

ESTIMATING THE ABUNDANCE OF WOLVES IN MICHIGAN



Why monitor wolf abundance?

- **Recovery Criteria:**
 - Federal: Combined MI & WI population of ≥ 100 wolves for a minimum of 5 consecutive years.
 - Federal: 5-factor threat analysis (habitat, overuse, disease, inadequate protection, other factors)
 - State: Population of ≥ 200 wolves for 5 consecutive years.
 - Federal: 5-year post-delisting monitoring
- **Wolf harvest management**

Actions

Legal Challenges

1974: Listed-Federal Endangered

1976: Listed-State Endangered

2002: Reclassified-State Threatened

2003: Reclassified-Federal Threatened

2004: Federal Delisting Proposed

2007: Federal Delisting

2009: Federal Delisting; State Delisting

2012: Federal Delisting

2021: Federal Delisting

2005: Federal Reclassification enjoined and delisting invalidated

2008: Federal Delisting enjoined

2009: Federal Delisting Withdrawn

2014: Federal Delisting enjoined

2017: 2014 Federal Court Decision Upheld

2021: On going litigation



Evolution of Wolf Survey Methods

Wolf Recovery
Begins



1989

Evaluation of
other methods



2002

Evaluation of
a G.L's occupancy
model



2020

1995



Survey entire UP

2007



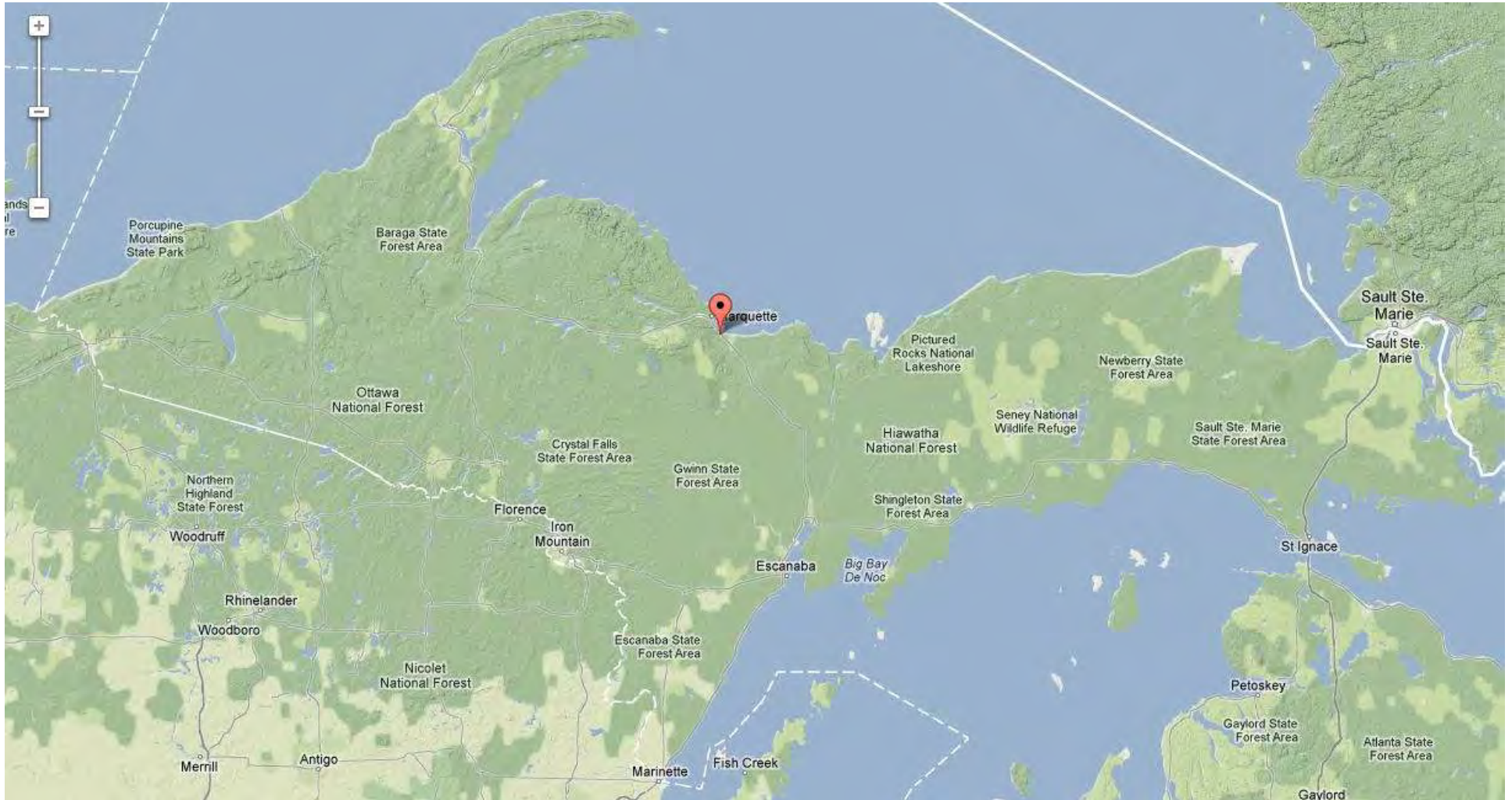
Implemented
sampling
scheme

Winter Wolf Survey

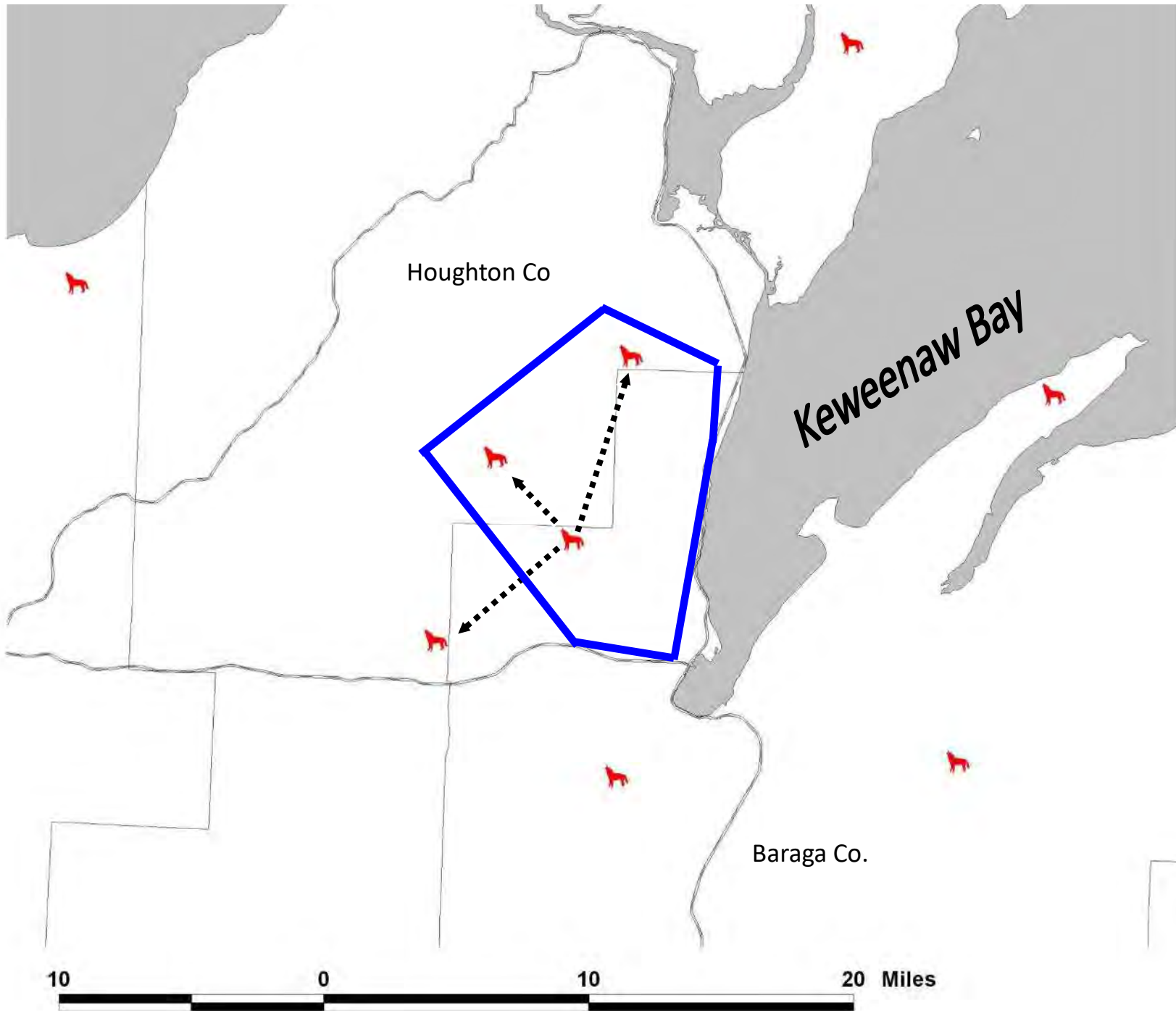
- Intensive & extensive search for wolf tracks and sign



