The Northern Edge

Study Guide

Wolverine Research

Wolverine Research

Introduction

This story is from **Issue #3 of The Northern Edge**. Some biologists and hunters and trappers are doing field research to learn more about wolverines. They find an effective way to snag wolverine hair and use DNA analysis to identify wolverines. There are three on-line learning activities – a spelling quiz, a comprehension quiz, and a writing activity.

This story is an opportunity for learners to explore research concepts. They discover ways that Aboriginal people contribute their knowledge to science. Learners at the upper 110 and 120 level can independently pursue an in-depth study.

This section first presents a list of 10 learning activities and the written text for the story. The pages following the written text give instructor notes and handouts for each activity, in the order on the list.

This symbol marks the written text for the story. 

This symbol marks instructor notes. 

This symbol marks handouts to copy for learners. 

Wolverine Research List of Learning Activities		
Instructor Notes 	**Handouts** 	**Page #s**
1) Vocabulary	1 handout	7 to 10
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Text – Wolverine Research
Issue #3 The Northern Edge

Wolverine Research in the Northwest Territories using DNA Analysis

You've heard of DNA being used to catch criminals, but have you heard about it being used to do research on wolverines?

Biologists are trying to find out more about wolverines on the central barrens in the NWT. They are trying a new technique to snag hair from wolverine and do DNA testing to find out more about them.

This is a study near the Ekati and Diavik diamond mines, located 300 kilometres northeast of Yellowknife near the Nunavut border.

Wolverines are facing challenges because of more disturbances to their environment. More wolverines are being killed. Over a number of years biologists will be able to see if the number of wolverines are going up, going down, or staying the same.

There are four main threats to wolverine.

1) Increased wolverine hunting and trapping by northerners poses a threat to wolverine populations.
2) Mines and exploration. More human activities such as mine development are happening in the wolverines' territory.
3) More roads mean people have easier access to wolverine.
4) Caribou outfitting and hunting camps provide people with more access to wolverines.

In the past, research on wolverine numbers was done mainly in two ways.

1) Wolverine were caught in barrel traps and collars and ear tags were put on them. This technique was a lot of work. It was difficult to catch them and the wolverine didn't keep the collars on very long.

2) Snow track counts are another way to tell how abundant wolverines are. Things like the snow conditions, wind, light conditions, and the experience of the observer can be different from year to year. As well, when you do track counts, you don't know how many different wolverines have made the tracks.

Biologists need a better way of estimating how many wolverines may be using an area and tried a new technique using DNA hair snagging.

They tried four different ways of snagging hair from wolverines.

1) Bucket
2) Cylinder
3) Rebar
4) Post

These devices all have barbed wire on them to snag hair from the wolverine. Biologists worked together with the local hunters and trappers.

198 hair-snagging stations were set up in the study area near Daring Lake in April 2003. Baits and lures were put at each station to attract the wolverines. The stations and hair samples were picked up 14

days later.

Did the hair snagging devices work? Yes. Biologists collected 361 hair samples. There was wolverine hair collected at 120 of the 198 stations.

Which one do you think worked best?

1) Bucket - No
2) Cylinder - No
3) Rebar – No
4) Post – Yes! The posts worked the best out of all the devices.

They had more wolverine hair than the other devices and they had fewer hairs from other animals like arctic fox, red fox, arctic hare, and musk ox. Wolverine can climb trees so it was the easiest for them to get to the bait on top of the post.

In fact, wolverines are so agile they can get over this kind of barbed wire fence that is protecting the garbage area. Can you see their hair on the wire?

You have hair samples? Now what? The biologists sent the hair samples to a DNA lab in British Columbia where they did tests on the hair.

They first have to get the DNA from the hair. This comes from the hair follicles - the part of the hair that goes into the skin.

They do a test to see which species the hair is from. They found hair from arctic fox, red fox, arctic hare, musk ox, and wolverine.

Individual Test - They looked at special markers on the DNA and

were able to tell how many different wolverines left the hair samples. They had hair from 20 different wolverines.

Gender Test – From the wolverine hair they can tell how many males and females there are. There were 12 males and eight females.

