes wolf management and monitoring activities conducted in Wisconsin during the wolf monitoring year, April 15th, 2017 to April 14th, 2018. Gray wolves (*Canis lupus*) reverted to federally endangered status in the Western Great Lakes region as the result of a federal court decision in December 2014. They have been in this status 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.

Observation reports were collected from the public and agency staff. A total of 256 reports of wolf or wolf sign observations were recorded. This is slightly less than the 269 reports recorded the previous year (Wiedenhoeft et.al. 2017). Additional reports were received but lacked sufficient information on date, location, or circumstances for recording. Eighty-four reports (33%) were verified as wolves by submitted evidence or field checks. Fifty-four reports (21%) were considered to be "probable" wolves. Photos were submitted for 9 of these reports and were inconclusive but considered to be probable wolves or wolf tracks. Descriptions provided for the remainder of these reports supported a designation of probable wolf. Ninety-seven reports (38%) lacked adequate evidence or descriptions to determine species and were designated as indeterminate. Some reports were likely mis-identifications. Photos were submitted for 7 of these reports, but were inconclusive. Twenty-one reports (8%) were confirmed as not wolves based on submitted evidence or the description being inconsistent with wolf. Photos were submitted for 17 of these reports. Species found included coyotes (7 photos), coyote tracks (1 photo), domestic dogs (3 photos), domestic dog tracks (4 photos), wolf-dog hybrid (1 photo), and deer tracks (1 photo). Verified, probable, and indeterminate wolf observations are shown in Table 1 and 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.

During summer 2017, 153 howl surveys were conducted in 108 pack territories (Table 2). Fifty-four packs (50%) were detected by howl responses. Pups were detected in 63% of the detected packs. This compares with a pup detection rate of 77% of 53 packs responding during howl surveys in summer 2016 (Wiedenhoeft et.al. 2017), and is the lowest pup detection rate in the past 5 summers, but similar to 2015 when pup detection rate was 65% of responding packs. Over the past 5 summers the average pup detection rate has been 71.3%.

During winter 2017-18, a total of 16,133 miles of track surveys were conducted by WDNR and volunteers, with 163 of 167 active survey blocks and 2 de-activated survey blocks tracked (Figures 2 & 3). Tribes tracked an additional 2 active survey blocks. One of the untracked active blocks was monitored for wolf sign by DNR staff during other work duties. Packs in the other untracked active block were counted in adjacent blocks. A total of 238 packs were detected in Wisconsin (Figure 4), an increase of 6 packs from last winter. Two wolves from a pack considered to be primarily in

Minnesota were also detected (Table 3). Of the 232 packs detected in winter 2016-17, 13 (6%) were either not detected at all or were considered to have combined with an adjacent pack in 2017-2018. Eight packs (3%) detected in 2016-17 were detected as loners in winter 2017-18. Twenty-eight of the 238 packs detected in winter 2017-18 had not been detected the previous winter. Of these packs, 12 (5%) had been detected previous to the winter of 2016-2017, 6 (3%) had been detected as loners in 2016-17, and 10 (4%) had not been previously detected. An average of 3.2 surveys were conducted per pack or area surveyed.

During the 2017-2018 monitoring period 72 wolves were monitored by telemetry (Table 3). Average pack territory size was 51.8 mi² for 58 packs with ≥ 20 telemetry locations. This included 44 territories determined from satellite and VHF locations (avg. = 53.9 mi²) and 14 territories with only VHF locations (avg. = 45.1 mi²). Average territory size varies between the wolf management units from 36.7 mi² in WMU 5 to 63.5 mi² in WMU 2, though this may be partially due to the relative percentage of territories calculated using GPS locations in each WMU. Research trapping resulted in telemetry collars being placed on 25 wolves. Four wolves were collared in relation to depredation control activities, and an additional 7 wolves incidentally captured by recreational trappers were collared by DNR personnel before release. Telemetry collars were deployed on a total of 36 wolves captured during the monitoring period (Table 4), including 13 adult and 3 yearling females, and 13 adult, 4 yearling, 2 pup, and 1 unknown age males.

In April 2018 the statewide minimum wolf population count was 905-944 wolves, a decrease of 2.2% from the previous year (Table 3 & Figure 5). This included increases in 4 of the 6 management units and decreases in 2 units, ranging from -28.2% in WMU 3 to +23.1% in WMU 5. The count included 883-924 wolves living in 238 packs, or an average of 3.8 wolves per pack. An additional 22 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 2018 was 876-914 wolves. More detailed information on the 2017-2018 wolf count can be found on the Wisconsin DNR website, <https://dnr.wi.gov/topic/Wildlifehabitat/wolf/documents/2018WolfCountDetails.pdf>.

Statewide Wolf Distribution

Contiguous wolf pack range was estimated to be 23,687 mi² in northern and central forested regions of Wisconsin (Figure 1). Using the 2018 minimum population count of 905-944 wolves, wolf density is estimated to be 1 wolf per 25.1 to 26.2 mi² of contiguous wolf range, calculated by dividing contiguous wolf 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 36 wolf mortalities were detected during the monitoring period (Table 5, Figure 1). Detected mortalities represented 4% of the minimum 2016-2017 late winter count of 925-952 wolves (Wiedenhoef et.al. 2017).