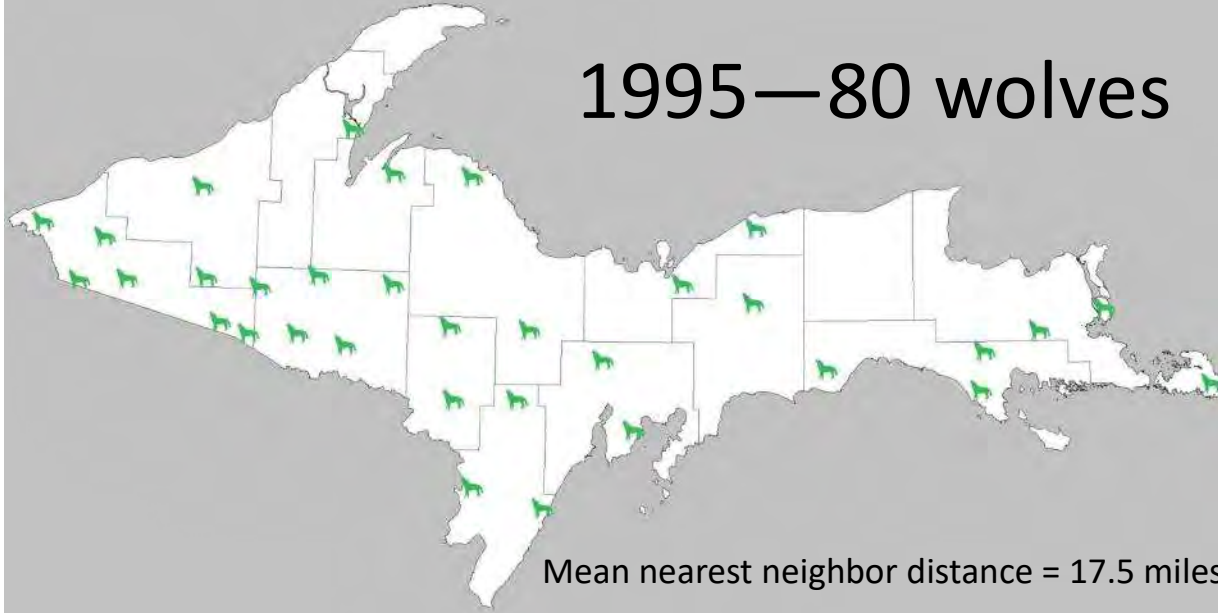
Winter Wolf Survey



Upper Peninsula: $\sim 16,500$ mi² or 43,000 km²

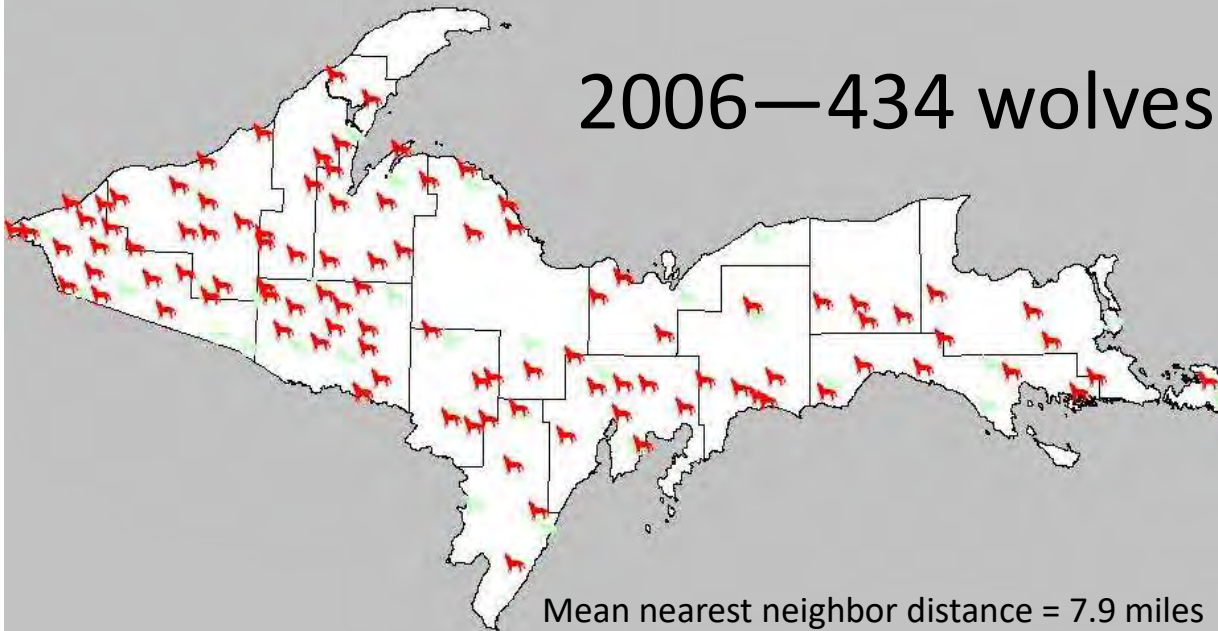


1995—80 wolves



Mean nearest neighbor distance = 17.5 miles

2006—434 wolves



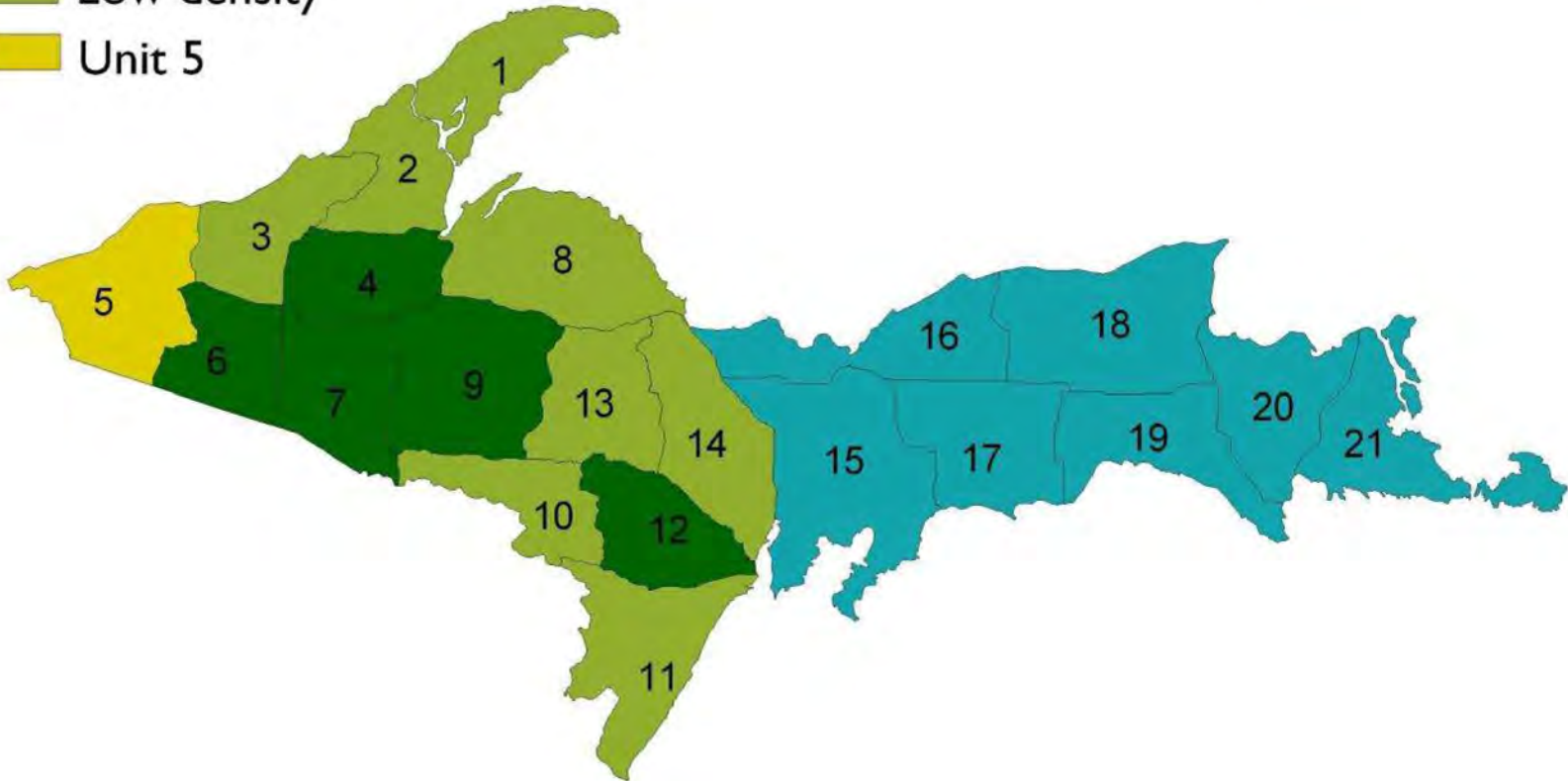
Mean nearest neighbor distance = 7.9 miles

Survey Unit Stratification

West UP

- High density
- Low density
- Unit 5

East UP



100 0 100 200 Kilometers



Sources of Error

Are we missing packs?

- Probably not--data suggests high level of effort is effective

Are we missing loners?

- Yes--(MI-1-7%; literature-10-15%)

Are we counting all members of a pack?

- To evaluate how many, we are missing:
 - Double counts
 - Independent survey crews

How accurate are the minimum population estimates?

Pack Area	2001-02		2002-03		2003-04		2004-05	
	DNR	MTU	DNR	MTU	DNR	MTU	DNR	MTU
<u>Ewen</u>	3	3	3	3	4	4	4	6
Baraga Plains	7	8	7	12	7	9	8	14
<u>Sidnaw/Kenton</u>	4	4	3	3	8	4	11	6
Trout Creek	5	5	2	2	4	6	4	5
<u>Gardner</u>	---	---	6	5	9	8	7	4
<u>Curwood</u>	---	---	9	11	3	4	5	2
Total Count	19	20	30	35	35	35	39	37

The field work is done--What are the next steps?



Final Review

Information used in wolf survey review

- Geographically where was the pack found?
- Justification for surrounding packs, which also includes packs that are not in the survey unit (or even a unit that is being surveyed)
- How many times was the pack found?
- How far were the tracks followed?
- When was the last snow fall?
- When during the survey was the pack found (January or March)
- Is telemetry available?
- Historic pack information (Telemetry and past survey locations)
- Signs of breeding (Urinations, Estrus)
- Other data when available (Predator Prey, etc.)



Track Data



MICHIGAN WOLF TRACK SURVEY DATA 2017-2018

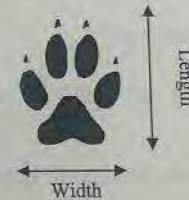
Observers Name JEFF LUKOWSKI
 Date 2/24/18 Time 4:00pm Temperature 30°F
 County MENOMINEE Town HDN Range 26W Section 22
 GPS Coordinates (decimal minutes, WGS84) Latitude _____ Longitude _____

SNOW TYPE:
 Hard pack Crusted _____ Soft Fluff Wet Melt _____
 Approximate hours since last snowfall 12HRS.

TRACKS:

(Tracks)/ Sighting (circle one)
 Pack Name NORTH POWERS
 Number of sets of tracks or animals 7
 Track measurement- several by random (average)

Length <u>5</u> "	Width <u>4 1/4</u> "
Length <u>4 3/4</u> "	Width <u>4</u> "
Length <u>4 3/4</u> "	Width <u>4</u> "
Length <u>4 3/4</u> "	Width <u>4</u> "
Length <u>4 1/2</u> "	Width <u>3 3/4</u> "



Track stride- several by random (average)
 (measured from front of 1st step to front of 3rd step)



Tracks: (Straight lined)/ Staggered (circle one)

Approximate track age 1 DAY
 Approximate depth of track in snow 1/2" - 5"
 Approximate distance followed 4.16 MILES

RLU's found YES number found in area 11
 SQU's found YES number found in area 2
 Estrus (yes)/ no
 Scat (yes)/ no Collected yes/(no)
 Photos taken (yes)/ no

WOLF TRACK SURVEY MAP
"2017-18"
UNIT 9
JEFF LUKOWSKI

MICHIGAN
 DEPARTMENT OF NATURAL RESOURCES
EAST PART
IRON COUNTY

CABLE LAKE
2/17/18 12:30P.M.

