The Science Behind Algonquin's Animals

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Wolf Telemetry Activity

Grades: 9-12
Subject: science, geography
Skills: map reading, data plotting, compass use
Duration: 60 minutes
Vocabulary: telemetry, triangulation, necropsy, global positioning system

Objectives:

Students will be able to: 1) plot GPS coordinates on an Ontario base map.
2) triangulate ground telemetry data in order to plot the location of radio collared wolves on a base map of Algonquin Provincial Park.

Method:

Using telemetry data from radio collared Algonquin Park wolves students calculate the location of individual wolves.

Background:

Wolves have been studied in Algonquin Provincial Park since 1958. The initial study was carried out by Dr. Douglas Pimlott of the Ontario Department of Lands and Forests (forerunner to the present day Ontario Ministry of Natural Resources). During this initial research Dr. Pimlott was only able to track and locate wolves during the winter months. The lack of leaves on the deciduous trees and snow covered, frozen lakes allowed for easy spotting of wolf tracks and wolves from an aircraft. With open water and heavy cover over much of the Algonquin landscape during the rest of the year, locating wolves other than winter months was all but impossible. Dr. Pimlott did realize that birds would respond to their own tape recorded calls and theorized that wolves might do the same. The theory was correct and this allowed those early wolf researchers to locate and track packs during the summer and fall months. It also became evident that not only would wolves respond to tape recorded howls, but they would also respond to a human imitation of a wolf howl.

While howling for wolves was an important breakthrough in the early years of wolf research in Algonquin Park and did allow Dr. Pimlott and his team to locate wolves year round, it was not effective in actually following the movements of individual pack members and packs. The only effective way to track these elusive, wide-ranging, forest dwelling carnivores is with the use of radio telemetry equipment. This consists of a collar that is equipped with a VHF radio transmitter that is placed on the animal, and emits a high frequency signal that is inaudible to humans and to wildlife. The collars do not affect wolf movements or social status in the pack. Each collar is tuned to a different frequency allowing for individual animals to be identified and tracked. The signal is picked up by a receiver and an antenna which is either ground based or mounted on a fixed-wing aircraft. The collars last for 3-4 years and are equipped with a mortality sensor which is activated after eight hours of inactivity by the animal. When the mortality signal is triggered, the pulse rate of the telemetry signal doubles, alerting researchers to the death of one of their study animals, and allows them to retrieve the body for necropsy purposes.

Telemetry equipment was first used to effectively track Algonquin wolves by Dr. John Theberge, of the University of Waterloo, Ontario, from 1986-1999. Wolves were captured using modified leg-hold traps, so as not to injure the animals, and then fitted with radio collars. In the first three years of the study Dr. Theberge and his team collared 36 wolves, representing animals from half the packs in Algonquin Park. By the end of the study period, 92 wolves were collared from twenty different packs, most in a 2300 km² section in the eastern part of Algonquin.

Through radio telemetry, Dr. Theberge was able to establish that there were approximately 34-40 packs in the Park. He was also able to document the seasonal movements of Algonquin Park wolves. During the winter, Dr. Theberge found that the wolves in the eastern section of Algonquin Park travelled outside Park boundaries. The reason for this dispersal was in response to the seasonal movements of the wolves' main food source, White-tailed Deer, to wintering areas outside Park boundaries.

In 2002 a new wolf research project began in Algonquin Park lead by Dr. Brent Patterson of the Ontario Ministry of Natural Resources. The research was to focus on pup mortality and recruitment within the Algonquin population, the affects of harvesting closures in the townships bordering the Park, and the winter diet of wolves in the western section of the Park which do not migrate to deer

yards outside of the Park. Using several trapping methods, leg hold traps, snares, and aerial net gunning, Dr. Patterson and his research team have collared over 100 wolves since 2002.

It quickly became evident early on in the research that collars on pups are quickly destroyed by other members of the pack, and therefore not an effective means of locating young wolves. To overcome this problem small transmitters are surgically implanted in the pups. Unlike normal telemetry collars, the implants are only on for 10 hours during the day and have a life span of 10 months.