Vehicle collisions (39%) and illegal kills (19%) were the leading causes of death for detected mortalities and were similar to the rates detected the previous year. Human caused mortality represented 72% of known cause detected mortalities overall.

Twenty-eight percent of known cause mortalities were due to natural causes. This was a considerable increase compared to the previous 2 years when natural mortality averaged 5%. Disease and euthanization of sick animals accounted for most of the natural mortality (16% of all mortalities). One wolf (3%) died as a result of intraspecific strife, and 1 wolf (3%) died from unknown natural causes.

Cause of mortality could not be determined for 7 (19%) of the cases.

Eleven collared wolves died during the monitoring period. All were being actively monitored at the time of death (Table 5). Cause of death could not be determined for 3 collared wolves. For the 8 where cause of death could be determined, 3 (38%) were illegally killed, 2 (25%) were killed by vehicle collision, 1 likely died as a result of capture related myopathy, 1 died as a result of disease, and 1 apparently died as a result of intraspecific strife. For an analysis of estimated rates of undetected mortality in Wisconsin wolves see Stenglein et al. 2015.

Recent research has shed significant light on patterns of wolf mortality in Wisconsin. Scientists at UW-Madison and Wisconsin DNR used locations from 501 wolves with known fates radio-collared between 1979 and 2013 to estimate survival rate, test for compensation among mortality factors, and evaluate spatial variation in risk (Stenglein et al. 2018). Key findings from this study include:

- Mean annual adult wolf survival was 76% (SD=0.019).
- Mean annual mortality rates, by cause, were:
 - 9.4% (SD=1.7) illegal harvest
 - 5.1% (SD= 1.1) other human causes
 - 9.5% (SD=1.7) natural and unknown
- Loss of contact with collars occurred with an average of 21.8% (SD=2.1) of collared wolves annually.
- Illegal harvest peaked in late November, coincident with Wisconsin's 9-day gun deer season.
- Survival varied through time, being relatively low during population establishment (early 1980s), stable and relatively high from the late 1980s through 2009, and declining from 2010 – 2013.
- Survival also varied spatially, being highest in portions of WHZ 1 and WHZ 2 where wolves have been established the longest. Survival was dramatically lower in peripheral areas within Wisconsin's established wolf range.
- Risk of illegal harvest also showed spatial variation, being relatively higher in peripheral areas of established wolf range.
- Natural mortality hazard was highest where wolves have been established the longest.

- Human-caused mortality appeared additive during early years of wolf recovery in Wisconsin (1981 – 2003), but there was evidence for partial compensation from 2004 – 2013.

Disease / Parasite Occurrence in Wolves & Body Condition

General body condition was reported for 36 wolves that were captured (Table 4). Thirty-two (89%) were reported to be in good or excellent body condition, 3 (8%) were reported to be in fair body condition, and 1 (3%) was reported to be in poor condition. Average weight of 13 live-captured adult males was 84 lbs. (range 60 to 100 lbs.), and average weight of 13 adult females was 68 lbs. (range 55 to 87 lbs.). Monitoring for mange was conducted by inspection of 36 wolves live-captured for research monitoring, and inspection of 36 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 24 (67%) of captured wolves. Canine distemper was detected in 5 wolves that died or were euthanized due to sickness. This included 1 pup, 1 yearling, and 3 adults. While distemper has been suspected to be a fairly common cause of death for pups, it has not commonly been detected in adult wolves in the past. Blastomycosis and pneumonia were determined to be the cause of death for one wolf.

Wolf Depredation Management

Wolf depredation incidents were investigated by United States Department of Agriculture – Wildlife Services. During the monitoring period, Wildlife Services confirmed 59 wolf complaints of the 103 investigated (Figure 6). Unconfirmed complaints were either confirmed to be due to causes other than wolves or lacked sufficient evidence to attribute a cause. Thirty-one incidents of wolf depredation to livestock and 6 incidents of wolf threat to livestock were confirmed on 31 different farms during the monitoring period (Table 6). This included 13 of 34 farms classified as chronic wolf depredation farms (38%). Livestock depredations included 29 cattle killed and 1 injured, and 4 sheep killed. The number of farms affected was the same as the previous monitoring year (Figure 7).

Twenty incidents of non-livestock depredation and 2 incidents of non-livestock threats were confirmed during the monitoring period. This included 17 dogs killed and 10 injured while actively engaged in hunting activities, and 1 dog killed and 2 injured outside of hunting situations (Figure 8). This was a 55% decrease from 2016-17 when 44 incidents of non-livestock depredation were confirmed. Fifteen of seventeen (88%) of hunting dog incidents occurred between July 15th and October 1st. One incident occurred in January and 1 occurred in March.

Regulatory Changes Affecting Wolf Management

Language that would have removed wolves in the Upper Great Lakes region from the federal endangered species list, and hence returned management authority to individual states, was included in both House and Senate versions of the 2018 omnibus federal funding bill. However, this effort, which would have also precluded any legal challenges to the delisting action, failed as the proposed delisting language was removed prior to passage of the final bill in March of 2018.

