



Managing Wildlife

Middle Level Lesson Plan

Overview

QUEST *Managing Wildlife* helps students explore the current condition of several wildlife species in northern New England.

As our landscape and its uses have changed over the past century, so, too, have the wildlife species that live here. This program investigates some New England animals whose populations have declined through hunting or through loss of habitat due to settlement. Some of these animals (such as the turkey) have been successfully reintroduced, while others (like the black bear) have recovered with successful management.

The material in this unit will help students understand the complexities of tracking, predicting, and managing wildlife populations. It will also make them more aware of the issues related to biodiversity, genetic diversity, and behavioral changes that have resulted from increased human interaction.

Introduction

This lesson provides students in Grades 7 and 8 with an opportunity to explore the notion of *population* by focusing on the black bears of northern New England. By viewing the *Quest* video, reading articles, and applying population distribution data to a map of the United States, students will learn about the environmental factors that support bear populations as well as the impact that humans have had on these animals over the last 200 years.

Time Allotment

This lesson requires approximately eight 45-minute class periods to complete.

Accessing Prior Knowledge

Students being introduced to this middle-level lesson should already have a general idea that organisms satisfy their needs in the environment in which they are typically found; for any particular environment, some kinds of animals survive well, some survive less well, and others cannot survive at all. It may be helpful if students already have some understanding of the predator/prey relationship as they begin to learn more



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about the black bear and its behavior, especially in light of the fact that the bear, for the most part, does not assume a predator role in its habitat despite its appearance.

Finally, it will benefit students to have some understanding of the makeup of New England’s northern forest. (See the Resources section at the end of this lesson for a Web site offering material on this topic.) Students should also have a general sense of the geography and ecosystems making up the various regions in the United States.

Concepts to Clarify

Research indicates that upper-elementary students may not believe that food is a scarce resource in ecosystems, thinking that organisms can change their food at will according to the availability of particular sources. Middle- and high-school students may believe that organisms are able to effect changes in bodily structures to exploit particular habitats, or that they respond to a changed environment by seeking a more favorable environment. It has been suggested that the language about “adaptation” used by teachers or textbooks to make biology more accessible to students may cause or reinforce these beliefs.

Teachers should be especially cautious when discussing the needs of, and changes to, black bear populations, because bear do, to some extent, travel to other areas or select food other than their first choice when this preference is in low supply. Bears certainly are not able to change their bodily structure to exploit other foods.

CONNECTIONS TO THE STANDARDS

National Science Education Standards	Benchmarks for Science Literacy	Maine Learning Results	New Hampshire Curriculum Framework	Vermont Learning Standards
<p>Content Standards (5-8)</p> <p>Content Standards (5-8)</p> <p>C. Life Sciences: Populations and Ecosystems (pp. 157-158)</p> <p>– A population consists of all individuals of a species that occur together at a</p>	<p>Chapter 5: The Living Environment</p> <p>5D.The Interdependence of Life (pp.115-117); Benchmark 6-8, #1 (p. 117) – In all environments organisms with similar needs may compete with one another for resources, including food, space, water, air</p>	<p>Science and Technology</p> <p>B. Ecology: #2 – Analyze how finite resources in an ecosystem limit the types and populations of organisms within it.</p>	<p>Life Science</p> <p>3a. Demonstrate an increasing ability to recognize patterns and products of evolution, including genetic variation, specialization, adaptation and natural selection.</p> <p>– Relate different kinds of animals and plants to their habitat by observing their physical characteristics.</p>	<p>The Living World: Organisms, Evolution and Interdependence (5-8)</p> <p>7.13cc. Describe, model and explain the principles of the interdependence of all systems that support life (ex.: populations) and apply them to local, regional and global systems.</p>

<p>given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.</p>	<p>and shelter. In any particular environment, the growth and survival of organisms depend on the physical conditions.</p>			
<p>C. Life Sciences: Populations and Ecosystems (pp. 157-158) – The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water; range of temperature and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.</p>		<p>M. Implications of Science and Technology: #4 – Describe an individual's biological and other impacts on an environmental system.</p>	<p>3b. Demonstrate an ability to understand how environmental factors affect all living systems (i.e., individuals, community, biome, the biosphere) as well as species-to-species interactions. – Trace the history of an interaction between man and the environment that demonstrates how human activities can deliberately or inadvertently alter the equilibrium in an ecosystem.</p>	

Materials Needed

- Blank overhead transparencies and markers (for Activity 1)
- TV/VCR
- *QUEST Managing Wildlife* video
- Field guides to mammals and other inhabitants of New England's northern forest (optional)
- Colored pencils or thin-tipped markers
- Maps or atlas of the United States that indicate the predominant vegetative type or ecosystem (forest, grassland, etc.) within each state or region
- Maps of your town or county for individual student use
- Overhead transparencies of the map of your town or county (1 per group of 4 in Activity 8)
 - Student Handout 1: Thinking About Black Bears (*Ursus americanus*)
 - Student Handout 2: Memo from the American Black Bear Research Group
 - Student Handout 3: *QUEST Managing Wildlife* Video
 - Student Handout 4: Black Bear Articles
 - Student Handout 5: Harvard Forest Models – Some History (Optional)
 - Student Handout 6: Distribution of Black Bears (*Ursus americanus*) in the United States
 - Student Handout 7: North American Black Bear Populations by State
 - Student Handout 8: Quest At Home: Bears in Your Backyard

I. Introducing the Concepts

Activity 1

This warmup activity will help you to determine current student thinking about black bears and their populations in New England and throughout the United States.

Step 1

Provide each student with a copy of Student Handout 1 (Thinking About Black Bears). Allow 10-15 minutes for students to record their individual responses to the prompts, either in their notebooks or on the back of the handout.

Step 2

Discuss student responses as a class; record them on overhead transparencies, one transparency for each prompting question.

The next activity will help you to provide your students with context for the lesson segments that follow.