Since the posts worked best, the biologists wanted to see how they worked in action. So, this past summer they set up a camera to get a photo of the wolverine in action. The camera had a motion sensor on it so when something broke the beam it took a picture. They got photos of birds, a grizzly bear scratching its back, and finally a wolverine!

The DNA hair-snagging project was a success.

Biologists now have a new technique and the next steps are to:

- ✓ Do more research and find the best way of using this technique.
- ✓ Share what they've learned with other biologists and other people such as mines and other researchers.

With the new technique they can start to answer questions about wolverine.

Vocabulary
Learning Activity 1

One handout

Learners underline the word that has the best meaning in the sentence after they read or listen to the Wolverine Research story.

Language skills
Learning Activity 2

One handout

Learners rewrite past tense verbs as present tense verbs in a paragraph from the Wolverine Research story.

Vocabulary Learning Activity 1

Listen to or read the Wolverine Research story. Each sentence below has two words in brackets. Underline or circle the one word in brackets that has the best meaning in each sentence.

1) The team tried four ways to **(collect, check)** wolverine hair.

2) The biologist discovered the best way was to **(snag, pluck)** hair from wolverines.

3) Wolverines face challenges because of **(disasters, disturbances)** in their environment.

4) Biologists set up **(tools, devices)** that have barbed wire to snag wolverine hair.

5) Wolverines are so **(agile, sneaky)** they can climb over tall fences.

6) Scientists in British Columbia tested the hair to find out what **(species, DNA)** the hair is from.

7) Biologists are using a new **(technique, test)** to snag hair from wolverines.

8) More roads mean people have more **(access, excess**) to wolverines.

Use each word you underlined or circled to write your own sentence.

1) _____

_____

_____

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2) _____

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3) _____

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7) _____

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8) _____

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Language skills
Learning Activity 2

Read the following paragraph. Notice that the verbs are **bold** and they are in the past tense.

> The biologists **sent** the hair samples to a DNA lab in British Columbia where they **did** tests on the hair. They **found** hair from arctic fox, red fox, arctic hare, musk ox and wolverine. They **looked** at special markers on the DNA and **were** able to tell how many wolverines left the hair samples. They **had** hair from 20 different wolverines.

In the paragraph below, replace the verbs in the past tense with the same verb in the present tense.

> The biologists _____ the hair samples to a DNA lab in British Columbia where they _____ tests on the hair. They _____ hair from arctic fox, red fox, arctic hare, musk ox, and wolverine. They _____ at special markers on the DNA and _____ able to tell how many wolverines left the hair samples. They _____ hair from 20 different wolverines.

Questions
Learning Activity 3

Two handouts

3-1: Story questions

Learners read questions about the Wolverine Research story and write sentences to answer questions.

3-2: Journal writing

Learners use handout questions to guide their journal writing.

Questions
Learning Activity 3

3-1: Story questions:

Answer the following eight questions in sentences. Begin with a capital letter and end with the correct punctuation.

1) In your own words, explain the four main threats to the wolverine population?

_____

_____

_____

_____

_____

_____

2) What two methods did biologists use in the past to catch wolverines? Did they work? Why or why not?

_____

_____

_____

_____

_____

_____

3) Describe the experiment they used to snag wolverine hair.

_____

_____

_____

_____

_____

_____

4) Which device worked the best? Why?

_____

_____

_____

_____

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_____

5) What is the purpose of this experiment?

_____

_____

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_____

_____

_____

6) Do you think people are encroaching on wild animals' habitat? Explain your reasons.

_____

_____

_____

_____

_____

_____

7) In what ways can we keep wild animals safe?

_____

_____

_____

_____

_____

_____

8) Why do you think the biologists needed to work with the hunters and trappers?

_____

_____

_____

_____

_____

_____

Questions
Learning Activity 3

3-2: Journal writing

Use these questions to guide your journal writing.

- ✓ In what ways do you relate to this story?
- ✓ Have you had an experience meeting an animal in the wild? What happened?
- ✓ Has a wild animal wandered through your community? If so, what did you and/or others do?
- ✓ What is your opinion about doing research about wild animals?