However, two separate wolf delisting processes have recently been initiated:

- 1) The House Appropriations Committee has released their FFY19 Department of Interior funding bill, which includes language that would delist wolves throughout the lower 48 states and preclude legal challenges to delisting. As of this writing, the bill has not yet been scheduled for markup on the House floor.
- 2) The U.S. Fish and Wildlife Service has begun reviewing the status of the gray wolf under the Endangered Species Act (ESA). Working closely with federal, state, tribal and local partners, the Service will assess the currently listed gray wolf entities in the lower 48 states using the best available scientific information. If appropriate, the Service will publish a proposal to revise the wolf's status in the *Federal Register* by the end of the calendar year. Any proposal will follow a robust, transparent and open public process that will provide opportunity for public comment.

With the gray wolf's recovery goals exceeded, the Service proposed delisting the species throughout the remainder of its range in 2013 under the previous administration. The proposal was based on sound science and predicated on wolves already being delisted in the Northern Rocky Mountains and Western Great Lakes. Unfortunately, the delisting of wolves in the Western Great Lakes region was overturned by the courts, which prevented the Service from moving forward with the full delisting proposal at that time.

In November of 2017, several Wisconsin state legislators introduced legislation that would have prohibited WDNR staff from spending funds on wolf management, with the exception of compensation payments for livestock and pet losses, and prevented WDNR law enforcement staff from enforcing federal and state laws related to wolf management. Assembly Bill 712 and Senate Bill 602 were both read into the record and referred to the relevant natural resource committees; AB712 was voted on and passed by the Assembly Committee on Natural Resources and Sporting Heritage and referred to the Committee on Rules. However, both bills failed as neither was introduced for a floor vote prior to the end of the legislative session.

Law Enforcement

Population monitoring and law enforcement efforts detected 7 wolves illegally killed within the monitoring period. Law enforcement staff conducted 4 wolf related investigations and issued 2 citations during the reporting period (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 increased 2% statewide from the previous year estimate (Stenglein, 2018). In wolf management units 1, 2, and 5, considered to be primary wolf range and containing 80% of the minimum winter wolf count, deer density estimates increased 19% compared to 2016. New recommendations from the County Deer Advisory Councils for deer population objectives were approved by the Natural Resources Board in 2018. The current

recommendations are more varied than the previous recommendations, but are still primarily to increase or maintain the deer population in each of the 6 wolf management units. There is no indication that prey density is, or will negatively impact the wolf population.

Literature Cited

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- Wydeven, A.P., Wiedenhoft, 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 possible wolf observations reported by natural resource agency personnel and private citizens in Wisconsin, 15 April 2017 to 14 April 2018.

Wolf Mgmt. Unit	Number of Sightings	Wolves Seen	Track or Sign Observations	Total Wolf Observations
1	17	29	25	42
2	22	31	20	42
3	12	15	4	16
4	9	20	1	10
5	16	24	2	18
6	89	117	18	107
Statewide	165	236	70	235

Table 2. 2017 Wisconsin wolf howl survey data.

Wolf Mgmt. Unit	Howl Surveys	Packs Surveyed	Packs Detected	Detected Packs with Pups	% Detected Packs with Pups
UNIT 1	50	35	20	14	70
UNIT 2	42	27	15	6	40
UNIT 3	10	9	2	1	50
UNIT 4	7	5	2	1	50
UNIT 5	37	25	13	11	85
UNIT 6	7	7	2	1	50
TOTAL	153	108	54	34	63

Table 3. Pack and lone wolf summaries for Wisconsin in winter 2017-2018.

Wolf Mgmt. Unit		# of Packs	# of Wolves in Packs	Loners	Total # of Wolves	Change from 2016-2017	# of Telemetry Monitored Wolves ^a	Average Annual Pack Territory ^b (mi ²)
1	Off Reservations	89	336-354	3	339-357		28	
	On Reservations	2	9-10	1	10-11		2	
	Total	91	345-364	4	349-368	-11.2%	30	50.2 (n=25)
2	Off Reservations	52	209-217	2	211-219		22	
	On Reservations	5	19	0	19		1	
	Total	57	228-236	2	230-238	11.7%	23	63.5 (n=18)
3	Off Reservations	28	83	1	84		7	
	On Reservations	0	0	0	0		0	
	Total	28	83	1	84	-28.2%	7	45.1 (n=6)
4	Off Reservations	11	34-37	4	38-41		0	
	On Reservations	0	0	0	0		0	
	Total	11	34-37	4	38-41	2.7%	0	
5	Off Reservations	34	142-151	2	144-153		10	
	On Reservations	0	0	0	0		0	
	Total	34	142-151	2	144-153	23.1%	10	36.7 (n=8)
6	Off Reservations	17	51	9	60		2	
	On Reservations	0	0	0	0		0	
	Total	17	51	9	60	9.1%	2	40.2 (n=1)
Statewide	Off Reservations	231	855-893	21	876-914		69	
	On Reservations	7	28-29	1	29-30		3	
	Total	238	883-922	22	905-944	-2.2%	72	51.8 (n=58)
Outside WI		1	2	0	2		1	

^aWolves 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 2017 to 14 April 2018.