Activity 2

Step 1

Give each student a copy of Student Handout 2 (Memo from the Black Bear Research Group). Explain that the next few lessons will help students learn what they need to know to complete this “challenge” successfully.

Step 2

Have students read the memo and discuss with partners what “products” will be required to complete the challenge. (They may wish to circle the items described in the memo that they will need to do and/or to hand in.)

2. Exploring the Concepts

The following two activities allow students to begin exploring their own thinking about black bear populations in the context of actual research that is being conducted in the field.

Activity 3

Step 1

Provide each student with a copy of Student Handout 3 (QUEST *Managing Wildlife* Video). Before viewing the video, have students discuss each handout question with partners. They should record their preliminary ideas on their handouts. Suggest that students may wish to make additions or changes to their notes as they view the video.

Step 2

Show the first half of the video QUEST: *Managing Wildlife*. (If you are working within 45-minute class periods, stop the video about halfway through and allow students to discuss their written notes with their partners for a few minutes.)

Step 3

Before viewing the second half of the video, have students review what they have written on their handouts. They should be able to briefly synthesize what they have learned so far from the video. Remind them to continue recording notes in response to the prompts on Handout 3.

Step 4

Show the remainder of the video. When it is finished, discuss students’ responses to the prompts. Allow them to make additions or changes to their notes as needed.



3. Developing the Concepts

The following activity will help students develop a deeper understanding of the natural history – needs, adaptations, behavior – as well as management issues of *Ursus americanus*. It involves students in a cooperative-learning “jigsaw” reading activity. You may choose to download, print out, and distribute the four articles that are listed in the Resources section at the end of this teaching packet, or you can have students do their own Web searches for articles that describe the needs, behavior, adaptations, and management issues of black bears.

Each student will become an expert about the information in his or her own article. Students will then take turns sharing and receiving this information. You may wish to divide the research assignment into two parts, having students read and share responses to the prompts in Part I first (habitat and adaptations of bears), followed by reading and sharing of Part II (human impact and management issues). Each article in the Resources section at the end of this lesson includes information about both parts. The Teacher’s Answer Key provides possible responses pertaining to those specific articles.

Activity 4

Step 1

Form small groups of four students each.

Step 2

Provide each student with a copy of Student Handout 4 (Black Bear Articles) to use as a note-taking organizer. Assign each student in the group a different one of the four articles listed on the handout (or have them search the Web for their own articles). As mentioned above, you may wish to have them focus only on Part I for the first part of the jigsaw, and then have them go back and read the sections of their articles that pertain to Part II after their first discussion.

Give students time to read their articles and to record notes on their own.

Step 3

(Do this step if students are reading the four common articles listed on the handout.) Reform groups so that all students who have read the first article are together, all who have read the second article are together, etc. Ask them to take turns sharing within these groups what they found to be the important points in their article. (Students should come to consensus about which are the most important ideas to share about their articles before returning to their original groups.)

Note: Following this first conversation, you may also want to have students read and discuss their articles in terms of Part II (human impact and management of black bear populations) while they are still grouped with others who have read the same article.



Step 4

Students should return to their original groups of four and take turns sharing what they have learned from their different articles. Encourage them to use Student Handout 4 again, adding to and continuing to organize their new information.

Step 5

As a wrap-up discussion, have class members to share some of the more unusual or surprising things they have learned about black bears.

The following “think/pair/share” activity will help students develop a deeper understanding of how human behavior has affected the landscape of New England. They will then consider how this, in turn, has affected black bear populations in the region.

Activity 5 (Optional)

Step 1

Provide each student with a copy of Student Handout 5 (*Harvard Forest Models – Some History*). Have students observe the photographs and carefully read the descriptions of Harvard Forest dioramas in Part A of the handout. These depict the New England landscape at various periods over the past 300 or so years. Photos can be found at: www.mpbn.net/quest

Step 2

Now direct each student to develop his or her own responses to the prompting questions in Part B of the handout. Allow adequate time for them to write their answers to each prompt.

Step 3

Pair students up with partners. Have each pair discuss their responses. Let them add to or make changes to their responses.

Step 4

Facilitate a class discussion during which all students share their ideas about how the New England landscape has changed over the last three centuries.

4. Synthesizing the Concepts

The following activity will provide students with an opportunity to merge their new ideas into a more holistic understanding of the natural history and populations of black bears. Students will use state-by-state population data to create a distribution map of the entire black bear population for the United States. They will then develop hypotheses to explain why the populations might be distributed this way across the country.



Activity 6

Step 1

Provide each student with a copy of Student Handout 6 (Distribution of Black Bear [*Ursus americanus*] in the United States) and Student Handout 7 (North American Black Bear Populations by State). Students will also need a set of colored pencils or thin-tipped colored markers.

Step 2

Ask students to look at the data table to find out which states have no black bear populations. Discuss. Next, have them find the states with the largest black bear populations. Discuss.

Step 3

Have students discuss the following question with partners: Why do you think there are no black bears in some states and so many in other states?

(After a while, you may want to remind students to consider the size of each state as well as its important features, both geographical as well as ecological.)

Step 4

Now have students create a distribution map of black bear populations by state using Student Handout 6. (You may choose to mask over the color legend before copying the handout and challenge students to develop their own density legends.)

Step 5

Have students complete the written hypothesis exercise in #2 on the handout.

Note About Proficiency:

To demonstrate proficiency in this assignment, a student's hypothesis must clearly connect the bear population in each state or region with that state's geographical features and ecosystem descriptions as a way of explaining how the state is able to support (or not support) the habitat needs of bears. For example, the farm states of the Midwest have a bear population of zero because they provide little or none of the forest cover that is so important as a source of protection for black bears. On the other hand, Pennsylvania has extensive forests and a relatively mild climate; this makes late autumn food, and thus survival, more likely for bears.