Writing
Learning Activity 4

Three handouts

4-1: Who's at risk?

Learners explore what endangered and threatened means in terms of wild animals. They explore websites and find out what animals and plants are extinct, endangered, and threatened.

4-2: The five Ws

Learners answer questions and review the Wolverine Research story. They write their own summary of the story.

4-3: How many words can you make?

Learners use the letters from the title of the story to make new words. Have a contest. Ask learners to work in groups of three people and see which group can make the most words in five minutes.

Writing
Learning Activity 4

4-1: Who's at risk?

Wolverines are an endangered species in parts of Canada. Some plants and animals are endangered in the Northwest Territories. Other animals are threatened.

What does endangered mean?

_____

_____

_____

What does threatened mean?

_____

_____

_____

Use these three websites to help find the answers.

http://www.geocities.com/RainForest/Vines/1460/

http://www.animalinfo.org/

http://www.cws-scf.ec.gc.ca/theme.cfm?lang=e&category=12

Name three animals that are endangered in Canada. Name three animals that are threatened in Canada.

Three endangered animals	Three threatened animals

What are three reasons why animals become endangered or threatened?

_____

_____

_____

_____

_____

_____

_____

_____

_____

Writing
Learning Activity 4

4-2: The five Ws

Newspaper stories answer the questions **who, what, where, why when, and how.** Use a few words to answer these questions about the Wolverine Research story.

Who or **what** is the story about? _____

_____

Where does the story take place? _____

_____

When does the story happen? _____

_____

Why do things happen in this story? _____

_____

_____

How do things happen in this story? _____

_____

_____

Use the notes you made about who, what, where, when, why, and how. Use your own words and write a summary of the Wolverine Research story. Title your summary.

Writing
Learning Activity 4

4-3: How many words can you make?

This is a contest. Work in groups of three. Use the letters from the title Wolverine Research to make new words. How many words can you make in five minutes?

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

7) _____

8) _____

9) _____

10) _____

Animals we know
Learning Activity 5

One handout

i) Make three flipchart pages:

- ✓ Animals we know
- ✓ Threatened and endangered animals
- ✓ More threatened and endangered animals

Ask learners to brainstorm animals they know that live in the NWT. Write them on the flipchart page. Divide the group into smaller groups and give each small group part of the list of animals.

Each small group does research to find out if the animals on their list are threatened or endangered. As they do research, they may find out about other threatened or endangered animals. Each small group reports back and fills in the other flipchart pages.

ii) Use a large wall map of the NWT to look at where endangered and threatened animals live. Make two headings - endangered and threatened – and put them on either side of the map.

Ask learners to write the name of each of their animals on a piece of paper and pin it under the correct heading. Ask learners to use a stick pin to show the animal's habitat on the map. Tie a string around the pin to connect it with the animal's name on the piece of paper.

iii) Handout - Learners write a brief summary of what they learned.

Animals we know
Learning Activity 5

Write a brief summary of what you found out about endangered and threatened animals.

What did you learn that you didn't know before?

Animal research report
Learning Activity 6

Three handouts

6-1: Research plan

Ask learners to review this handout to help them plan their research.

6-2: Research cards

Copy the research cards for learners to use to keep track of where they get information.

6-3: Reference page guide

Learners use this as a guide to include references in their research report.

This activity is suitable for learners who have nearly completed English 120. Do it near the end of the school year after learners have enough practice with grammar, language skills, and writing. Do Activity 7 with 110 and other 120 learners at the same time.

Each learner chooses an endangered or threatened animal. They do research in the local library, on the internet, in books and magazines, and by interviewing local people. They use their research to write about the animal.

Instructors facilitate the process and give guidance. Reinforce concepts such as the dangers of plagiarism, how to write a reference page, reference cards, etc.