10 WOLVES COME FROM SOUTH PRIVATE 2-TRACK. ONTO
 CABLE LAKE ROAD. MARK INTERSECTION OF PRIVATE
 2-TRACK AND CABLE LAKE ROAD. THEN HEAD WEST ON
 CABLE LAKE ROAD. FOLLOW 0.7 MILES. FROM ROAD
 THEN WOLVES HEAD NORTH. THROUGH OPEN FIELD AREA. AND
 THEN WOLVES HEAD NORTH. FOUND 3 RLU'S. FOUND 3 SCALP,
 KEEP HEADING NORTH. FOUND 3 RLU'S. FOUND 3 SCALP. SOME
 FOUND 3 SCALP. FOUND 3 RLU'S. IN DEER IN AREA. SOME
 BARBARA PLOUSE IN AREA. SOME RABBITS IN AREA.

REPUBLIC
HOLMES
2/9/18 8:30A.M.

WOLVES COME FROM NORTH. OLD
 SKID TRAIL ONTO LURE'S ROAD. MARK
 INTERSECTION. THEN HEAD EAST ON
 LURE'S ROAD. FOLLOW 0.4 MILES. THEN
 HEAD SOUTH THRU SWAMPY AREA. FOUND
 3 RLU'S. FOUND 1 SCALP. FOUND 1 SCALP.
 FOUND 3 RLU'S. NO DEER IN AREA. SOME
 MOOSE IN AREA. LOGGERS SAY THEY SEE
 MOOSE EVERYWHERE. THERE'S A LOT OF

SHANK LAKE
SWOLVES
2/11/18 11:15A.M.

WOLVES COME FROM NORTH. OLD
 SKID TRAIL ONTO LURE'S ROAD. MARK
 INTERSECTION. THEN HEAD EAST ON
 LURE'S ROAD. FOLLOW 0.4 MILES. THEN
 HEAD SOUTH THRU SWAMPY AREA. FOUND
 3 RLU'S. FOUND 1 SCALP. FOUND 1 SCALP.
 FOUND 3 RLU'S. NO DEER IN AREA. SOME
 MOOSE IN AREA. LOGGERS SAY THEY SEE
 MOOSE EVERYWHERE. THERE'S A LOT OF

MITCHELL
WOLVES
2/13/18 12:30P.M.

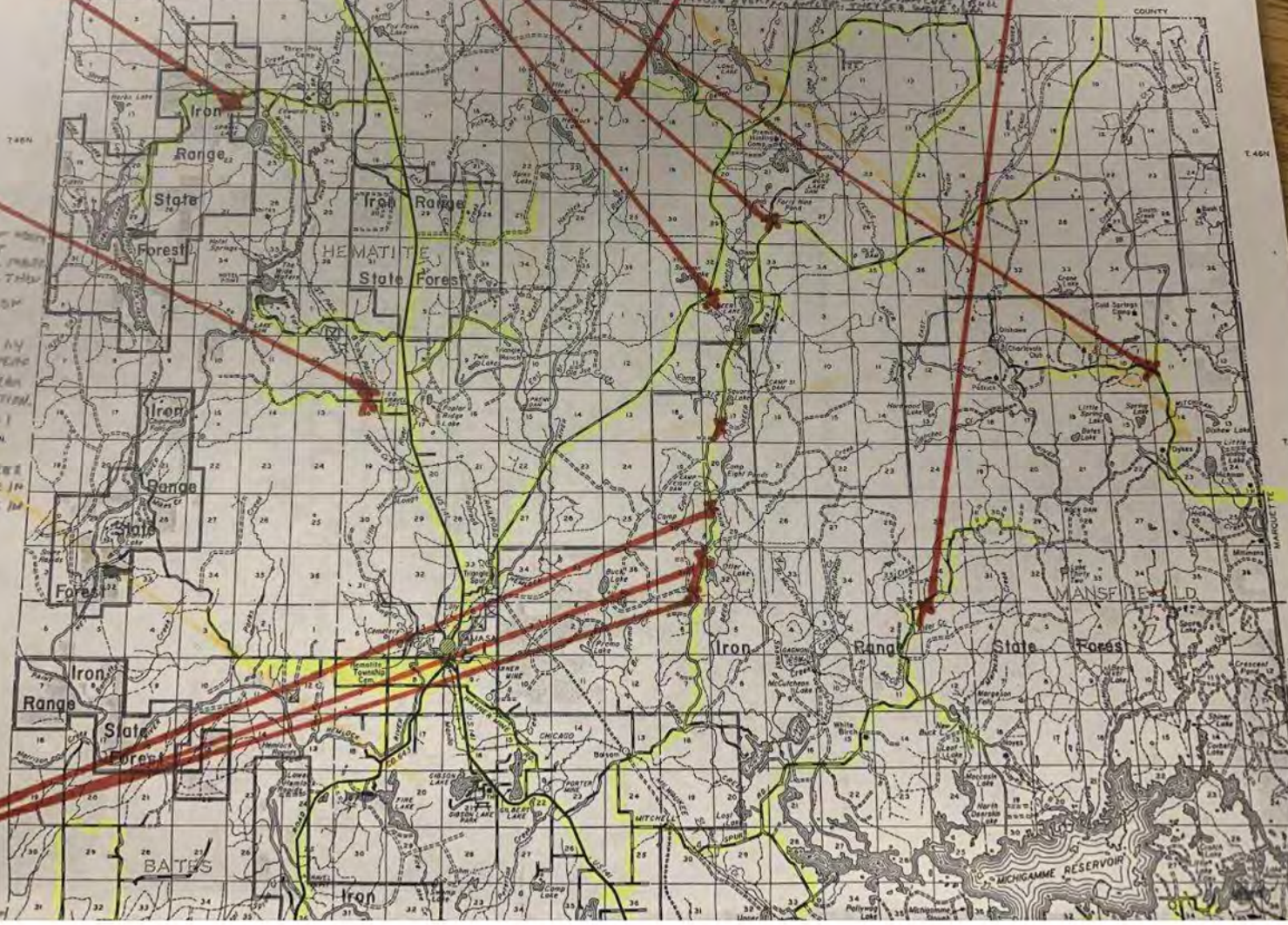
WOLVES COME FROM WEST
 ONTO DEER FOUR CORNER ROAD. THEN
 WOLVES HEAD SOUTH ON DEER
 FOUR CORNER ROAD. FOLLOW 0.1 MILES.
 THEN WOLVES HEAD EAST ON
 2-TRACK ROAD. FOUND 3 RLU'S.
 FOUND 1 SCALP. FOUND 1 SCALP.
 LOTS OF DEER IN AREA.

NET RIVER
WOLVES
2/17/18 2:30P.M.

WOLVES COME FROM WEST
 ONTO WEST ROAD NET
 RIVER. ACROSS ROAD. MARK
 COMING ONTO ROAD. THEN
 WOLVES HEAD WEST ON
 WEST NET RIVER
 ACCESS ROAD. FOLLOW IN
 MILES. THEN WOLVES HEAD
 SOUTH ON 2-TRACK
 ROAD. MARK INTERSECTION.
 FOUND 6 RLU'S. FOUND 1
 SCALP. FOUND 1 SCALP.
 FOUND 3 RLU'S. NO DEER
 IN AREA. SOME MOOSE IN
 AREA. SOME RABBITS IN
 AREA.

DEER LAKE
WOLVES
2/17/18 9:00A.M.

WOLVES COME FROM WEST
 ONTO WEST ROAD NET
 RIVER. ACROSS ROAD. MARK
 COMING ONTO ROAD. THEN
 WOLVES HEAD WEST ON
 WEST NET RIVER
 ACCESS ROAD. FOLLOW IN
 MILES. THEN WOLVES HEAD
 SOUTH ON 2-TRACK
 ROAD. MARK INTERSECTION.
 FOUND 6 RLU'S. FOUND 1
 SCALP. FOUND 1 SCALP.
 FOUND 3 RLU'S. NO DEER
 IN AREA. SOME MOOSE IN
 AREA. SOME RABBITS IN
 AREA.



ROBELO BRIAN
 EMPLOYEE SIGN

Additional

**WINTER WOLF SURVEY
JUSTIFICATION SUMMARY
2017-2018**

Observers Name JEFF LUKOWSKI Date 2/6/18
 Unit 4
 County HOUGHTON Town SON Range 35W Sec 20
 Pack/Pair/Loner ID PRICKETT DAM ([REDACTED]) Number of Wolves 5
 Breeding Territorial Signs

Adjacent Packs/Pairs/Loners:	<input type="checkbox"/> None close	Number of Wolves
(1) <u>BARAGA PLAINS</u>		<u>5</u>
(2) <u>ROUSSEAU</u>		<u>4</u>
(3) <u>SIDNAW/KENTON ([REDACTED])</u>		<u>8</u>
(4) <u>SIX MILE ([REDACTED])</u>		<u>4</u>
(5) <u>STURGEDAL GORGE ([REDACTED])</u>		<u>3</u>

([REDACTED]) **Justifications (check one or more):**

Justification (1) PRICKETT DAM vs BARAGA PLAINS

- A. Both packs observed from the air on the same day.
- B. Both packs radio-collared and telemetry shows both packs using different areas.
- C. Neighboring radio-collared pack never located in this area.
- D. No evidence of tracks found crossing roads between these two areas.

Additional Supporting Evidence

- 1. Tracks traveling opposite direction found on the same day.
- 2. Tracks found repeatedly in same locations during past track surveys.
- 3. Evidence of den sites and pups in both areas during the same year.

([REDACTED])

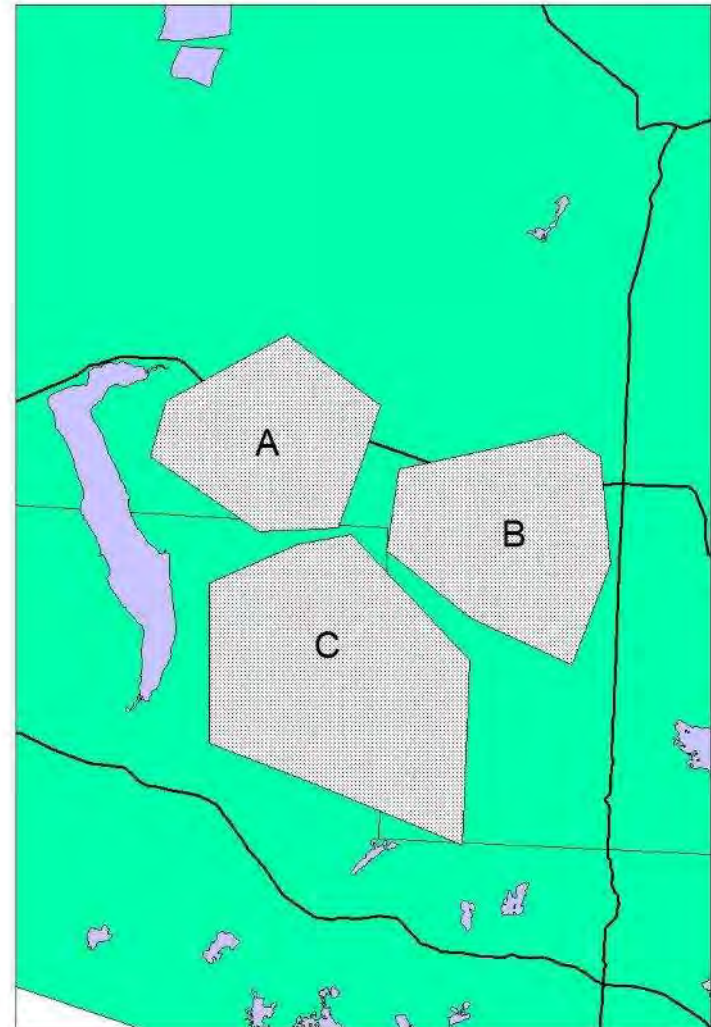
Justification (2) PRICKETT DAM vs ROUSSEAU

- A. Both packs observed from the air on the same day.
- B. Both packs radio-collared and telemetry shows both packs using different areas.
- C. Neighboring radio-collared pack never located in this area.
- D. No evidence of tracks found crossing roads between these two areas.