5. Applying the Concepts

To allow students to apply their conceptual understanding of black bear habitat requirements and populations at a higher level, redistribute copies of the original “challenge” memo (Student Handout 2, Memo from the American Black Bear Research Group) that students reviewed in Activity 2. Reread the memo together.

Activity 7

Step 1

Ask students to consider this challenge individually and to record their own personal brainstormed thoughts and ideas. You may also choose to provide them with a few extra minutes to discuss their ideas with partners or within small groups.

Step 2

Have students respond to the challenge individually.

Note About Proficiency: A “proficient” response to the challenge would be student work that includes the following:

- A map and data table that clearly indicate the predicted black bear population for each northern New England state for the year 2100.
- An appropriate explanation for each prediction that describes the habitat needs that will be available and/or in limited supply during that year.
- An appropriate explanation of how human behavior will impact the bear population (such as increased housing development that leads to habitat fragmentation or loss, increase of or restrictions on hunting permits, etc.); the important thing is that the student provide a logical and appropriate justification for his/her prediction.

Activity 8

As a means of extending their learning to family life and the world around them, students will now be able to collect data about the black bear from family members, friends, and neighbors.

Step 1

Provide each student with a copy of the Quest at Home activity on Student Handout 8 (Bears in Your Backyard). You should also provide them with a map of your own town or county.



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Step 2

Explain to students that they will be participating in some population research at the local level. Read over the instructions on the handout together. Clarify as needed, then assign a due date.

Step 3

When students return with their results, follow the steps outlined below to review their initial research.

Step 4

Have students form groups of four and choose a “reporter” for each group. Provide each group with a copy of the overhead transparency (map of your town or county) and an overhead marker (each team having a different colored marker).

Step 5

Ask all four team members in each group to add dots for their individual bear sightings onto the overhead transparency.

Step 6

Have reporters” come to the overhead projector and overlay their maps on top of each other.

Step 7

As a class, discuss the following:

- Where in our town/county have the most bear sightings occurred? The fewest?
- Why might there have been more sightings in certain places than in others?(Encourage students to consider the habitat components that exist in those locations as well as the likelihood that the people who were polled may be more or less likely to look for bears or to notice signs of them.)
- What can people do to help prevent problems with bears living near people’s homes?

Step 8

Help students recognize that even at their own local level, there may be some places that provide a more supportive environment for black bears than others. Students and their families can now be more aware of some of the issues and considerations that humans face when they live in close proximity to a population of animals like the black bear.



6. Extending the Concepts (Optional Activities)

Community Events

The following locations offer ongoing exhibits related to wildlife populations of New England. By visiting their Web sites, you can receive updates of the latest seasonal events.

- The Maine Wildlife Park in Gray, Maine, provides an opportunity to view a variety of live animals representative of the northern forest environment. (<http://www.mainewildlifepark.htm>)
- The Fairbanks Museum in St. Johnsbury, Vermont, provides exhibits about historical land use and development of the Northeast Kingdom over the past few centuries. (<http://www.northern-forestcurriculum.org/html/Introduction.html>)
- The Harvard Forest in Petersham, Massachusetts, has a series of dioramas depicting change to the central New England landscape during settlement. (<http://lternet.edu/hfr/mus.html>)
- “Something’s Bruin in New Hampshire,” a state of New Hampshire We site, provides an interesting and informative article about how humans can learn to live with bears. (<http://www.wildlife.state.nh.us/Somethings%20bruin.htm>)

Career Opportunities

- Prompt students to record all of the kinds of projects that occupy scientists, researchers, wildlife managers, and citizen scientists that are mentioned throughout the *QUEST* videotape.
- Visit each state’s fish and wildlife department Web site. Have students search for scientific projects and reports that might indicate the kinds of work that wildlife biologists do. (Web sites are listed in the Resources section that follows.)

Resources

Content Background

Helpful Web sites on black bear natural history and management issues include:

- **New Hampshire Fish and Game Department** (<http://www.mefishwildlife.com>)
- **Maine Department of Inland Fisheries and Wildlife** (<http://www.state.me.us/ifw/index.html>)
- **Vermont Department of Fish and Wildlife** (www.anr.state.vt.us/fw/fwhome/index.htm)
- **North American Bear Center** (www.bear.org/index.html)



QUEST Pedagogy

The Learning Cycle model that forms the foundation on which these lessons are designed is based on the belief that students construct conceptual understanding gradually, through active engagement in a series of coherent experiences. Of equal importance to the activities is the opportunity to have time and support for reflecting on the meaning of these new ideas.

For background on this model, please visit one of the following Web sites:

- www.coe.ilstu.edu/scienceed/lorsbach/257lrcy.htm
- www.mdk12.org/practices/good_instruction/projectbetter/science/s-26-28.html
- www.aenc.org/ABOUT/Philosophy-Learning.html

National Science Standards Documents

There are two major standards documents at the national level for K-12 science:

Benchmarks for Science Literacy were created by the American Association for the Advancement of Science. (Oxford University Press, 1-800-222-7809
http://www.project_2061.org/tools/benchol/ch5/ch5.htm)

The National Science Education Standards were developed by the National Research Council. (National Academy Press, 1-800-624-6242 <http://www.nap.edu/catalog/4962.html>)

Articles for Use with Activity 4 (Black Bear Articles)

- "Watchable Wildlife: The Black Bear" (http://www.bear.org/Black/Articles/Watchable_Wildlife.html)
- "Wildlife Profiles: The Black Bear" (http://www.wildlife.state.nh.us/Bear_facts.htm)
- "Maine Black Bear Study" (<http://www.state.me.us/ifw/wildlife/bear/ecology.htm>)
- "Black Bear" (<http://www.state.me.us/ifw/hunt/h-blackbear.htm>)

Other Related Activities

- Project WILD Activity: "How Many Bears Can Live in This Forest?"
www.projectwild.org
- GEMS (Great Explorations in Mathematics and Science)
www.lhsgems.org
or telephone Lawrence Hall of Science, UC Berkeley, (510) 642-7771