Apart from tracking movements, radio telemetry permits researchers to collect other important data about wolves. Territory size is able to be determined from telemetry fixes, giving an accurate picture of pack distribution throughout Algonquin. Researchers are also able to locate carcasses that wolves have been feeding on. This is established by determining if a wolf is travelling or stationary for a few days. If the wolf is stationary, it is assumed to be feeding on a carcass, and the then suspected carcass has to be located. Once located, the carcass is examined to see if wolves killed the animal or are merely scavenging an animal that has died of another cause. The femur of the prey is removed for later fat analysis to determine the general health of the animal and the lower jaw is removed for aging.

The use of radio telemetry is vital to wolf research in Algonquin Park but it is also a timely and costly endeavor. The collars themselves are inexpensive, costing between $200-300 a piece. The expense lies in the time spent flying acquiring data. Pilot, fuel, and maintenance costs can run into the tens of thousands of dollars over a field season. Telemetry work is also very labour intensive as three to four days per week are spent in the air by researchers searching for the wolves.

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Materials:

✓	Items Required	Quantity
	telemetry data sheet	one per student
	reference map 10 17 6750 50400 (Tea Lake)	one per student
	overhead reference map 10 17 6750 50400 (Tea Lake)	one
	map 10 17 7100 50450 (Clarke Lake)	one per student
	map 10 17 7050 50500 (Costello Lake)	one per student
	map 10 17 6800 50450 (Source Lake)	one per student
	map 10 17 6650 50300 (Park Lake)	one per student
	map 10 18 2850 50850 (Bunchberry Lake)	one per student
	compasses with a rectangular base (orienteering compasses work best)	one per student
	rulers	one per student
	tape	
	Wolf Telemetry Inquiry Sheet	one per student

Procedure:

1) Explain radio telemetry to students.
2) Have students brainstorm some problems with radio telemetry, e.g., cost for flying, labour intensive, limited range by terrain for ground work, finding exact location of animal, etc.
3) Elaborate on finding the exact location of the animal. Ask students why it would be difficult to determine the location of an animal. How could this problem be solved? Taking more readings from different locations and triangulating bearings. Demonstrate this on the board or overhead by plotting three points and extending lines out from each point towards the area of the known telemetry signal. Explain that where the lines meet, or make a triangle, is the area where the animal is located.
4) Explain to the students that they each will be wolf researchers, and using their gathered telemetry coordinates, they will plot these coordinates on Ontario base maps of Algonquin Provincial Park, and triangulate the location of individual wolves.

5) Demonstrate the exercise to the students by doing the first location with them. Hand out one map 10 17 6750 50400 (Tea Lake) to each student along with the telemetry data sheet. Create an over head of the map for the demonstration.
6) Demonstrate to students how to place the GPS coordinates for each reading onto the map using the grid until all three coordinates are plotted.
7) Take the compass and place it so the edge of the base is flush with one of the vertical grid lines (the vertical grid lines run north-south and the horizontal east-west)
8) Turn the housing dial until the 360º mark lines up with the index mark.
9) Leaving the compass on the map, rotate the map until the compass needle aligns with the north arrow. The map will now be aligned correctly. Tape the corners of the map to the desk so the map will not move.
10) To plot each bearing take the compass and place one edge on the first coordinate. Turn the housing dial until the appropriate bearing for the first reading is lines up with the index mark, i.e., 356°. Keeping the edge of the compass on the coordinate rotate the compass until the North arrow and needle line up.
11) Using a pencil, draw a line from the coordinate point along the edge of the compass. Use a ruler to further extend the line if needed.
12) Repeat this process with the other two coordinates. The result should be either all three lines converge or a triangle is formed. This is the area where the animal is located
13) Hand out the other maps to the students and have them calculate the locations of each wolf.

Extensions:

1) Research and report on other tagging and tracking methods used in wildlife research.
2) Research the use of Global Positioning System (GPS) collars and report on the pros and cons of using them.

Evaluation:

Ask students to:

1) Submit the completed Clarke, Costello and Park lake maps.
2) Use the telemetry coordinates for Wolf 30, an adult male, to plot his location on map 10 17 6800 50450 (Source Lake) and hand in map.
3) Use the Wolf Telemetry Inquiry Sheet to answer questions about Wolf 30.