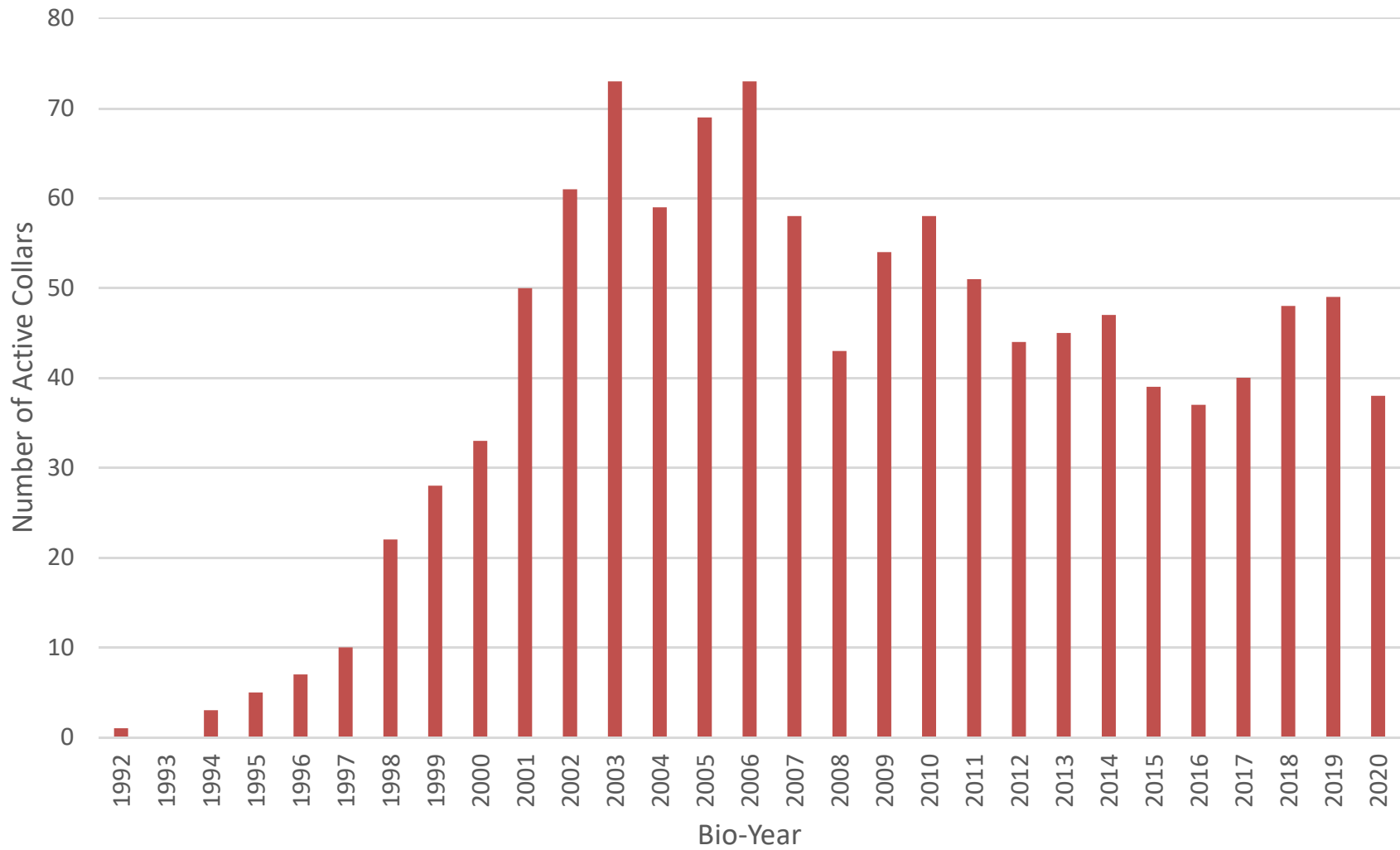
Additional Supporting Evidence

- 1. Tracks traveling opposite direction found on the same day.
- 2. Tracks found repeatedly in same locations during past track surveys.
- 3. Evidence of den sites and pups in both areas during the same year.

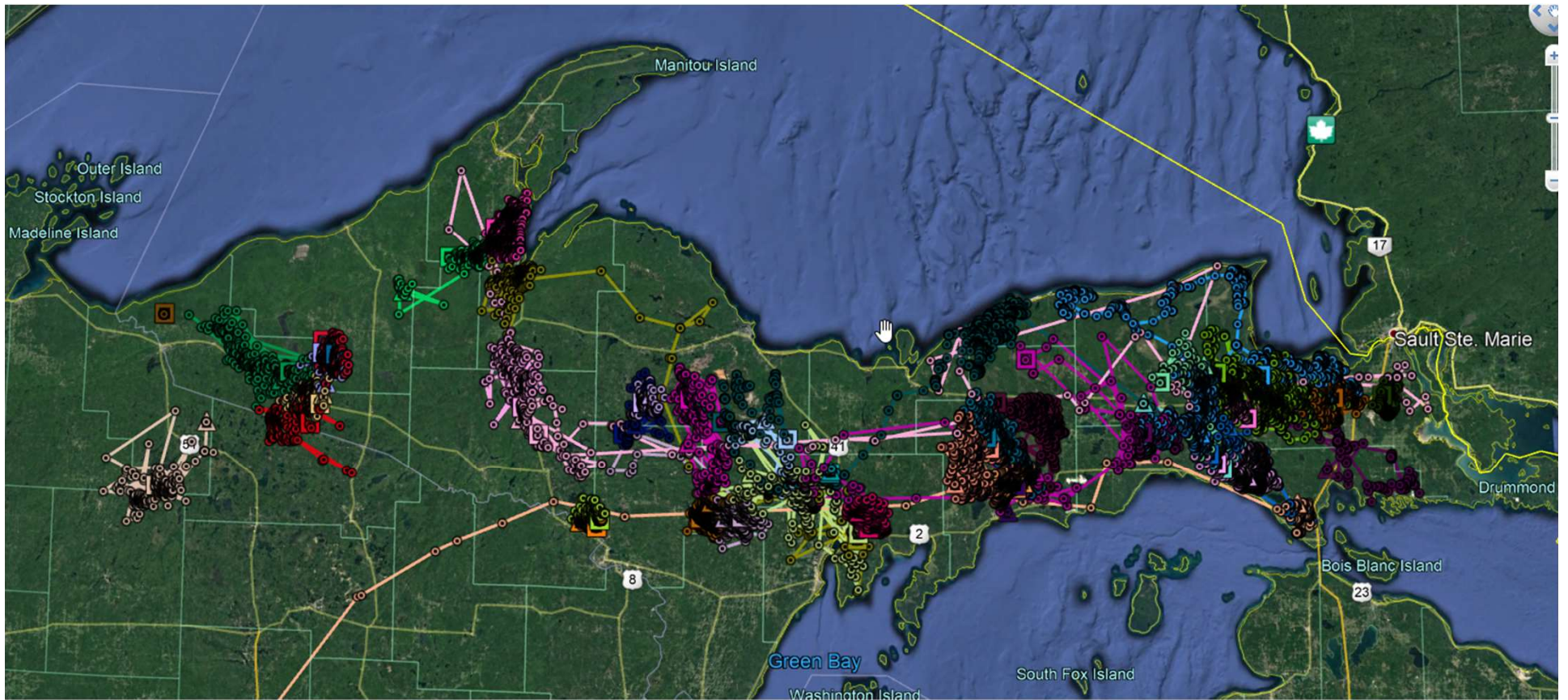
Justifications



Number of Active Collars

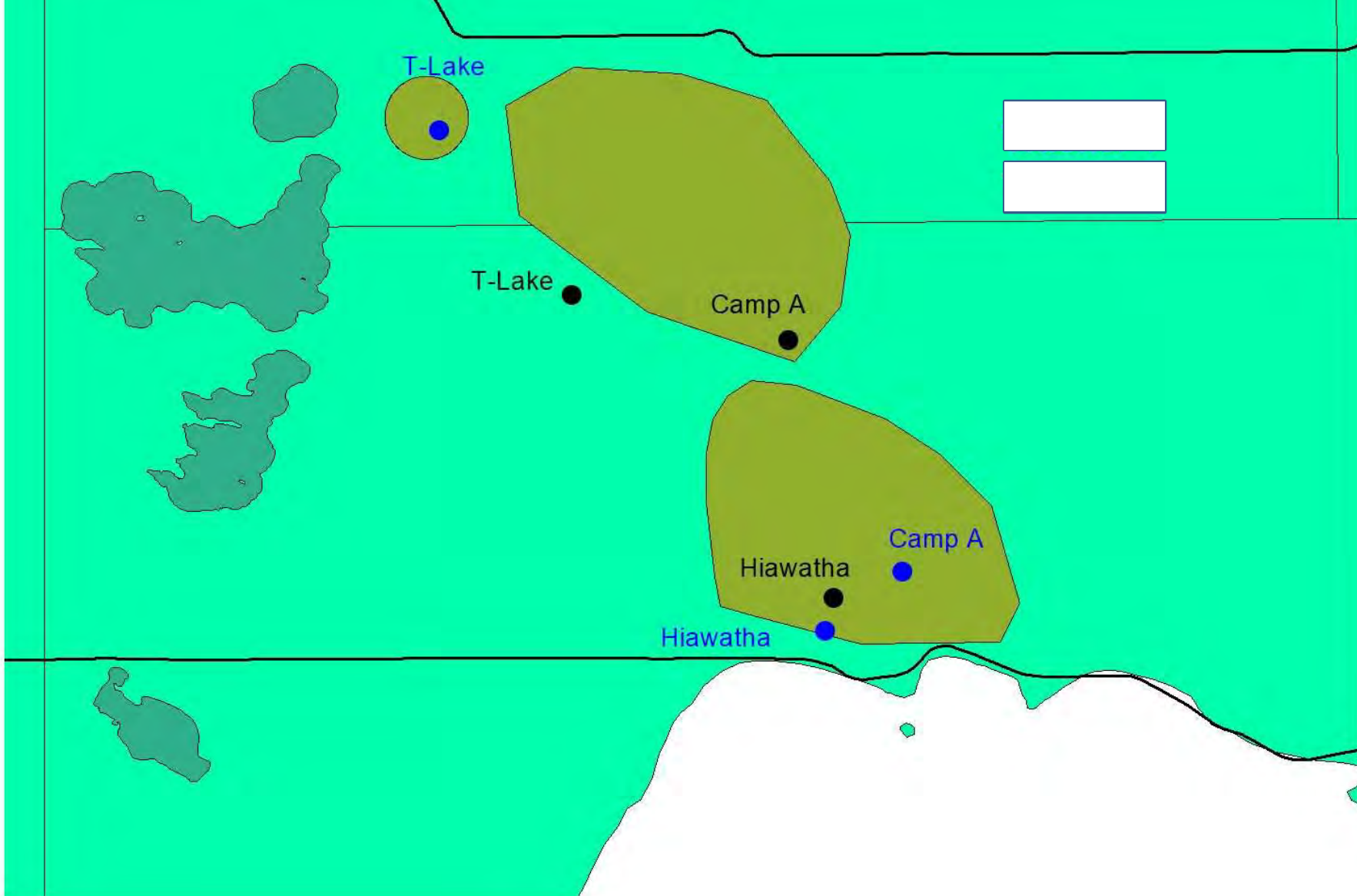


Over 50,000 individual locations in year



2020 Data

2018 Data



2018 Data

Kristie – Found T-Lake on 1/18 (5), 2/28 (4), and 3/14 (6) and had justifications for Danaker, Dollarville, Mile Alley, Camp A and Big Ditch.