"Mapping Animal Movements"

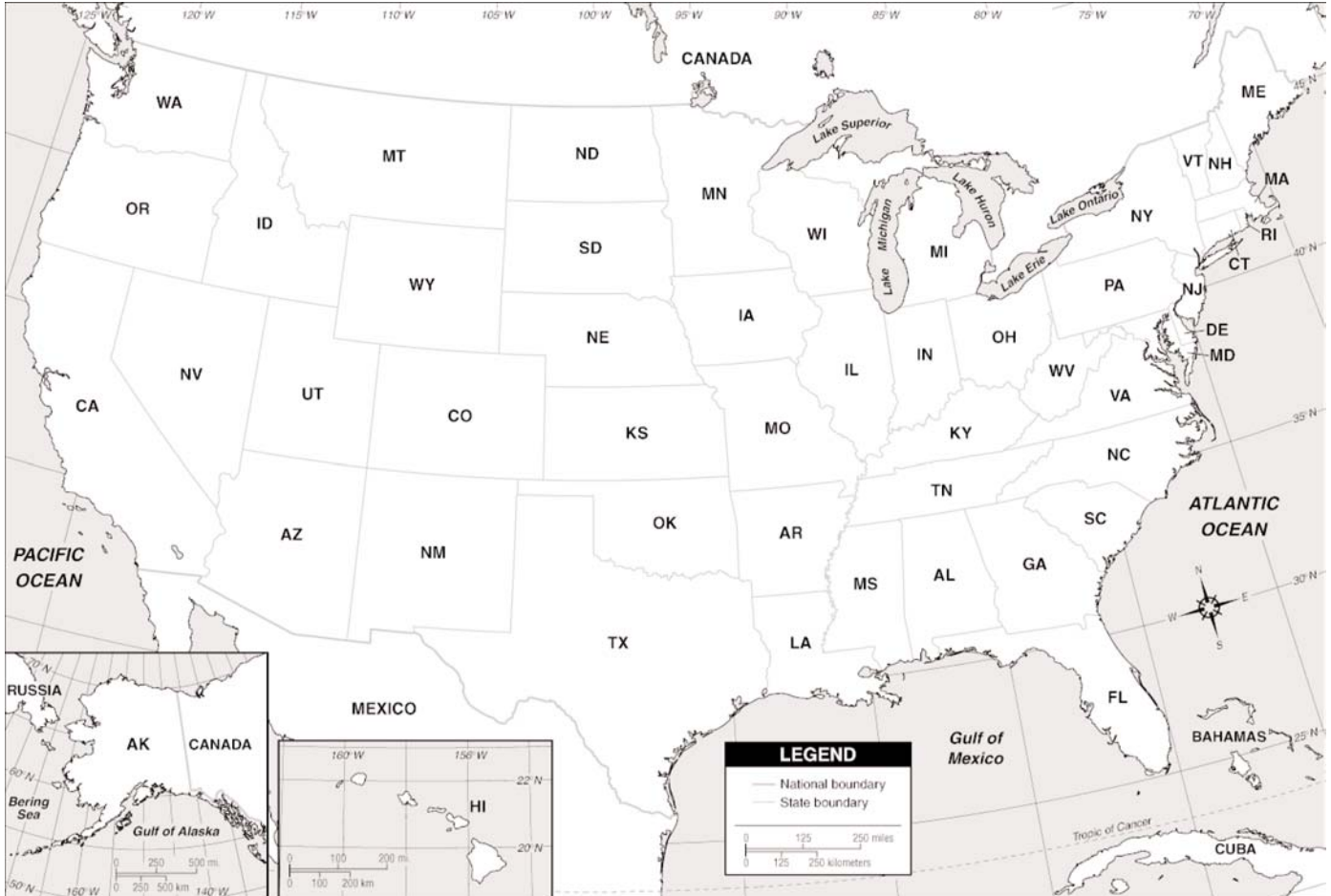
This five-lesson unit for grades 5-8 provides opportunities for scientific observational studies of animal behavior in the classroom using readily available animals. It also includes a reading about the monitoring of the Tule elk population in California.



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- "Introduction to the Great Northern Forest"
This curriculum unit is available at the Fairbanks Museum (St. Johnsbury, Vermont) Web site,
<http://www.northernforestcurriculum.org/html/GNFIntroPacket.html>
- **WEBQUEST** from Burlington, Vermont (Edmunds Elementary School)
The task for students is to identify wild animals and find a way to look for evidence of them in the wild by designing an electronic field guide for two or more native mammals.
<http://burlington.k12.vt.us/webquest/diverson/wild.htm>

Thinking About Black Bears (*Ursus americanus*)



Journal Questions:

Think about each question, then respond in your notebook or on the back of this page with your own ideas.

1. In what area(s) of the United States do you think that black bears live? (You may either shade in areas on the map above or describe regions in your notebook.)
2. Why do you think that black bears live in that /those area(s) and not in other parts of the country?
3. Do you think that the population of black bears within each state stays the same or changes over time? Please explain your thinking. (A "population" consists of all individuals within a species that occur together at a given place and time.)



Memo from the American Black Bear Research Group

To: **Wildlife Research Apprentices**
From: **The American Black Bear Research Group**
Re: **Population Prediction Study**

Greetings, Wildlife Research Apprentices!

We are inviting you to participate in our black bear population study. We have been collecting population data for each state in the United States. We seek ideas from analysts in different regions about what the data might mean for the future of black bears in this country.

The Black Bear Research Group consists of wildlife biologists who study the trends of black bear (*Ursus americanus*) populations across the states that these bears inhabit. We observe the bears in their natural (and sometimes unnatural!) habitats and collect information about their food, shelter, space, and other needs, as well as about their behavior. Our work sometimes requires basic equipment, such as binoculars and video cameras. At other times, we need more sophisticated technology, like radio tracking gear. With our data, we create mathematical models that help us understand and predict the success of this animal's population in various states.