Animal research report
Learning Activity 6

6-1: Research plan

- ✓ Choose an endangered or threatened animal or bird to write about. Make sure you can get information about them.
- ✓ Decide who is the audience for your report.
- ✓ Decide what is the purpose of your report. What information does the audience need? What do you want them to know?
- ✓ Use just the facts that you find during your research. Write a report to describe the information you found in books or magazines, on the internet, or from other places.
- ✓ Do not copy other peoples' words exactly unless you use a quote. This is called plagiarism and it's a serious offence.
- ✓ Fill in the attached reference cards as you research.

Make an outline first. For example, you might use the following headings:

i) The problem

ii) Why does this happen?

iii) Possible solutions

iv) Conclusion

Use the writing process to write your report:

- ✓ Brainstorm and organize
- ✓ Write the first draft
- ✓ Revise – talk with other students and edit for spelling and grammar
- ✓ Rewrite – proofread for corrections
- ✓ Write or type final copy

Hints about your final printed report

- ✓ Write neatly or type a two or three page report. Use the headings you decided in the outline.
- ✓ Make a cover page. Put the title of your report in the middle. On the bottom right side put your name, the date, your instructor's name, and the name of your school.
- ✓ Include maps, photos, drawings, or other graphics to illustrate the text of your report.
- ✓ Include a reference page at the end. Use the reference page guide and list at least three of your references.

Animal research report
Learning Activity 6

6-2: Reference card

Reference card	
Date	
Source	Book ☐ Encyclopedia ☐ Website ☐ Magazine ☐ Other _____
Author	
Title	
Year	
Address	
Other	
Notes	

Animal research report
Learning Activity 6

6-3: Reference page guide

List the references you used on one page at the end of your report, before the back cover. Separate your reference into three sections – books, websites, and other references. See the examples below.

Books

Hopkins, Jane All About Cats New York, Macmillan, 1981

- ✓ Author's name first, with last name first.
- ✓ List in alphabetical order according to the author's last name if you have more than one book.
- ✓ Book title underlined or in italics
- ✓ City, name of publisher, and year published

Websites

"The Wolverine" www.blindkat.tripod.com/zoo/wolverine.html April 1, 2005

- ✓ Title of article in quotation marks
- ✓ Website address
- ✓ Date you found the article

Other references

"Animal Rights" World Book Encyclopaedia 1990 edition

- ✓ Article in quotes
- ✓ Book title underlined or in italics
- ✓ Year

Wood Buffalo National Park research project
Learning Activity 7

One handout

Learners get some very brief background information about Wood Buffalo National Park. They also get information about how to take action to make and distribute their flyers.

Use this learning activity with 110 and 120 learners at the same time more advanced 120 learners do Activity 6.

Learners each make a flyer about an animal or bird that lives in Wood Buffalo National Park.

Adapt this activity to a wildlife area near your community if you want.

Copy the flyers and hand them out at the local tourist centre or business outlets.

Alternative

Ask the learners to all contribute to one booklet. Each learner takes one feature of the park or other wildlife area near your community.

Wood Buffalo National Park research project Learning Activity 7

Background

Wood Buffalo National Park is a World Heritage Site. It protects:

- ✓ One of the world's only free-roaming bison herds
- ✓ The only remaining whooping crane nesting grounds
- ✓ Excellent examples of karst topography
- ✓ The salt plains
- ✓ The delta of the Peace and Athabasca Rivers

Wood Buffalo National Park is located in the boreal plains ecosystem. Many animals and birds live there.

Take Action

Make a flyer for people who visit Wood Buffalo National Park.

- ✓ Pick one animal or bird that lives in the boreal plains ecosystem.
- ✓ Use books, the internet, encyclopaedias, or other sources to do research about this animal or bird.
- ✓ Write a short description in your own words. Answer these kinds of questions. What habitat does it use? What does it eat? How is it adapted to the northern environment? Does it live in the north all year or does it migrate? Is it threatened or endangered? If yes, why?

- ✓ Draw, trace, colour, or make a collage of the animal or bird in its habitat to go with the description. Make sure everything fits on one page.
- ✓ Work carefully. Talk with your classmates and your instructor.
- ✓ Revise and rewrite your work.
- ✓ Hand out printed copies of your flyers at the tourist centre, the Band Office, and to local businesses.