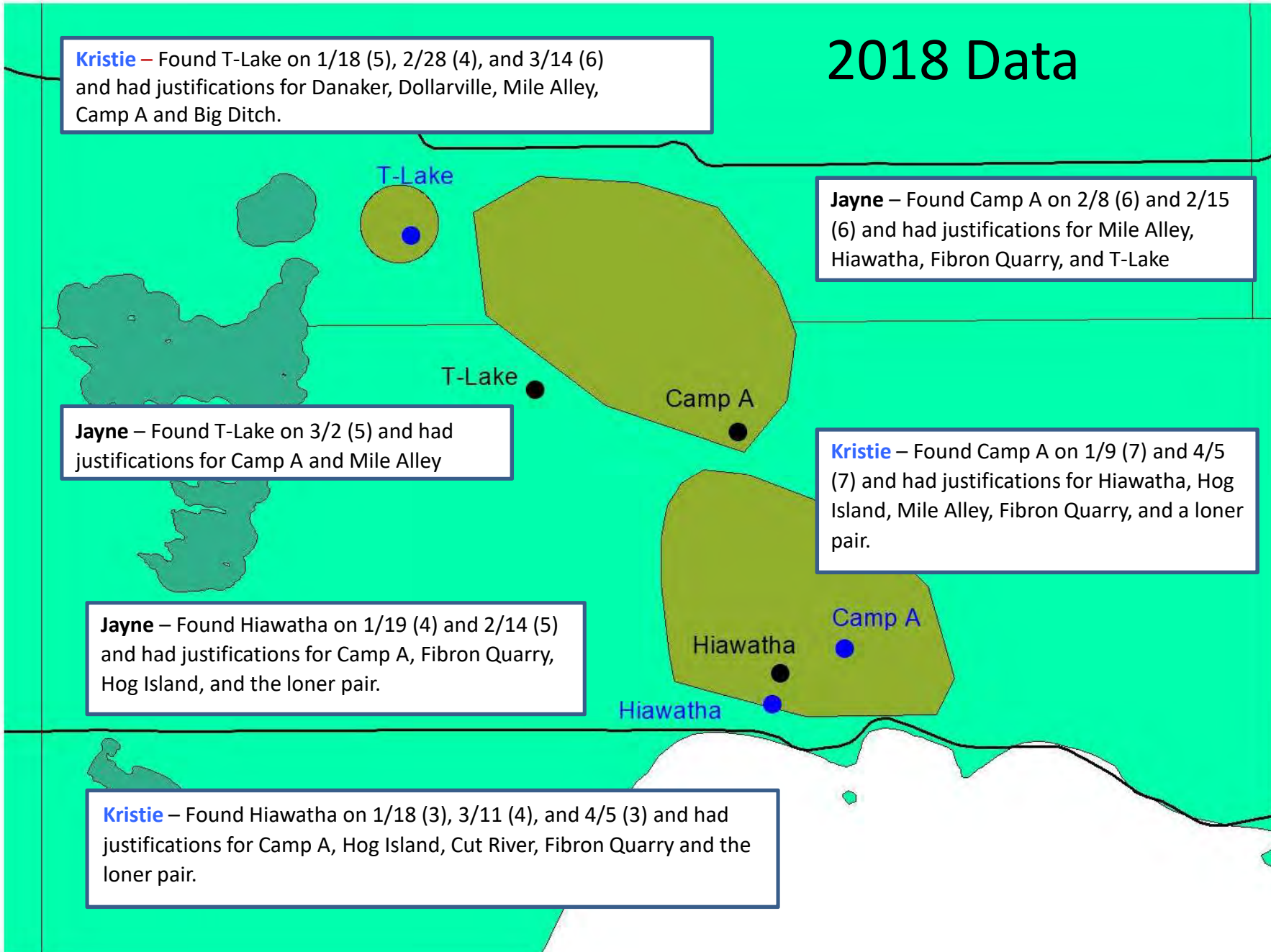
Jayne – Found Camp A on 2/8 (6) and 2/15 (6) and had justifications for Mile Alley, Hiawatha, Fibron Quarry, and T-Lake

Jayne – Found T-Lake on 3/2 (5) and had justifications for Camp A and Mile Alley

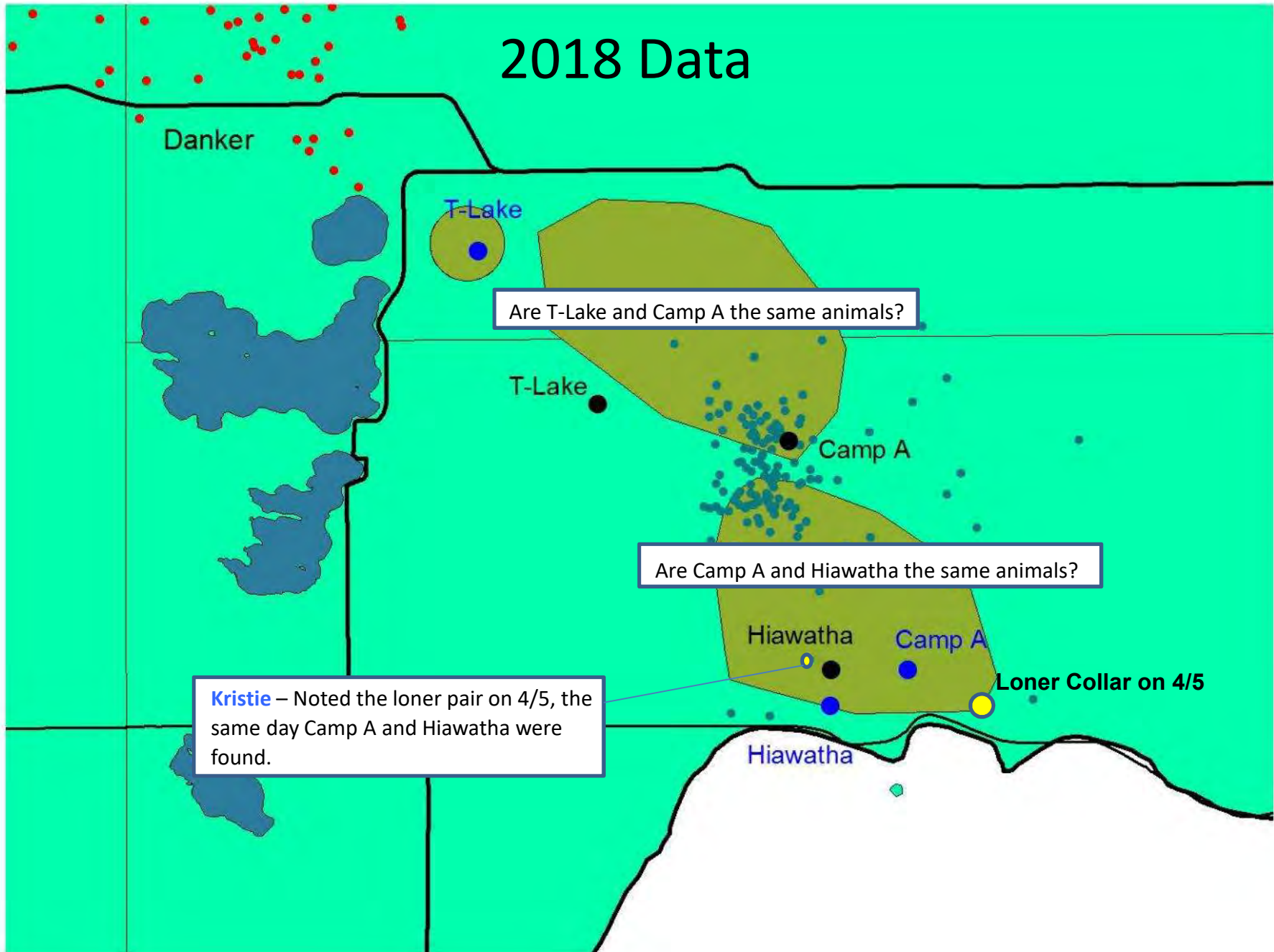
Kristie – Found Camp A on 1/9 (7) and 4/5 (7) and had justifications for Hiawatha, Hog Island, Mile Alley, Fibron Quarry, and a loner pair.

Jayne – Found Hiawatha on 1/19 (4) and 2/14 (5) and had justifications for Camp A, Fibron Quarry, Hog Island, and the loner pair.

Kristie – Found Hiawatha on 1/18 (3), 3/11 (4), and 4/5 (3) and had justifications for Camp A, Hog Island, Cut River, Fibron Quarry and the loner pair.



2018 Data



2018 Data

Did **Kristie** find part of the Danker pack?

T-Lake

Are T-Lake and Camp A the same animals?

T-Lake

Did **Kristie** find Camp A and not Hiawatha?