If you are interested in helping us, here is what you will need to do:

- 1) Do some background reading to learn as much as you can about the basic needs (for food, shelter, space, etc.) of the black bear, *Ursus americanus*.
- 2) Find out how (and why) black bear populations have changed over the past 300 or so years, including recent changes to the population of this species.
- 3) Use this knowledge of current black bear populations to create a map and data table showing your predictions of what black bear populations will be in each of the northern New England states (Maine, New Hampshire and Vermont) for the year 2100.
- 4) On a separate piece of paper that is attached to your map and table, explain the following:
 - Why do you think that the population of the black bear, *Ursus americanus*, will either increase or decrease in each of the three northern New England states? Be sure to consider and include ideas about each of the following in your response:
 - Which of the things needed by black bears will be available, and which ones will be in limited supply or unavailable, in each state?
 - How might the behavior of humans either positively or negatively affect the black bear population in each state? What leads you to make these predictions?
- 5) Finally, please offer any recommendations that we may share with New England wildlife management departments about how they might continue or improve the ways in which they support healthy black bear populations in their states.

We look forward to receiving your work!

With many thanks,
The American Black Bear Research Group



QUEST *Managing Wildlife Video*

Discuss each of the following questions with a partner. Record your ideas *before* viewing the video. Then, add or make changes to your notes as you view the videotape on wildlife management.

1. Why do black bears live in northern New England? (What habitat or other needs are met within this region?)

2. What are some tools (both simple and sophisticated) that wildlife biologists use to study bears and other wildlife species?

3. Why have the populations of black bears and other wildlife species changed over the last 300 years or so?

Harvard Forest Models – Some History¹

Note: Photos can be viewed at www.mainepbs.org/quest

PART A

1. Primeval Forest of Central New England, A.D. 1700

The primeval forest of central New England consisted of mixtures of coniferous and broad-leaved trees. In the northern areas of this region were favored “northern” species such as hard maple, beech, yellow and paper birch, poplar, red spruce, red pine, and balsam fir.

Analysis of an old growth area near Pisgah, New Hampshire, showed that fires, wind, storms, and hurricanes had destroyed the forest periodically since 1650. Such catastrophes created the patchwork of even-aged pine and pine/hemlock/hardwood forests that were found when the settlers came. Each stand started after some natural disturbance.



Thus, the primeval forest was not a stable community but one subject to periodic, drastic alteration.

2. Early Settlement, 1740



Groups of families were granted land within 36-mile-square territories (“townships”) and were expected to settle on the land within three years. For the central New England region as a whole, settlement took place chiefly between 1700 and 1760, the date being progressively later as one moved from south to north.

Rough lean-tos were often used for immediate shelter; but provision was soon made for sawing lumber. The choicest trees were sawn for boards, with some of the other tree material split for wood fuel.

Great quantities of wood for which there was no immediate use

were piled and burned as the clearing progressed, releasing nutrients from the trees to fertilize farm crops.

¹ (Information and photo images in this handout was taken from The Harvard Forest Models, a booklet published by the Harvard University Printing Office.)

3. Height of Cultivation for Farm Crops, 1830

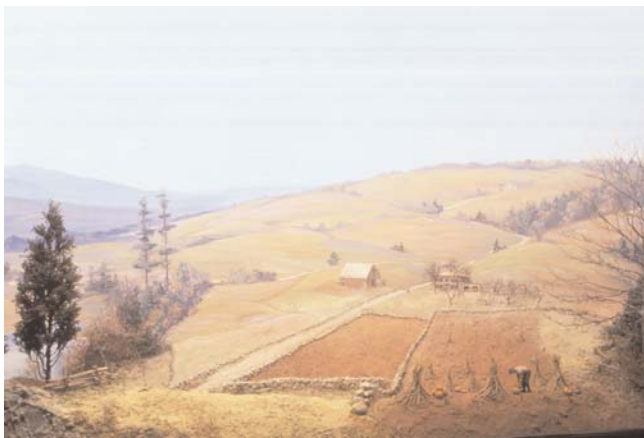
The height of cultivation of central New England was during the period between 1800 and 1850.

The percentage of land cleared for tillage, pasture, orchards, and building sites has been estimated at between 60% and 75%. To the south, no less than 80% was cleared, while to the fairly near north, the percentage was considerably less. For the region as a unit, probably 70% of the land area was under some form of agricultural use.



Some 170 years later, the ratio of cleared to forested areas has been reversed.

4. Farm Abandonment, 1850



Beginning shortly after 1830 and continuing for nearly half a century, the central New England region entered an era when farming was given up on a large scale. Accessibility to new, rich farmlands in the West by the building of the Erie Canal and transcontinental railroads, growth of industrial centers, the discovery of gold in California, and the Civil War all helped draw New England farmers away from the hilly, rocky hill land that could no longer be farmed profitably in competition with the West.

Almost immediately upon abandonment, the forest started to reclaim the idle fields and pastures. Young pine stands soon became exceedingly thick, and little or no undergrowth could become established during the next 30 to 40 years.

As the pine canopy rose, it provided increased room and light beneath – making conditions more favorable for animal life.



PART B

The video *QUEST Managing Wildlife* briefly describes changes (mostly human-caused) that have occurred in the New England landscape over the past 300 years. A diorama model from the Harvard Forest in Petersham, Massachusetts, is shown in Part A of this handout to illustrate some of these changes.

Combine what you know about the needs of black bears with what you have learned about the changes to the New England landscape to answer the following questions.

1. Primeval Forest

- What features of the landscape in about 1700 would have provided the habitat requirements necessary to support a population of black bear (*Ursus americanus*)?

- In what ways was this not a supportive habitat for black bears?

- In what ways (if any) did humans have an influence on the creation of this landscape?

2. Early Settlement

- What features of the landscape in about 1740 would have provided the habitat requirements necessary to support a population of black bear (*Ursus americanus*)?