Table 4. Research capture summary, body condition, and detection of ectoparasites in captured wolves and mortalities in Wisconsin from 15 April 2017 to 14 April 2018.

	n	Body Condition			# (%) w/Mange	# (%) w/Ticks
		Good	Fair	Poor		
Unit 1						
Research Captures	14	13 (93%)	1 (7%)		0	10 (71%)
Mortalities	19				0	
Unit 2						
Research Captures	11	9 (82%)	2 (18%)		0	6 (55%)
Mortalities	6				0	
Unit 3						
Research Captures	6	5 (83%)		1 (17%)	0	5 (83%)
Mortalities	3				0	
Unit 4						
Research Captures	0					
Mortalities	1				0	
Unit 5						
Research Captures	5	5 (100%)			0	3 (60%)
Mortalities	5				0	
Unit 6						
Research Captures	0					
Mortalities	2				0	
STATEWIDE AVERAGES						
Research Captures	36	32 (89%)	3 (8%)	1 (3%)	0	24 (67%)
Mortalities	36				0	

Table 5. Detected wolf mortality in Wisconsin 15 April 2017 to 14 April 2018.

Cause of Death	Wolf Management Unit						State Total	% of Total
	1	2	3	4	5	6		
Human Caused Mortality								
Agency Control	1						1	3%
Vehicle Collision	7 ^a	1	1	1	1 ^a	1	12	33%
Illegally Killed	1 ^a	4 ^b	1		1		7	19%
Capture Related	1 ^a						1	3%
Unknown Human Caused							0	
<i>Total Human Caused</i>	10	5	2	1	2	1	21	58%
Natural Mortality								
Disease / Injury	2	1 ^a					3	8%
Intra-specific Aggression	1 ^a						1	3%
Euthanized (non-control)	2		1				3	8%
Unknown Natural Causes	1						1	3%
<i>Total Natural Causes</i>	6	1	1	0	0	0	8	22%
<i>Unknown Causes</i>	3^b	0	0	0	3^a	1	7	19%
Total Detected Mortality	19	6	3	1	5	2	36	

^aIncludes 1 radio collared wolf^bIncludes 2 radio collared wolves

11 radio collared wolf mortalities all being monitored at time of death

Table 6. Wolf depredation management in Wisconsin, 15 April 2017 to 14 April 2018.

	Wolf Management Unit						State Total
	1	2	3	4	5	6	
Livestock Cases							
Depredation	14	0	8	0	2	7	31
Threat	5	0	0	0	1	0	6
Chronic Farms Affected	9	0	2	0	0	2	13 of 34 (38%)
Total Farms Affected	15	0	6	0	3	7	31
Cattle Killed	14		9		1	5	29
Cattle Injured						1	1
Sheep Killed					2	2	4
Non-Livestock Cases							
Depredation	9	1	5	1	2	2	20
Threat	1	0	0	0	1	0	2
Dogs Killed While Actively Engaged in Hunting Activities	8		6	1	1	1	17
Dogs Injured While Actively Engaged in Hunting Activities	2	3		1		4	10
Dogs Killed While Not Engaged in Hunting Activities						1	1
Dogs Injured While Not Engaged in Hunting Activities			1		1		2

Table 7. Summary of law enforcement activity 15 April 2017 to 14 April 2018.

# of wolf hunting related complaints received:	0
# of wolf trapping related complaints received:	0
# of wolf related investigations conducted:	4
# of car killed wolves	3
# of hunting related citations issued:	2
# of trapping related citations issued:	0
# of verbal warnings issued:	0
<hr/>	
# of incidentally trapped wolves recovered:	0
# of Illegally harvested wolves recovered:	2
# of shot & unrecovered wolves:	0
# of unknown cause of death wolves found:	0
# of other dead/injured wolves recovered:	0
Total Wolves Recovered	2

Table 8. White-tailed deer post-hunt density estimates in wolf management units in 2016 & 2017.

Wolf Mgmt. Unit	# of Deer Mgmt. Zones	Deer Range (mi ²)	2016 Post-Hunt Mean Deer Density (Deer/mi ²)	2017 Post-Hunt Mean Deer Density (Deer/mi ²)	% Change	% Deer Range in each 2018-20 Deer Population Objective
1	7	6,516	18.7	21.3	+11%	43% Increase 36% Maintain 22% Decrease
2	6	4,573	19.2	26.6	+39%	49% Increase 51% Maintain
3	4	3,141	31.0	31.4	+1%	26% Increase 74% Maintain
4	4	2,305	35.7	38.6	+8%	67% Maintain 33% Decrease
5	7	2,315	31.5	34.1	+8%	69% Increase 31% Maintain
6	53	16,995	51.7	50.0	-3%	3% Increase 68% Maintain 30% Decrease
TOTAL	81	35,845	37.3	38.4	+2%	

Deer range and post-hunt deer estimates based on Jennifer Stenglein, 2018, Final 2017 SAK Population Estimates 03-06-2018, 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>.