We could not work out a justification to count all three packs

Did **Jay**

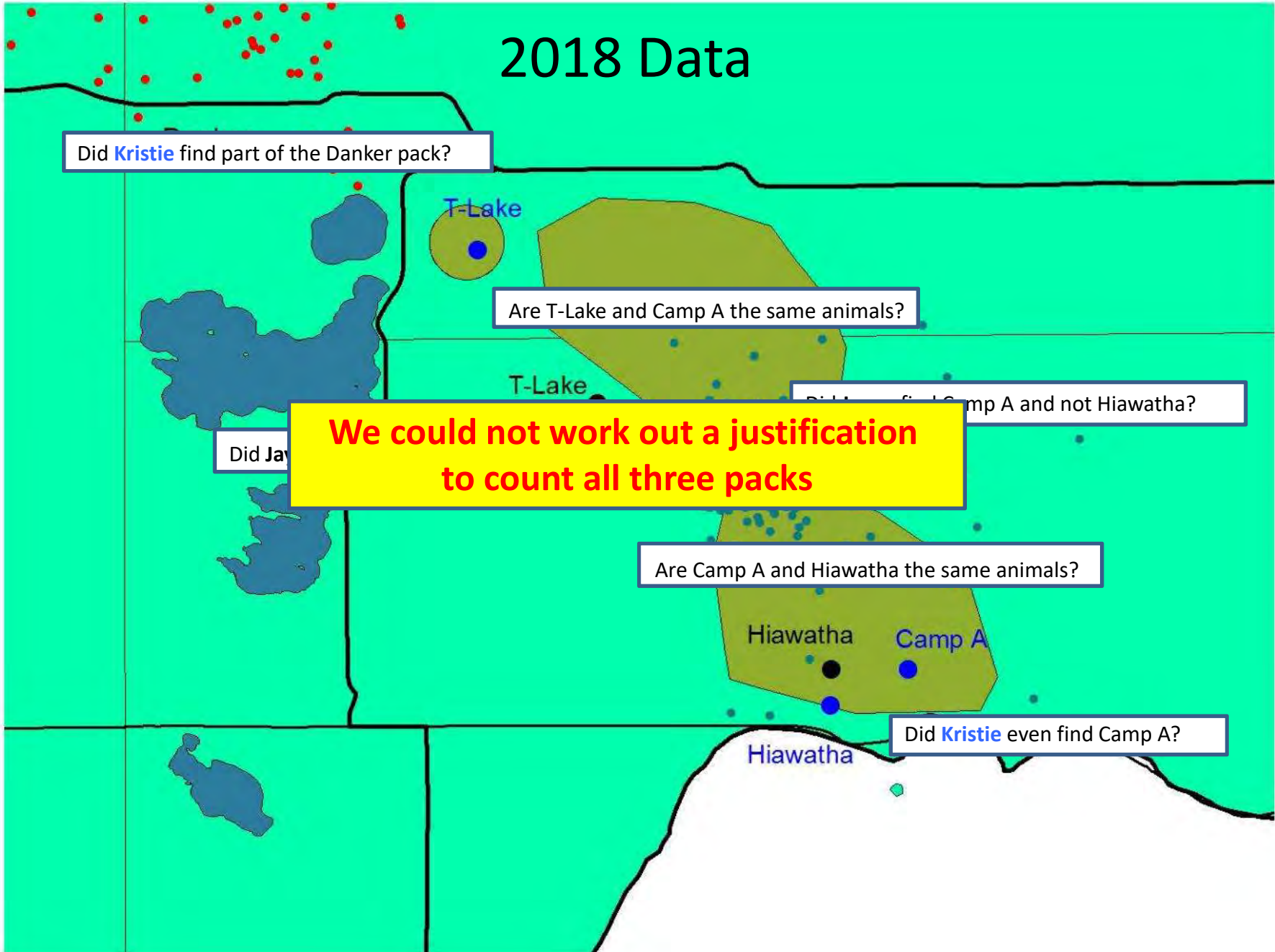
Are Camp A and Hiawatha the same animals?

Hiawatha

Camp A

Did **Kristie** even find Camp A?

Hiawatha

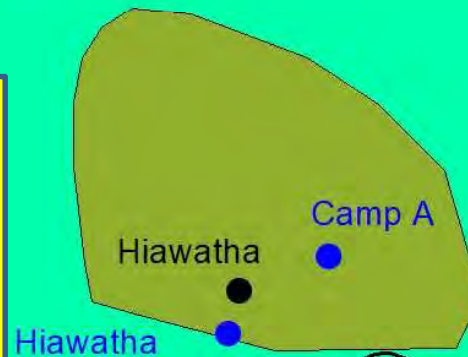


2018 Data

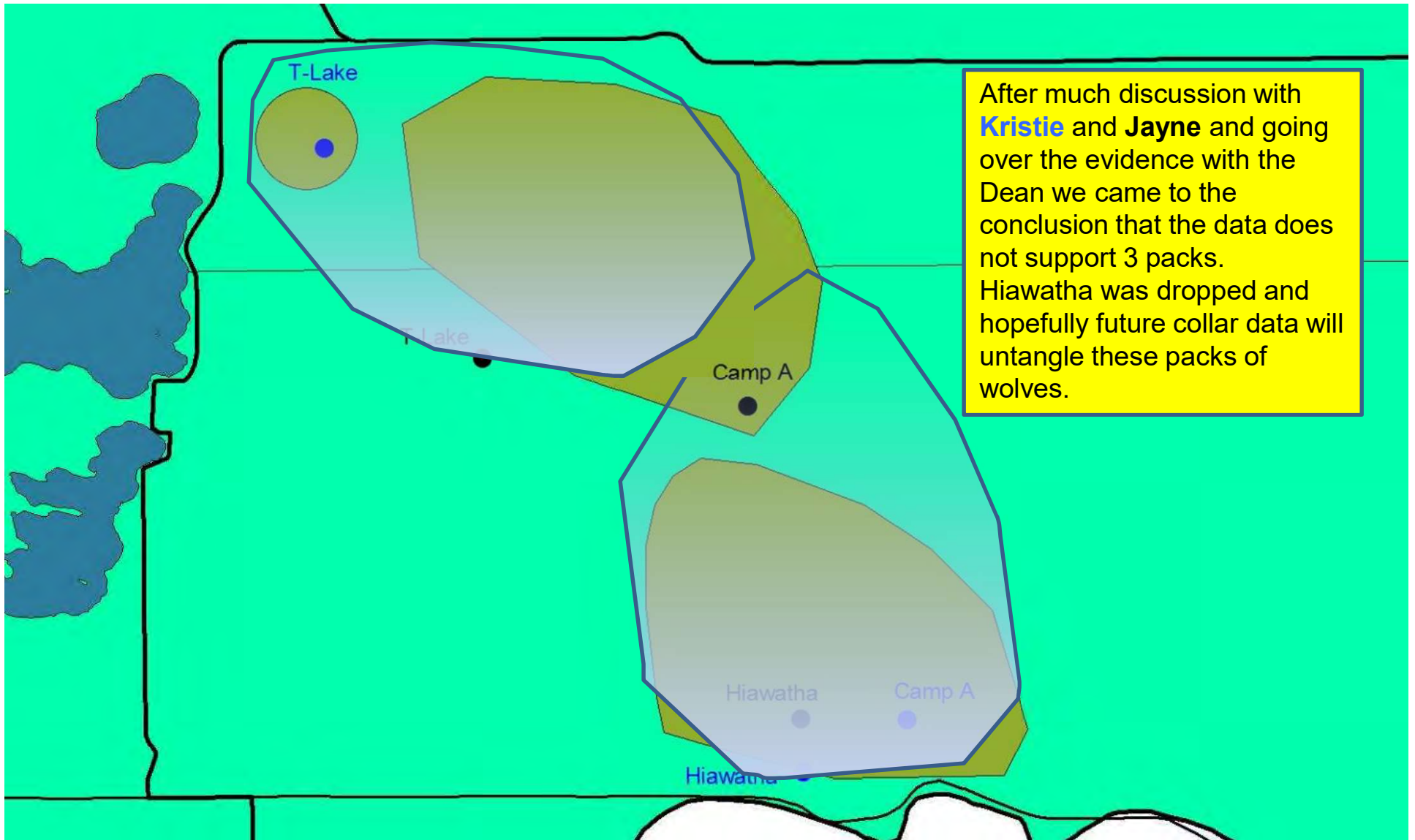
Neither **Kristie** or **Jayne** found T-Lake and Camp A on the same day and given the Telemetry and the location for Camp A and Danaker. Is this correct?

Kristie (7 animals) found Camp A way out of their normal range, and didn't follow them very far, so it makes us wonder about the extra animal. It could have been the Loner (Pair) following Camp A.

Jayne found (6 animals) and has them in the collared wolf core area but she followed them for 3 miles.



2018 Data



Brampton 2018

Rock

Caleb found this pack (5) on 3/9 in the same area as Kevin but also did not provide a Justification Report, He did try to coordinate with Colter to find X-Skunk Creek, however he could not find them on 3/9 suggesting these animals may be X-Skunk Creek.

Kevin found this pack (5) on 2/27 but did not provide a Justification Report for this pack.

Jeff was then asked to look for this pack because they are so close to the X-Skunk Creek pack but after multiple attempts he could not locate them and did not believe there was a separate pack using this area.

X-Skunk Creek

Colter and Karen also tried to locate the two packs but could not find X-Skunk Creek on the same day.

Brian made many attempts to find these animals and was unable to find these animals even after a discussion with Caleb to look in the same area and X-Skunk Creek on the same day.

MICHIGAN WOLF TRACK SURVEY DATA
2017-2018

Observers Name K. Swanson
Date 2/27/18 Time 12:20 PM Temperature 42°
County Delta Town 41N Range 25W Section 24
GPS Coordinates (decimal minutes, WGS84) Latitude 45. [redacted] Longitude -87. [redacted]

SNOW TYPE:

Hard pack _____ Crusted _____ Soft Fluff Wet Melt
Approximate hours since last snowfall _____ soft fluff over

TRACKS:

Tracks / Sighting (circle one) Rock on X-skunk Creek.
Pack Name Brampton
Number of sets of tracks or animals 5
Track measurement- several by random (average)

Length <u>4</u> "	Width <u>3.5</u> "
Length <u>4.5</u> "	Width <u>4</u> "
Length _____ "	Width _____ "
Length _____ "	Width _____ "
Length _____ "	Width _____ "



Open Agriculture (Farmland) _____

Tracks found near known pack territories yes / no

Narrative: Provide a brief description of wolf activity including the approximate distance and direction from the location of radio-

packed out walked to north east
Recently minimum tracks. The wolves came
property headed SE after visiting two
aspen. the timber sale area. Caleb,
yet been attempting to find all packs
of sale is from the area on the same day, but
deer carcass. This locale is within
Colter and the Brampton area but could
in this also be the Rock Pack, or
it is pro even X-skunk creek.
No collars