- In what ways was this not a supportive habitat for black bears?



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- In what ways (if any) did humans have an influence on the creation of this landscape?

3. Height of Cultivation

- What features of the landscape in about 1830 would have provided the habitat requirements necessary to support a population of black bear (*Ursus americanus*)?

- In what ways was this not a supportive habitat for black bears?

- In what ways (if any) did humans have an influence on the creation of this landscape?

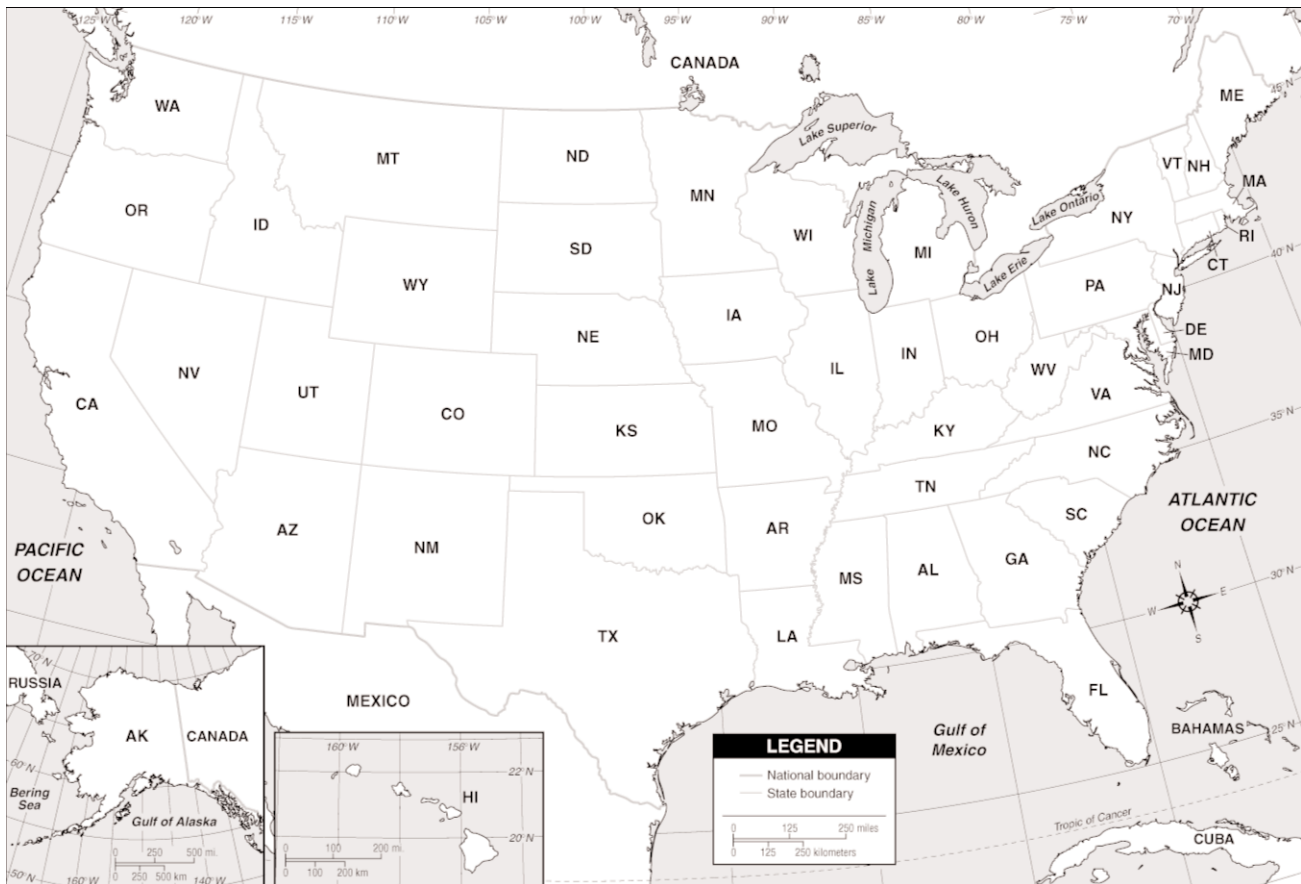
4. Farm Abandonment

- What features of the landscape in about 1850 would have provided the habitat requirements necessary to support a population of black bear (*Ursus americanus*)?

- In what ways was this not a supportive habitat for black bears?

- In what ways (if any) did humans have an influence on the creation of this landscape?

Distribution of Black Bear (*Ursus americanus*) in the United States



1. Use information from the data table in Student Handout 7 and the map above to create a population distribution map of black bears in the United States. You may do this by using different colors to represent each different population range.

Example:

0	=	Leave blank
1-150	=	yellow
151-1,000	=	light green
1,001-2,000	=	light blue
2,001-5,000	=	orange
5,001-10,000	=	red
10,001-20,000	=	orange-brown
20,001-30,000	=	brown
>30,000	=	black



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2. Using what you know about the geography and the ecosystems within each state and what you know about the needs and behaviors of black bears, please do the following:

- Create a **hypothesis** that explains why the black bear population within each state or region is as indicated on the map.
- You may want to include in your explanation information about the states or regions, such as **climate, geographical features, ecosystem description, and size of the state or region.**
- You may also want to include information about the black bears themselves, such as their **needs and behaviors.**
- Finally, it may also be important to include information about the impact of humans in terms of **land development, wildlife management, and/or hunting.**



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North American Black Bear Populations by State

State	Black Bear Population
Alabama	50
Alaska	100,000
Arizona	2,500
Arkansas	2,500
California	18,000-23,000
Colorado	8,000-12,000
Connecticut	30-50
Delaware	Data Not Available
Florida	1,000-1,500
Georgia	1,800
Hawaii	0
Idaho	12,000-20,000
Illinois	0
Indiana	0
Iowa	0
Kansas	Occasional visitors
Kentucky	A few hundred
Louisiana	200-400
Maine	23,000
Maryland	Data Not Available
Massachusetts	1,200
Michigan	12,000
Minnesota	20,000
Mississippi	25-50
Missouri	50-150