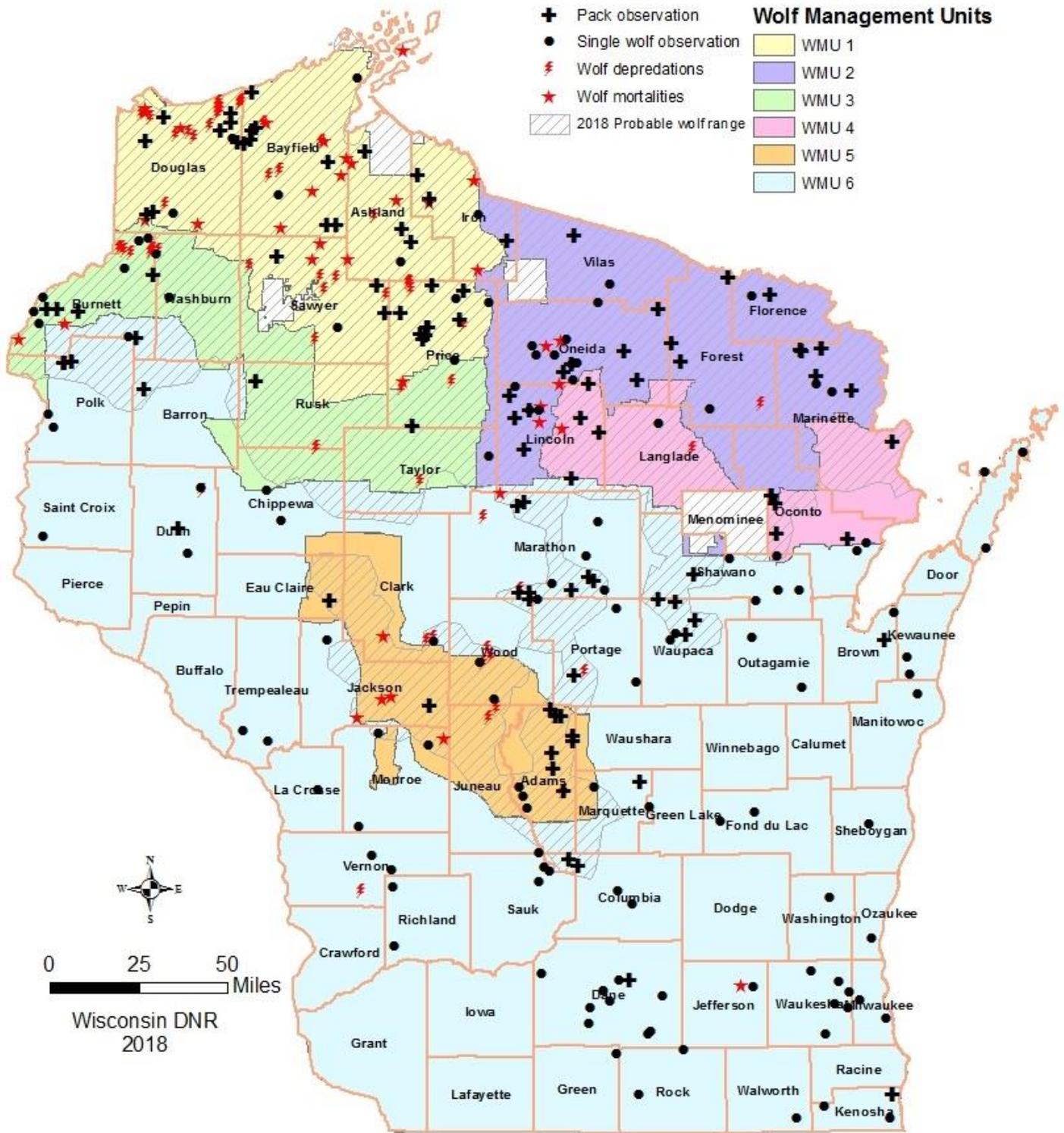


Figure 1. Probable wolf pack range, wolf mortalities, verified and probable wolf depredations, and verified, probable and indeterminate wolf observation reports in Wisconsin 15 April 2017 to 14 April 2018.