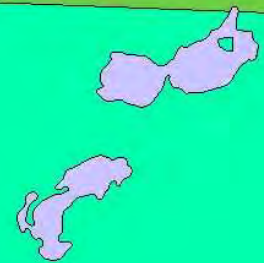
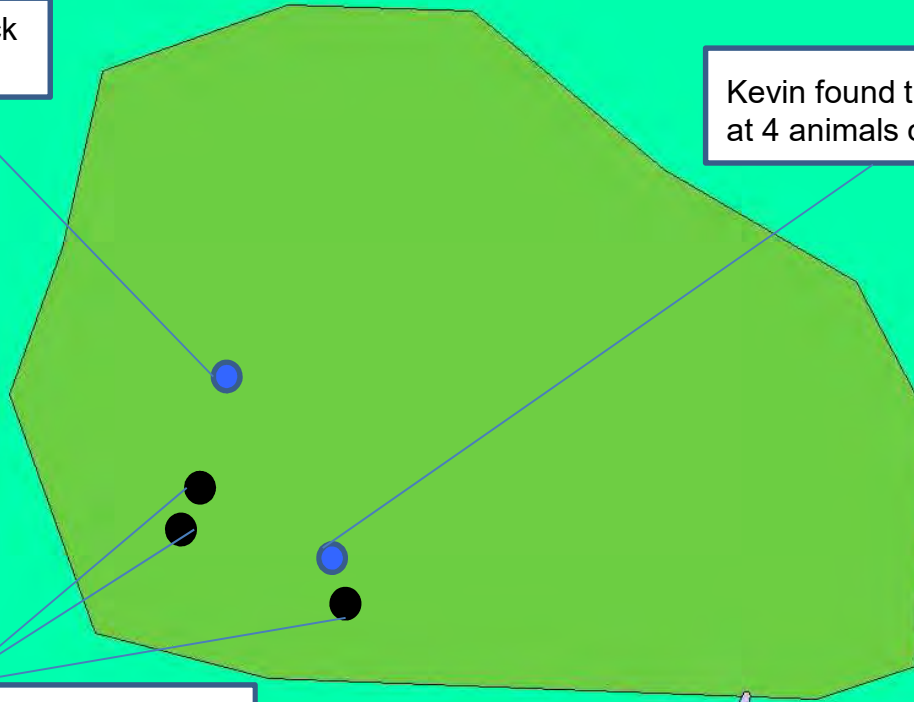


Strawberry Lake 2018

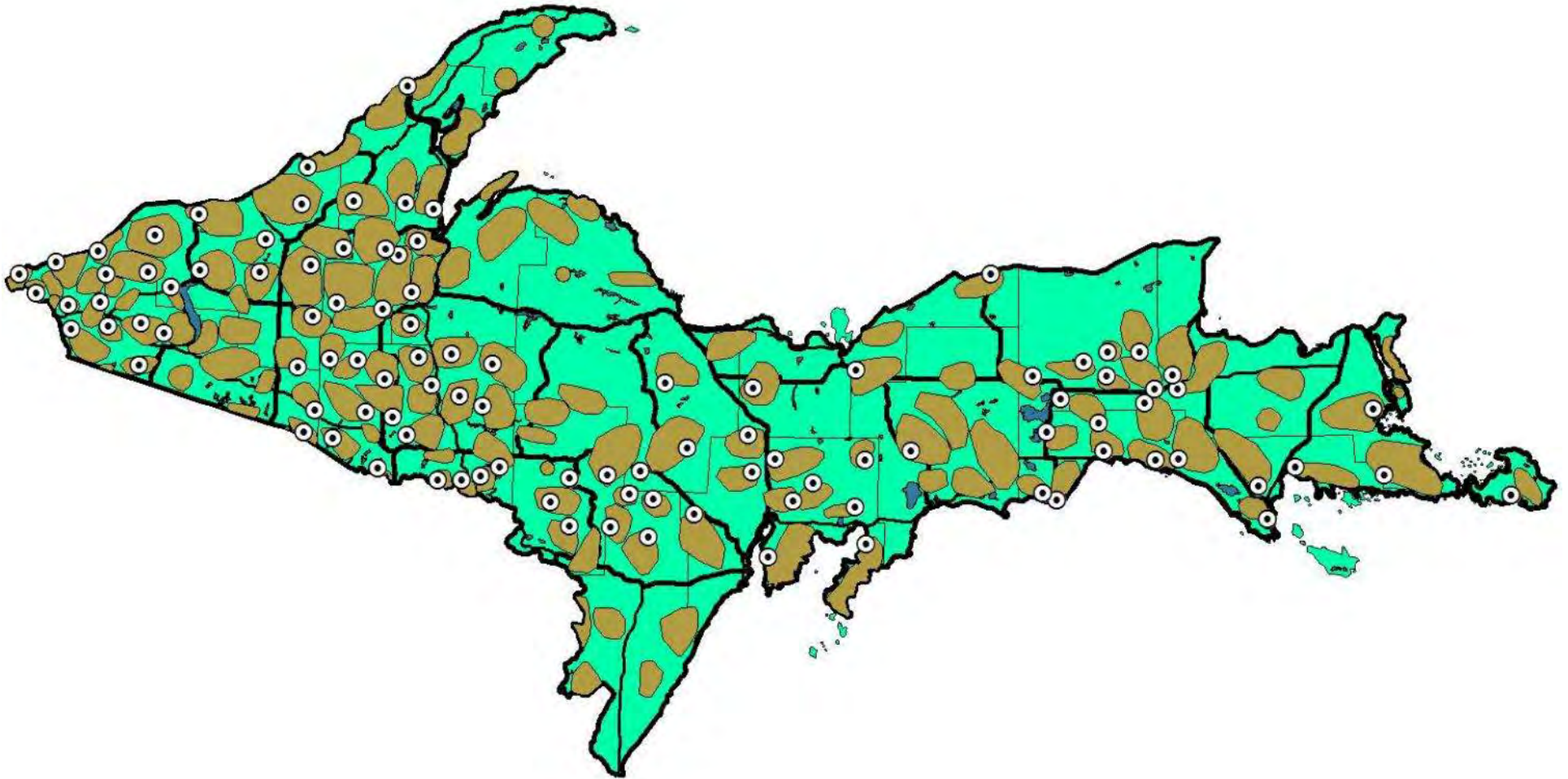
Kevin and Caleb found this pack together on 1/2 at 2 animals

Kevin found this pack 1 time at 4 animals on 1/5.

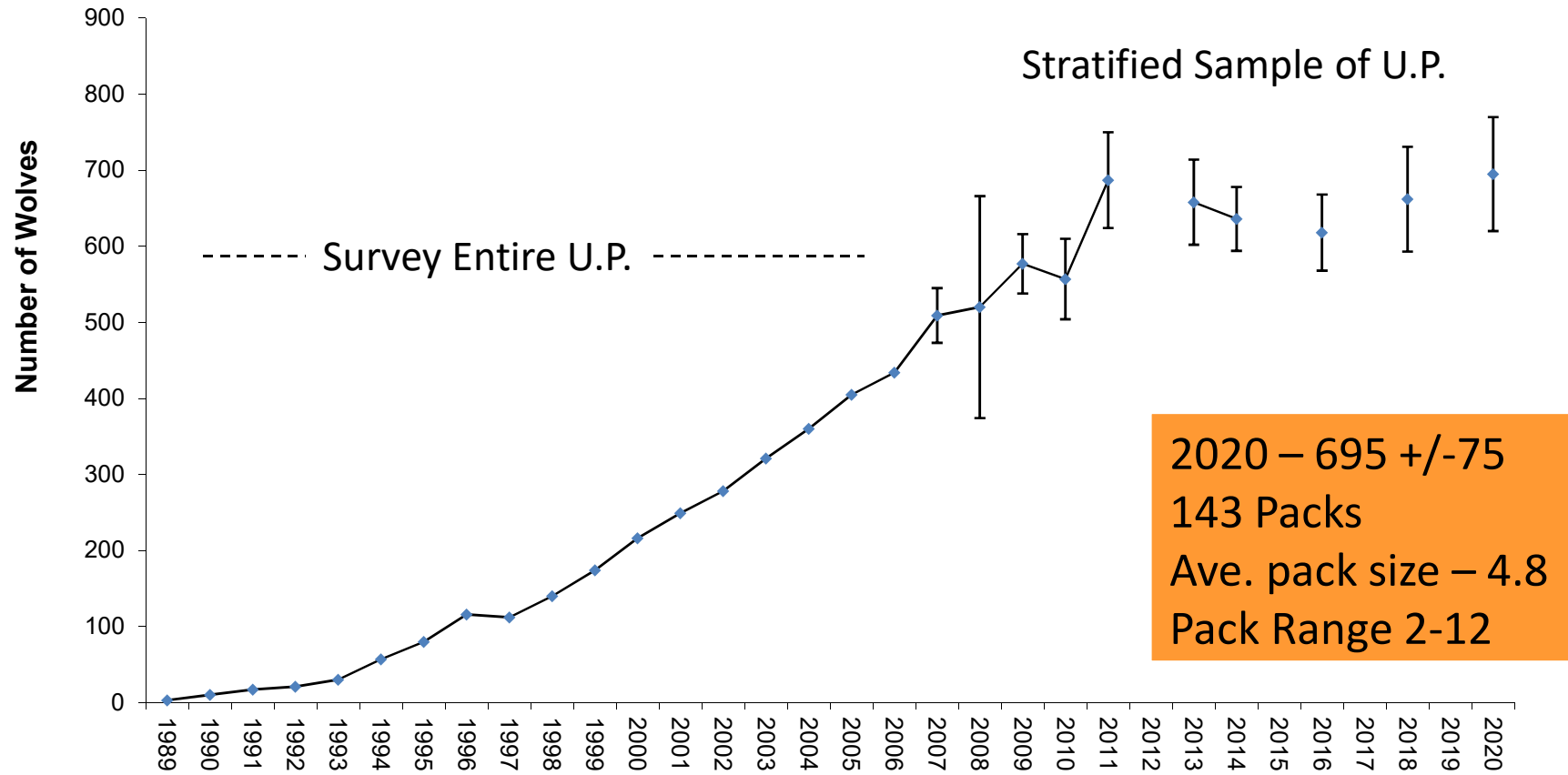
Brian found 2 animals in this pack on 3 different times (1/10, 2/7, 3/14), I also looked throughout this packs normal range multiple times and could not document any more than 2 animals. In this case the data from the more experienced tracker was used because it was found over a longer time span and the multiple searches over the normal range.