State	Black Bear Population
Montana	10,000-15,000
Nebraska	0
Nevada	300
New Hampshire	2,500-3,000
New Jersey	450-550
New Mexico	3,000-5,000
New York	4,500-4,700
North Carolina	8,000
North Dakota	Occasional visitors
Ohio	Data Not Available
Oklahoma	200-300
Oregon	At least 25,000
Pennsylvania	9,000-10,000
Rhode Island	0
South Carolina	350
South Dakota	Very small
Tennessee	600-900
Texas	50
Utah	1,000-1,200
Vermont	2,500
Virginia	2,500-4,000
Washington	25,000
West Virginia	5,670
Wisconsin	14,000
Wyoming	No estimate



Bears In Your Backyard

You're on a Quest!

Explore the population of black bears in New England! By collecting data from your family and friends, you may find out about some places in our neighborhoods, towns, and in our counties that harbor black bears. And, in some cases, you may find that black bears are living right in your own backyard!

Materials needed:

- Computer with Internet access
- Pen and paper for notes
- Local map showing mountains and foothills

Investigate with your family!

- Where do bears exist in your state? Visit your state's Fish and Wildlife Web site and search for reports about black bears within the state. Have there been black bears reported in your area?

Here is a list of helpful Web sites on New England's black bear natural history and management issues:

- New Hampshire Fish and Game Department** <http://www.mefishwildlife.com>
- Maine Department of Inland Fisheries and Wildlife** <http://www.state.me.us/ifw/index.html>
- Vermont Department of Fish and Wildlife** <http://www.anr.state.vt.us/fw/fwhome/index.htm>
- North American Bear Center** <http://www.bear.org/index.html>

- Talk with family members, friends, neighbors and community members about black bears in your area. Identify as many individuals as you can who have seen bears in your town or county.
- Using a local map, place a dot on your map to indicate each sighting you have recorded.
- Record each person's name and data about their bear sightings in the chart below.

NAME	LOCATION OF SIGHTING(S)	YEAR & SEASON SIGHTED	NUMBER OF BEARS SEEN

Compare your information and the dots you placed on your local map with the information you learned about the entire state!

Visit <http://www.wildlife.state.nh.us/Somethings%20bruin.htm>
and read the article *Something's Bruin in New Hampshire*.
You will find some helpful ideas about what you and your family might do to avoid
confrontations with bears if one should unexpectedly appear in your backyard!





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Maine Forest Products Council





ACTIVITY 4

Article I: “Watchable Wildlife: The Black Bear”

1. Habitat requirements of *Ursus americanus*

- Need forested areas, found over much of N. America
- Areas with nuts and berries
- Will live near people when their natural food source is unavailable

2. Physical adaptations of *Ursus americanus*

- Stand upright so they can see farther
- Can run 25+ mph
- Climb trees
- Hearing is more sensitive than humans
- Uncanny sense of smell (to warn about danger, to help find food)
- Sharp vision (can see colors) – helps find food
- Blocky bodies are designed to store fat and conserve heat in winter
- Long canine teeth – mainly to bite into logs (for insects) or to tear carrion
- Curved claws (help in climbing trees or cutting into logs for insects)
- Mate in June, but fertilized egg is implanted in November only if the female has stored up enough fat to survive the winter
- Mother nurses her young

3. Behavioral adaptations of *Ursus americanus*

- Usually travel alone because food can be so scattered
- Adult males have a larger range (may include territories of 7-15 females) for finding mates
- Male mates with many females (and may fight for them)
- Bear may leave their own territory at end of summer if food is scarce
- Adult females defend their offspring
- Bears hibernate to escape winter food scarcity (more than to protect from cold).
(Hibernation may last up to 7 months in the North. Bears can cut their metabolic rate in half but maintain a high body temperature in order to respond to danger and tend to cubs.)
- Communicate by: grunting (playful), blowing (afraid, protecting cubs), screaming (by cubs only, when in distress), marking trees with their scent

4. Human impact on black bear populations

- Converting forest to farms during early settlement eliminated bears from large part of their original range
- Abandoning farms in the last century meant that some bear range was reclaimed



INVESTIGATING OUR WORLD

- Used to be a bounty to encourage hunting of bears, but the last one was removed in 1965
- Hunting of bears is managed in 28 states
- Oriental market for bear gallbladders and paws leads to much poaching in some areas
- Conversion of habitat to house lots and vacation homes leads to lower bear population

Article 2: “Wildlife Profiles: The Black Bear (*Ursus americanus*)”

1. Habitat requirements of *Ursus americanus*

- Forested areas with thick understory vegetation
- Need some wetlands as well
- Optimal habitat is large tracts of forest with little human disturbance

2. Physical adaptations of *Ursus americanus*

- Powerful limbs
- Small head with rounded ears
- Feet have five toes with claws; bears walk on soles of their feet

3. Behavioral adaptations of *Ursus americanus*

- Can change their diet with the season in order to find enough food:
 - Spring: succulent greens and buds
 - Summer: berries, fruits, insects
 - Fall: hard “mast” (acorns, beechnuts, etc.)
 - Meats and succulent greens are eaten when preferred foods are scarce
 - Alternatives to natural food: crops, garbage, bird food
- Winter sleep (not true hibernators) in dens of brush piles, under logs or rocks
- Solitary
- Active at dawn or dusk in the wild
- Active at night if living near people
- Young cubs stay with female
- Opportunistic predator on fawns and other small birds and mammals

4. Human impact on black bear populations

- People should stop filling bird feeders by mid-April to prevent bears from visiting, or at least take feeders in at night

Article 3: “Maine Black Bear Study”

[*Note: This article is best for more proficient readers.*]