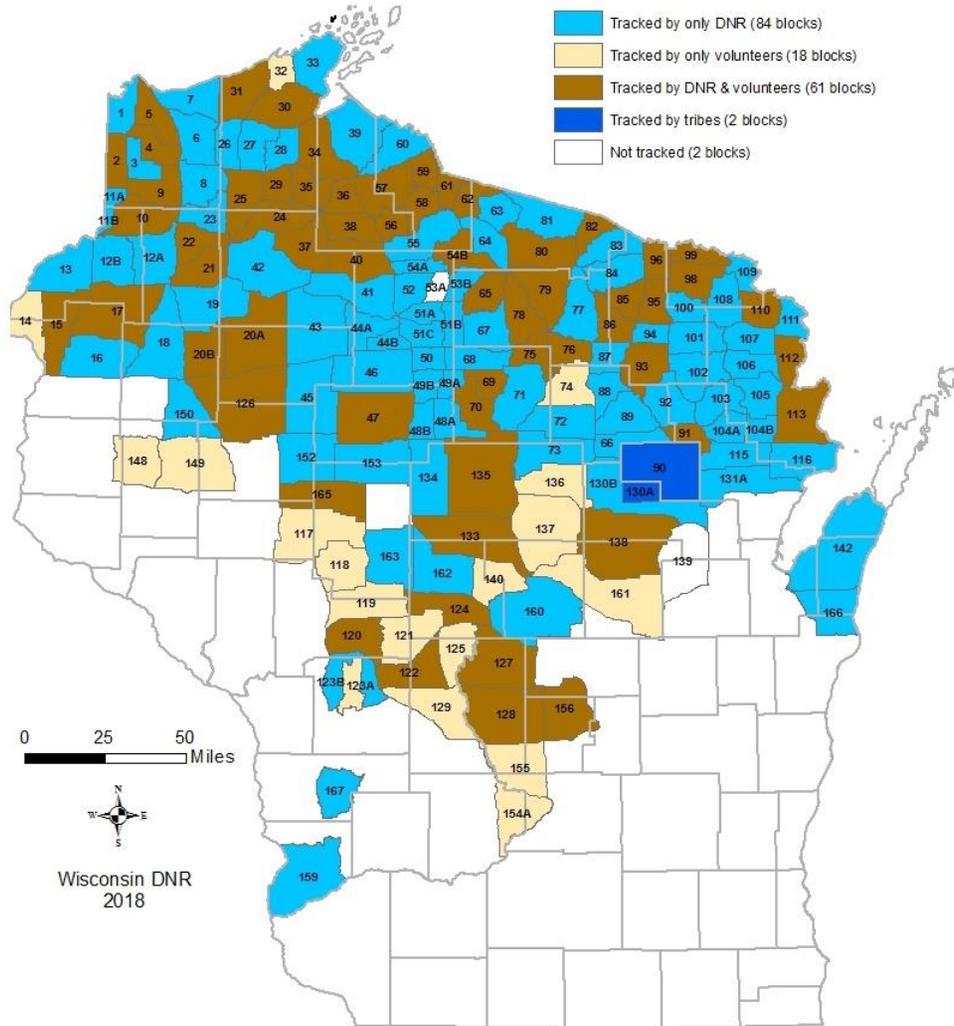


Figure 2. Wisconsin carnivore survey blocks tracked: winter 2017-2018.