Alternative

Each learner picks one feature of the park or other wildlife area near the community to do research and to write about. For example, people can write about different animals and plants, climate and weather, human activity, etc.

Learners put their work together to make one booklet.

Traditional knowledge
Learning Activity 8

One handout

Learners explore the meaning of traditional knowledge.

Learners get some very brief background information about traditional knowledge. They use the Wolverine Research story to explore ways traditional knowledge helps us understand the world.

Go through the handout together. Use the concepts to guide a class discussion about traditional knowledge – what it is, how it works, how it's different from scientific knowledge, how the two can compliment each other and work together, what are the potential sources of conflict between the two 'ways of knowing'?

Ask learners to come up with their own definition of traditional knowledge.

Traditional knowledge
Learning Activity 8

In the story **Wolverine Research** hunters and trappers worked with biologists. The biologists used their scientific knowledge. The hunters and trappers used their traditional knowledge.

Western science and traditional knowledge both try to understand how the world works. Both use observation and experience to gain knowledge.

People around the world look at the world somewhat differently. This is called their worldview. Peoples' worldview is usually connected with their culture. Traditional knowledge is closely connected to the land and the stories and traditions that come from the land.

Discuss these concepts about traditional knowledge and how they might apply to the Wolverine Research story or to other research.

- ✓ Aboriginal people pass their traditional knowledge from generation to generation through stories.
- ✓ Traditional knowledge describes changes with words and stories.
- ✓ Traditional knowledge recognizes that the world is interconnected. It is a holistic view of the world.
- ✓ Humans are part of nature. They are not more powerful or more important than nature.
- ✓ Traditional knowledge is based on people learning by watching, doing, and experiencing.

Informal debate
Learning Activity 9

One handout, including debate information sheets

Learners briefly explore what it means to debate something. Then they have a debate. The objective is to present a good argument and to reach consensus, rather than win a contest.

The topic is diamond mining in the NWT.

- ✓ **'For'** diamond mining - diamond mining is a good thing for the NWT and the people and the land.
- ✓ **'Against'** diamond mining – diamond mining is not a good thing for the NWT and the people and the land.

Give learners the chance to review the debate information sheets or to do research before you start the debate. These sheets include some web references to help learners gather information, if they want.

To carry out the debate:

i) Prepare two flipchart pages. Mark one 'for' diamond mining and one 'against' diamond mining.

ii) Ask learners to sit on the side of the room near the statement they mostly agree with.

iii) Identify one person to record comments for each side.

iv) Agree on a time limit for each person to talk. Agree on a total time limit for the debate.

v) Ask people from each side to take turns and give reasons why they agree with that side of the question.

vi) Ask people to move to the other flipchart if they change their mind about their position. They may move back and forth as many times as they want.

vii) When the time is up, read the comments on both flipcharts. Note how many people are sitting at each one.

viii) As a whole group, discuss how learners felt the debate went and what they learned from it.

Learners follow up the debate with a written assignment. Encourage learners to refer to the text on the flip charts, if needed, to write their essay.

Informal debate
Learning Activity 9

A debate is an organized discussion between two people or two groups of people about a particular topic. Each person or group of people presents a particular point of view.

Example:

- ✓ The topic is abortion.
- ✓ One person or group of people think it's a good idea. They are 'for' the question.
- ✓ The other person or groups of people think it's a bad idea. They are 'against' the question.

The idea of debate is to present a good argument.

Today your group will have a debate about diamond mining. Use the debate information sheets if you need to or want to.

- ✓ The topic is diamond mining in the NWT.
- ✓ 'For' diamond mining - diamond mining is a good thing for the NWT and the people and the land.
- ✓ 'Against' diamond mining – diamond mining is not a good thing for the NWT and the people and the land.

After the debate, write a short essay or opinion about how you feel about the issue. Use comments people wrote on the flipcharts during the debate to inspire your writing.

Debate Information Sheet

'For' diamond mining - diamond mining is a good thing for the NWT and the people and the land.