1. Habitat requirements of *Ursus americanus*

- Heavily forested areas with few humans
- Found only on the fringes of agricultural lands
- Need dense understory for shelter and cover

2. Physical adaptations of *Ursus americanus*

No information available in this article

3. Behavioral adaptations of *Ursus americanus*

- Movement and food habits depend on the season: They travel up to 30 miles when food is scarce or stay in one place if there is plenty. By seasons, they eat:
 - Spring: greens and buds, sometimes carrion if greens are scarce
 - Summer: berries, fruits
 - Fall: hard “mast” (beechnuts, acorns, etc.)
 - Visit dumps, farms, etc.
- Become dormant beginning in late fall
- Successful reproduction depends on food supply
- Do not venture out into open areas more than 125 m away from protective underbrush

4. Human impact on black bear populations

- There used to be bounties (until 1957 in Maine) because bears damaged crops, camps, etc.
- Now there is a substantial hunting industry
- Biologists study bears using telemetry (radio collars) and scat (feces) studies
- Forest management produces major sources of spring and summer food by creating openings in the canopy where berries, grasses, etc., can grow
- Development for agriculture and housing breaks up bears’ habitat
- More roads in bear territory lead to more road kills
- Bears are killed for damage control when all other deterrents are not effective

Article 4: “Black Bear”**1. Habitat requirements of *Ursus americanus***

- Black bear is the only bear species in eastern U.S.



INVESTIGATING OUR WORLD

- Bears require forests for protection and food
- They can live near humans as long as there is forest cover to escape to

2. Physical adaptations of *Ursus americanus*

- Store fat in fall for winter energy
- Black or brown in color
- Female stores fat in summer and fall. If she hasn't stored enough energy to support a gestating cub, her pregnancy is terminated in late fall.
- Can live up to 30 years; nearly all deaths, if bear survives beyond age 2, are from hunting or other human causes

3. Behavioral adaptations of *Ursus americanus*

- Bears are opportunists when it comes to food (following the seasons)
- Not efficient predators, but can prey on young deer and moose
- Breed in May-August, with males traveling a long way to find mates if necessary
- Solitary except for cubs, which are dependent on mother and stay with her until she reenters estrus
- Breeding begins at age 3-5 for males, 4-6 for females
- Alternating years of high and low cub production follow the high and low food supply
- Bears travel long distances for food (up to 40 miles outside their range)
- They don't enter dens for winter until snow makes traveling difficult

4 Human impact on black bear populations

- Interest in hunting increased in 1970s
- Bear study in Maine began in 1975 to study population:
 - 1975: 6,000-9,000 (hunting was restricted to help population grow)
 - 1984: 18,000
 - 1985: 21,000
 - 1998: 22,000-23,000
- Wildlife managers hope to maintain a population of 21,000 bears in Maine and allow hunting of about 3,500-4,000 bears per year.



ANSWERS TO STUDENT HANDOUT 5

What follows are some possible responses that students may have from their readings.

I. Primeval Forest

- What features of the landscape in about 1700 would have provided the habitat requirements necessary to support a population of black bear (*Ursus americanus*)?
 - Mixtures of coniferous and broad-leaved trees -- provided shelter
 - Included beech, yellow birch, oak, which all provide nuts for bears to eat
 - Openings in forest from fires, hurricanes, etc., would allow for berries and other food plants to grow in the open
- In what ways was this not a supportive habitat for black bears?
 - This would mostly be a very supportive habitat for bears
 - If a student surmises that the pure white pine stand would not provide enough of the food that bears prefer, this would be correct.
- In what ways (if any) did humans have an influence on the creation of this landscape?
 - Humans did not have a major influence on primeval forest area

2. Early Settlement

What features of the landscape in about 1740 would have provided the habitat requirements necessary to support a population of black bear (*Ursus americanus*)?

- There would still be some habitat in areas that were not yet cleared, but the clearings would have no trees for protection or food for bears
- In what ways was this not a supportive habitat for black bears?
 - Cleared areas provided no protective cover or food
 - Valuable nutrients went back into the ground when waste trees were burned
- In what ways (if any) did humans have an influence on the creation of this landscape?
 - Humans were encouraged to clear as much land as possible—legally, they had to be settled on granted land within three years of arrival
 - Humans used cleared land for agricultural crops and removed trees for use in construction



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3. Height of Cultivation

- What features of the landscape in about 1830 would have provided the habitat requirements necessary to support a population of black bear (*Ursus americanus*)?
 - So much land was cleared that the only possible food for bears might be within orchards or along hedgerows, but there wasn't enough forested area for their protection
- In what ways was this not a supportive habitat for black bears?
 - No less than 80% of the land was cleared of trees in some areas, at least 70% in all areas – with cleared lands used for agriculture
 - Clearings did not provide the protection or food that bears need, nor winter den areas
- In what ways (if any) did humans have an influence on the creation of this landscape?
 - Cleared the land of trees
 - Worked hard to put land into good-enough condition to grow hay when it was really better suited for growing trees
 - Continued to cut the remaining wood to use for building, fuel, etc.
 - Finally had to bring coal in by railroad when they had used up so many trees

4. Farm Abandonment

- What features of the landscape in about 1850 would have provided the habitat requirements necessary to support a population of black bear (*Ursus americanus*)?
 - Forest that immediately reclaimed cleared fields and pastures included oak, chestnut, and birch, which could provide food for bears
 - Forest that began to grow under the thick pine stands (see response to next question) eventually grew taller and opened up, allowing other hardwoods to appear
- In what ways was this *not* a supportive habitat for black bears?
 - In areas where there were still a few tall pines on edges of fields, the forest grew back almost completely to pine stands -- very thick with little or no undergrowth that bears need for protection
- In what ways (if any) did humans have an influence on the creation of this landscape?
 - Tree species that recolonized these abandoned farm areas depended upon what was available as seed sources; in many cases, these were just pine along edges of fields