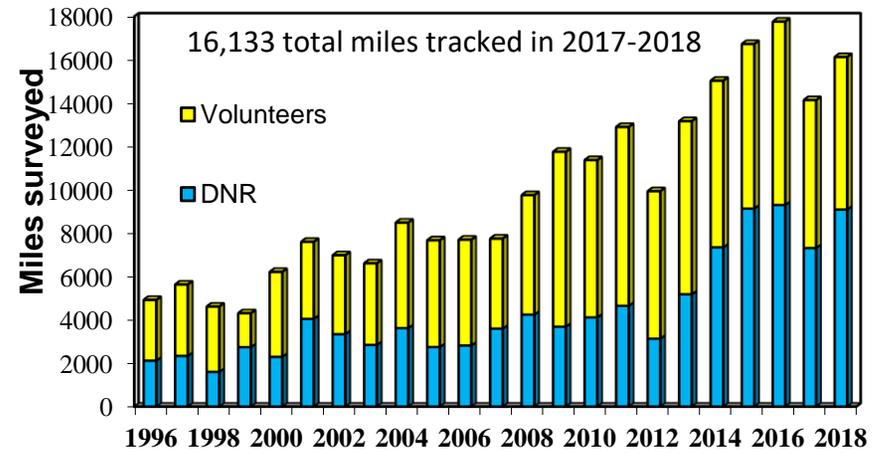


Figure 3. Carnivore track surveys in Wisconsin by WDNR & volunteers 1996-2018

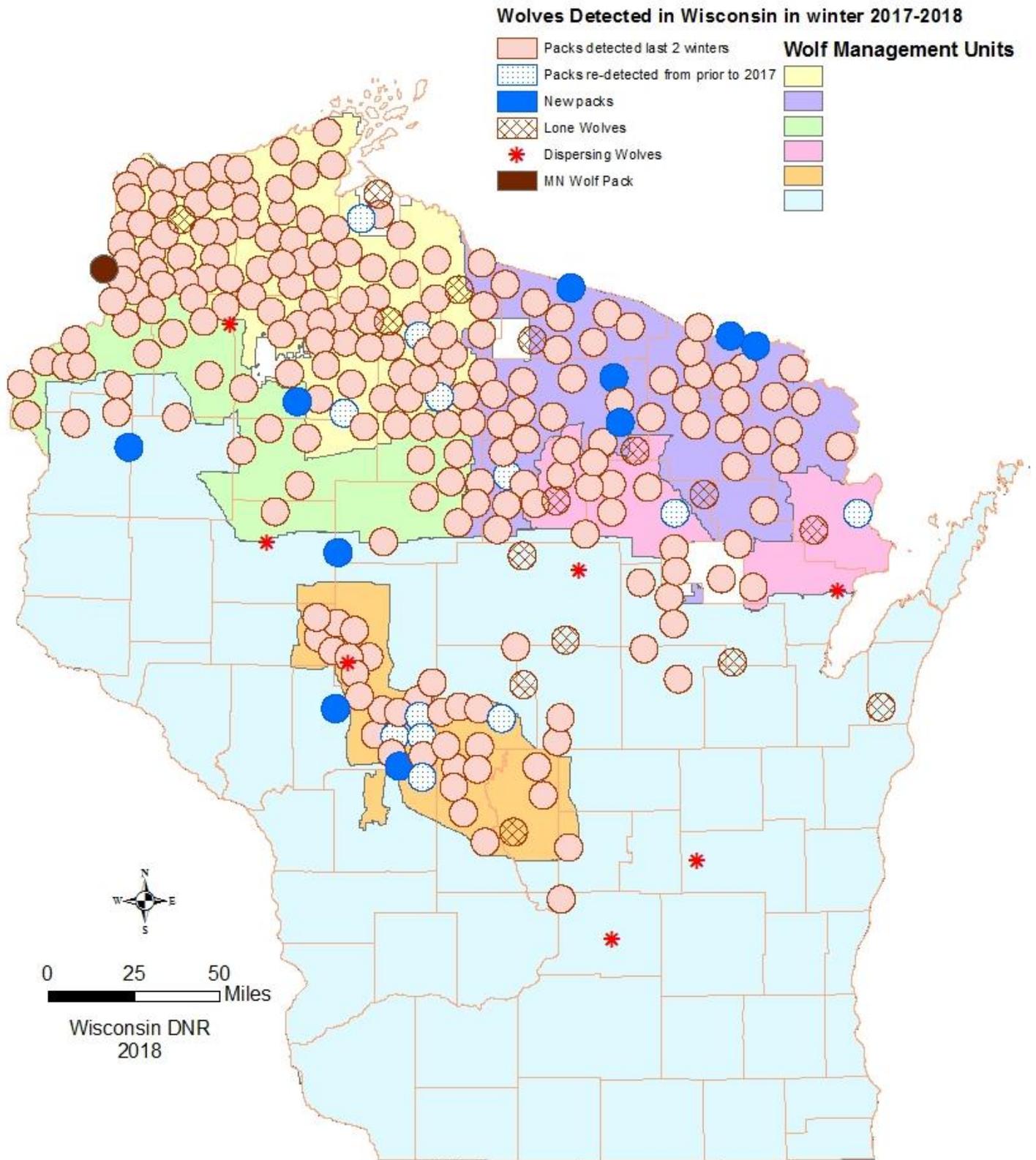


Figure 4. Wolves detected in Wisconsin in winter 2017-2018.