- ✓ Diamond mines improve the economy.
- ✓ Diamond mines employ northern workers.
- ✓ Mining companies have programs in place to protect wildlife.
- ✓ Aboriginal people have opportunities for careers in mining.
- ✓ The NWT Mining Skills Strategy opens the door to a wide range of rewarding careers. Aboriginal communities can take advantage of exciting employment opportunities arising in the NWT's expanding diamond mining industry.
- ✓ The diamond industry will produce 1500 jobs within the next 20 years.
- ✓ Aboriginal people expect to get 380 long-term jobs.
- ✓ Diamond mines work in partnership with government and other agencies to provide literacy programs and to train workers on site.
- ✓ People who want to continue their education and prepare for higher paying jobs can apply for a scholarship.
- ✓ Ekati Diamond Mine tries to minimize impacts on the environment. They built a 3.5 km channel so fish can move around the pits.
- ✓ If the mine has a large chemical spill, an Emergency Response Team takes care of it.
- ✓ Workers take care of small spills with spill kits that are available throughout the mine site.
- ✓ Mining companies must employ at least 68% northern residents, half of which must be northern Aboriginal people.

Debate Information Sheet

'Against' diamond mining - diamond mining is a not a good thing for the NWT and the people and the land.

- ✓ Diamond mining harms wildlife in many ways.
- ✓ Caribou, grizzly bears, and wolverine are losing their habitat because of diamond mining.
- ✓ Caribou cows from the Bathurst herd spend 7 to 8% less time feeding if they're close to the Ekati mine.
- ✓ Fish lost habitat because lakes get drained, streams are destroyed, and water quality changes.
- ✓ The NWT lost twenty lakes and mining companies haven't paid any compensation for lost fish habitat.
- ✓ People may spend less time on the land hunting, fishing, trapping, etc.
- ✓ People spend less time in their community and with their families when they work two weeks in and two weeks out.
- ✓ People often use their income to buy more alcohol and drugs, instead of helping their family.
- ✓ Social and economic problems may include more addictions, family violence, and loss of Aboriginal language and culture.
- ✓ Many workers live in the south, so they don't spend any money in the NWT.
- ✓ The Government of the Northwest Territories doesn't get any resource revenue from diamond mining.

Other ideas for research
Learning Activity 10

No handout

Here is an idea for another research topic for curious learners.

- ✓ Is DNA used in other animal research? If yes, how is it used? With what animals?

What other research topics do learners want to explore?

Resources

Websites:

- ✓ **http://www.arctic-caribou.com/links.html**
  Collared animal herds in northern Canada.

- ✓ **www.raysweb.net/specialplaces/pages/crane.html**
  The Magnificent Whooping Crane: Wildlife and Endangered Species Pages.

- ✓ **www.nrcan-rncan.gc.ca/mms/diam/index_e.htm**
  Natural Resources Canada website about diamond mining.

- ✓ **www.minetraining.ca/index.htm**
  The website for the Mine Training Society. They work to ensure Aboriginal people have access to training and jobs in the mining industry.

- ✓ **www.iti.gov.nt.ca/mot/index.htm**
  The website for the GNWT Department of Industry, Tourism, and Investment. This part of their website is about minerals, oil, and gas.

- ✓ **www.carc.org**
  The Canadian Arctic Resources Committee website. CARC is a citizens' organization dedicated to the long-term environmental and social well being of northern Canada and its peoples. Has some good information and links to other resources about the mining industry and its impacts.

Magazines:

- ✓ Struzik, E. "Grizzlies in the Kingdom of the Polar Bear" in Up Here Magazine. Volume 21, Number 1. January/Febuary 2005. Special Travel Issue. Up Here Publishing Ltd. Yellowknife, NWT.

Videos

- ✓ Atonement: wildlife specialists work to protect our endangered species
  National Film Board of Canada. Available through Aurora College Thebacha Campus or try the NFB website http://www.nfb.ca/

- ✓ Arctic River by Bruce McKay Video/DVD
  A unique ecosystem has evolved where the Mackenzie River meets the Beaufort Sea.
  Available through Aurora College Thebacha Campus.

Books

- ✓ Jitten, J. Whooping Cranes and Other Birds at Risk McMillan Publishing Co. Ltd. 1997