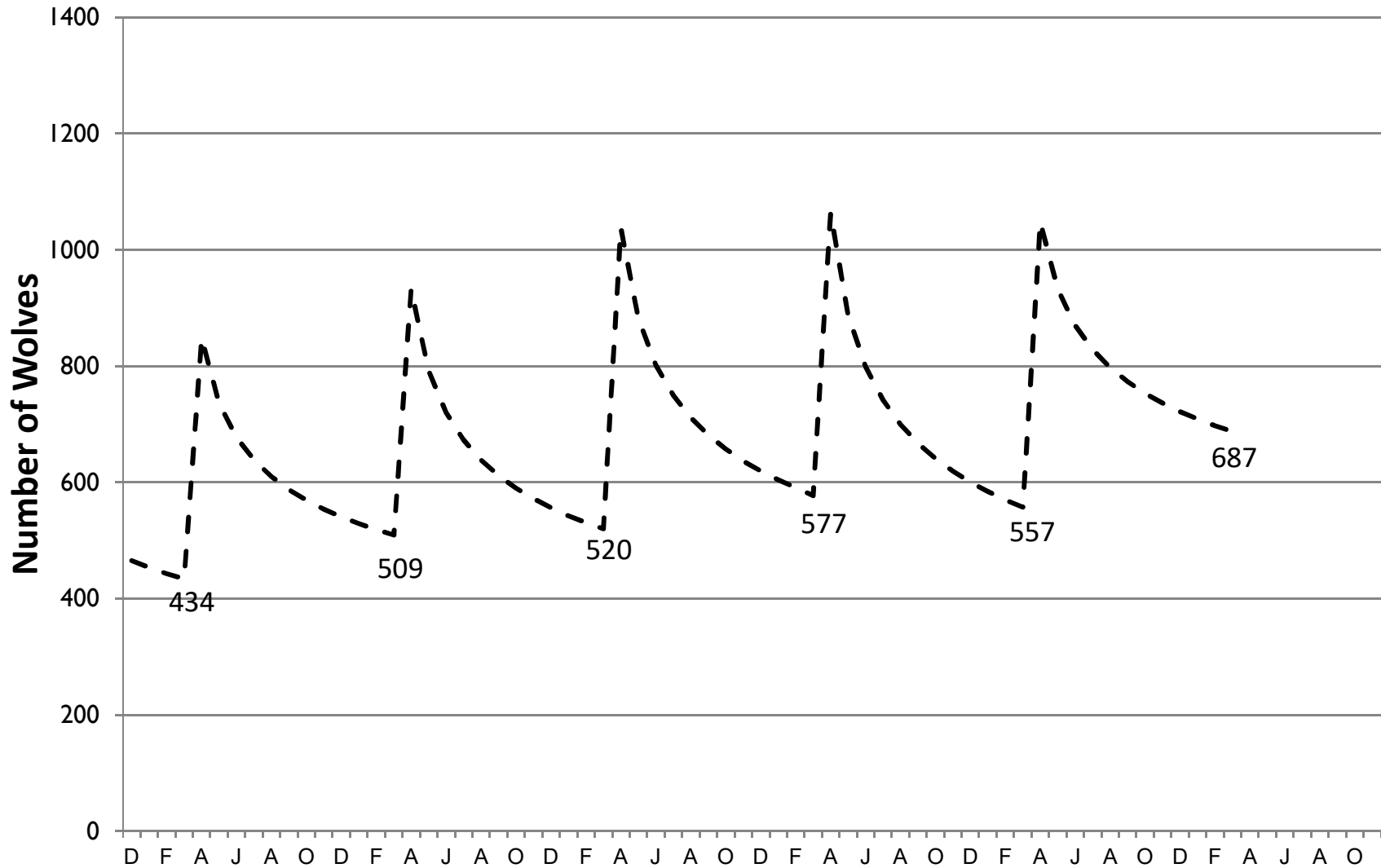
The same level of attention was given to the other 93 packs counted in the 2018 minimum wolf population survey.



Minimum Winter Estimates of Wolf Abundance in the Upper Peninsula



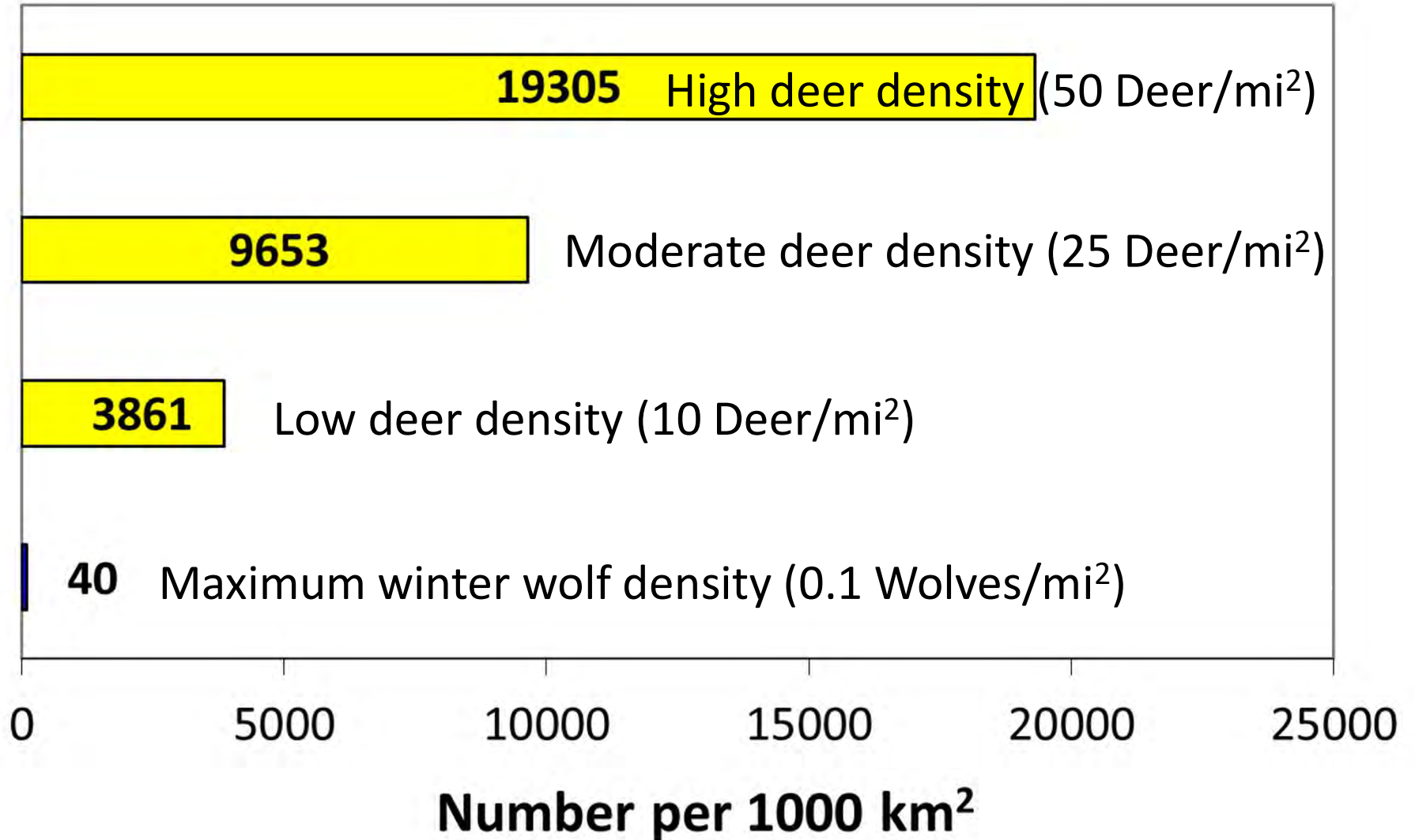
Wolf Population Annual Cycle



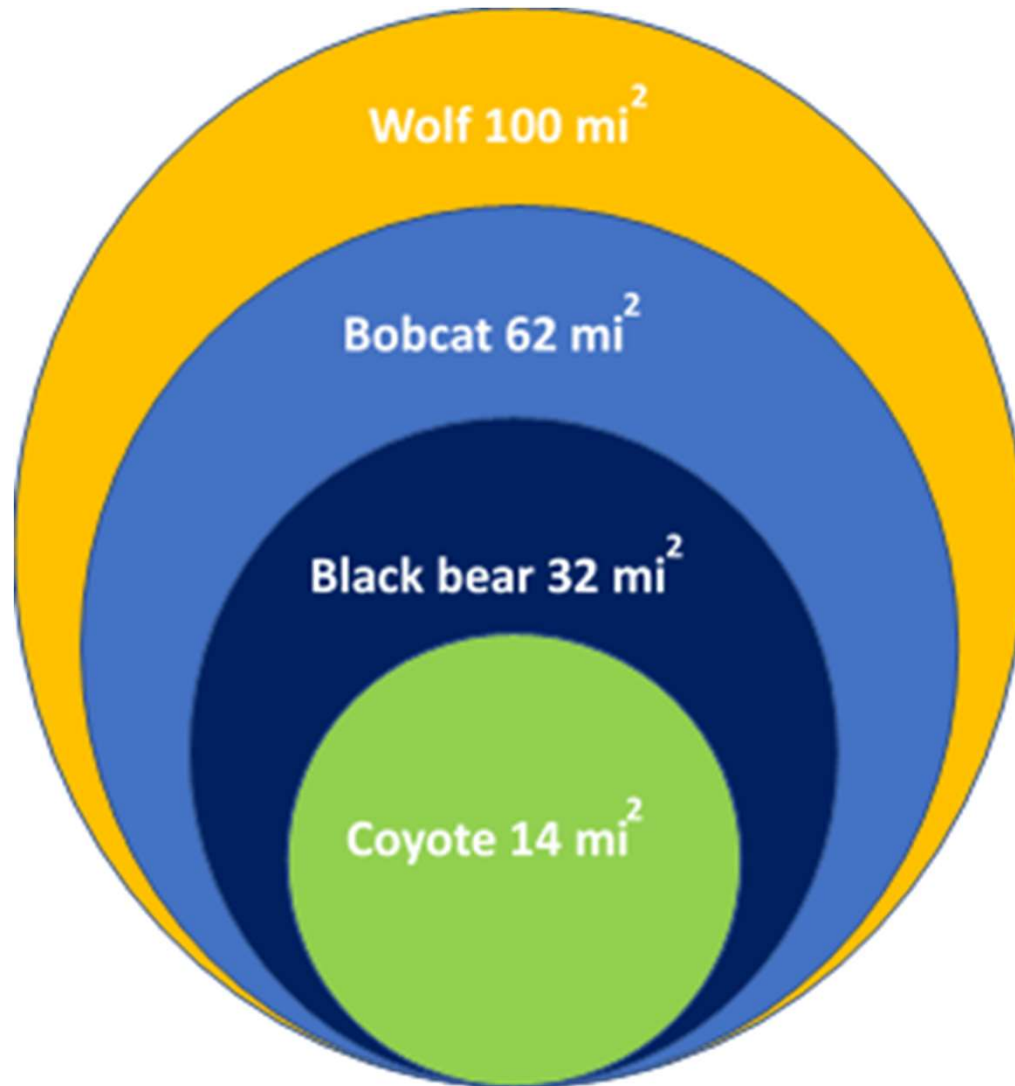


Questions?

Deer Density vs Wolf Density



Average territory/home range size of predator species in Michigan's Upper Peninsula.



Wolf Population Survey Summary

Parameter	2007	2008	2009	2010	2011	2013	2014	2016	2018	2020
Pop. Estimate	509	520	577	557	687	658	636	618	662	695
No. Packs	94	115	108	109	131	126	125	124	139	143
No. Pairs	21	27	20	21	27	24	23	23	24	16
No. Loners	5	11	4	3	4	3	3	4	1	4
\bar{x} Pack Size	4.9	4.4	5.3	5.1	5.2	5.2	5.0	5.0	4.8	4.8
Hours	1801	1413	1254	1410	1330	1161	1197	1116	1402	1321 ^a

^a Estimate