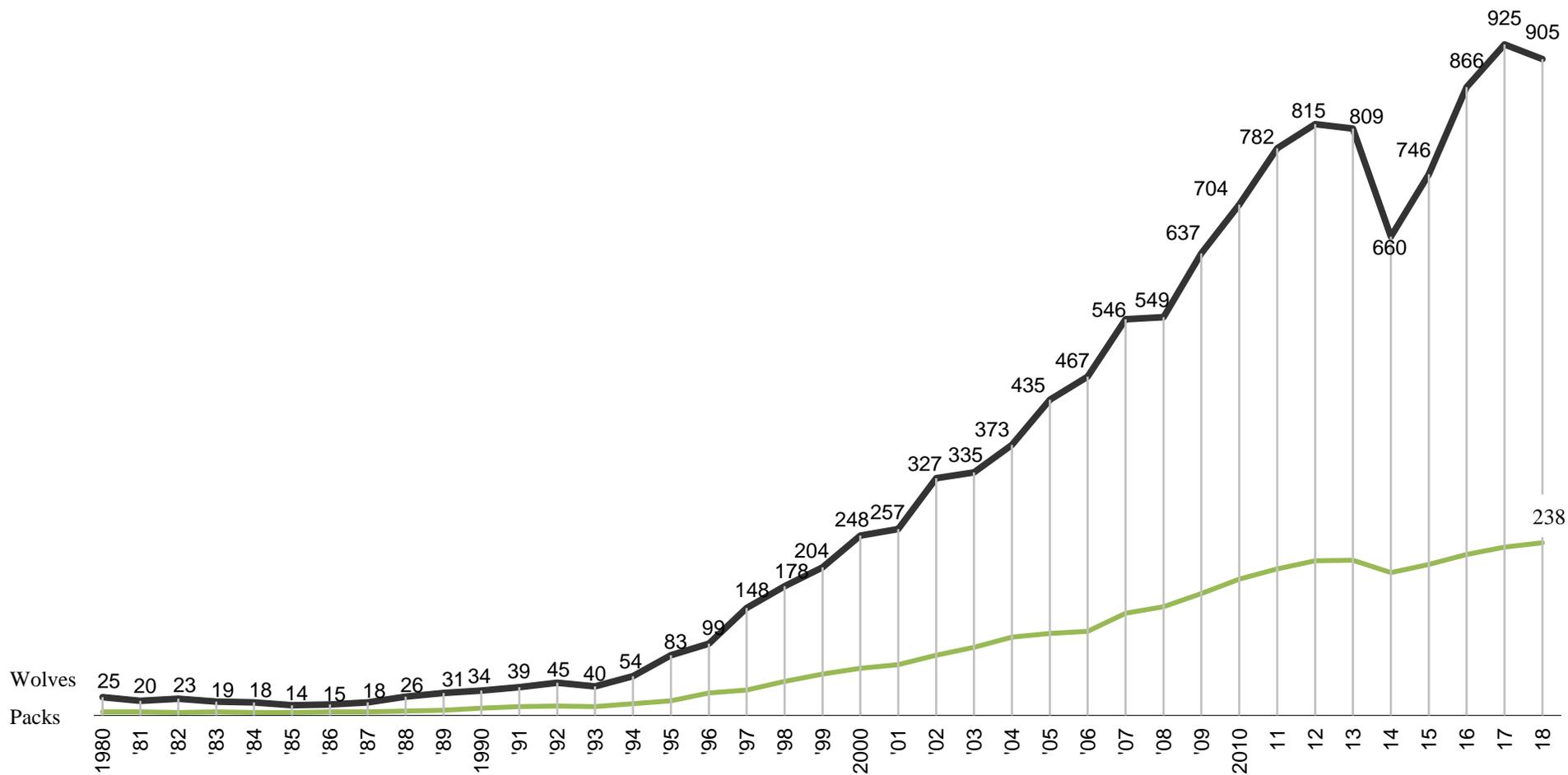


Figure 5. Changes in Wisconsin Gray Wolf Population: 1980-2018.

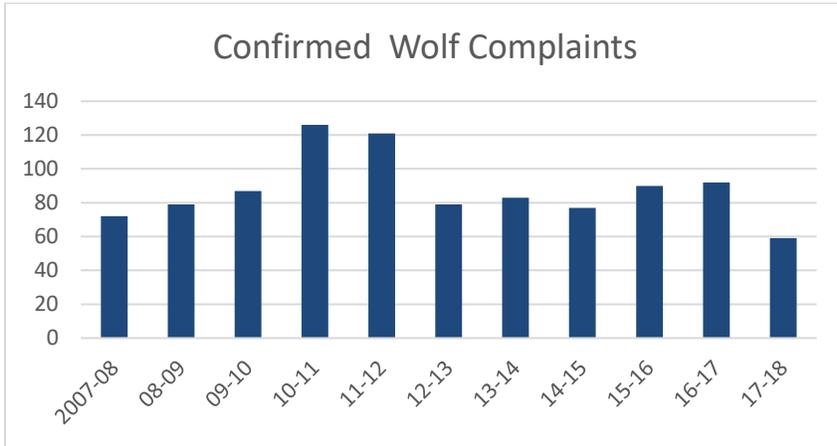


Figure 6: Total number of confirmed wolf complaints 2007-2017 wolf monitoring years

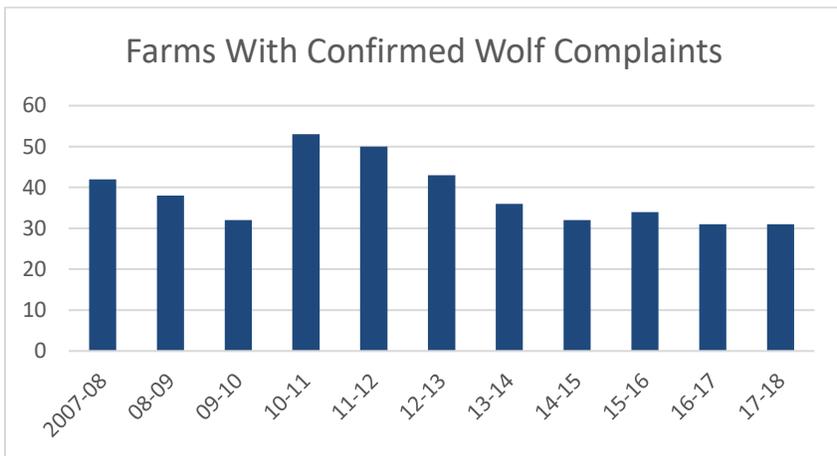


Figure 7: Farms with Confirmed Wolf Complaints 2007-2017 wolf monitoring years

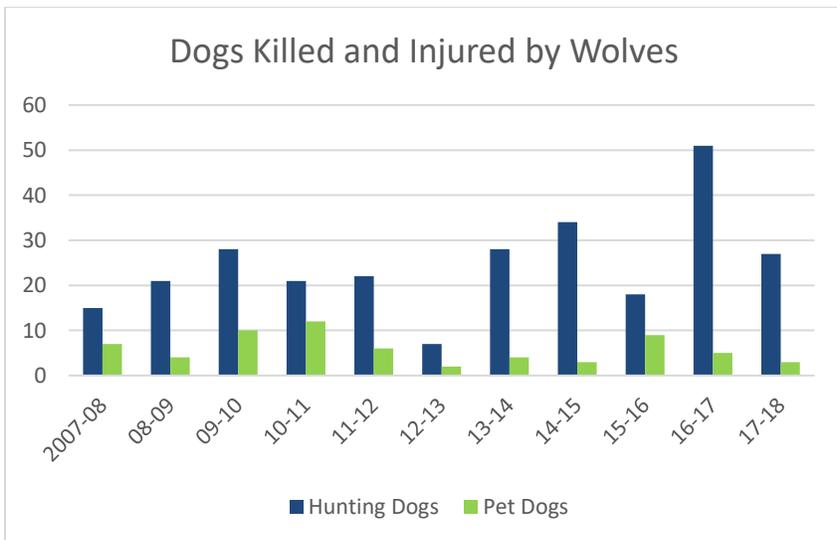


Figure 8: Dogs killed & injured by wolves 2007-2017 wolf monitoring years