

## **Spruce Grouse**

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### **Overall Unit Enduring Questions**

- Is the Victory Basin the right place for spruce grouse reintroduction? Why?

This question could result in discussions describing habitat, gene flow, home range, state-owned land, acreage measurements, prescribed management and timber harvests, and spruce grouse's historical presence in this location.

- What effect could climate change (warmer temperatures) have on Vermont with respect to species like the spruce grouse?

This question should emphasize the fact that spruce grouse is at the southern edge of its range in Vermont. Climate change could result in shifting the southern boundary of their range towards the north. This could result in the loss of spruce grouse from Vermont entirely. It could also result in the loss of other species that are at the southern edge of their range, such as snowshoe hare. This should bring home the point that climate change could have serious economic and environmental costs, including thwarting a well-intentioned reintroduction project.

- Why put money and effort into saving/reintroducing species like this?

This question could provoke philosophical and theoretical responses including the concept of humans as stewards of their environment, the inherent value of a species, animal rights, the concept of biodiversity and the ecosystem stability associated with it. Furthermore, it could include practical responses such as revenue from birdwatchers, and potential revenue from hunters after successful reintroduction. Mention of previous successful reintroductions using the same technique of "trap and transfer" should be made (notably beaver and turkey which are both abundant and provide hunting and trapping opportunities today).

### **Previewing Activities**

- Class discussion prompted by: "Is anyone familiar with ruffed grouse (AKA partridge)?"

Promote discussions about students' experiences with this common relative (or you could use word, cousin) of the spruce grouse. The discussion may include students who hunt partridge describing their experiences. Other observations made about partridges may include their broken wing dance (to avoid fledgling predation), their burying themselves in the snow, their drumming and habitat needs with respect to downed hollow logs for courtship (some students may recognized the sound if someone in the class is willing to attempt to imitate it), and their sudden, explosive flushing. There are several websites with videos of this behavior, such as:

## Bagabuck's Drumming Ruffed Grouse at Photobucket

<http://s60.photobucket.com/albums/h28/Bagabuck/?action=view&current=MOV06093.flv>

- Map activity: Locate the Nulhegan and Victory basin areas on a VT map.

Students should notice several similarities between the two areas, most notably that they are both in the northeast kingdom and are surrounded by large expanses of undeveloped land. This could provide a lead into topics including past land use in this region (most notably timber harvesting) and land ownership (conversion of large timber company-owned land to state and federal ownership). If a topographic map is used, it could provide a lesson on reading topographical maps, understanding the concept of watersheds (and a related lesson on the value of watershed-based natural resource planning).

- What is a “basin?”

This question connects to the map unit above. Students should be able to recognize the washbasin-like shape of what we refer to as a basin in topographical terms. 3-D maps are helpful for younger students. Teachers could also use this question as a stepping-stone to a hands-on activity making 3-D maps. At the VT Fish & Wildlife Management for Educators course, we did this using crumpled newspaper to make landforms (try making basins), covering the landforms with clear plastic, and sprinkling water (with food coloring mixed in) over the entire landscape to see where ponds and rivers and wetlands form. An alternative (that I have done with high school students) involves making a landscape out of clay inside an aquarium tank. The students then add water in regular intervals (e.g., raising the water level one inch at a time) and draw a map of the contour lines that result with each addition of water. This helps students understand the contour lines on a topo map and how they would look on the ground. Related question: “Do wetlands tend to form in basins?” This is also a good place to research the differences and defining characteristics of bogs, swamps, marshes, and fens (see “The Nature of Vermont,” by Charles Johnson, p. 169, 182).

### **Viewing Activities and Questions**

- What is the boreal forest?

This question should result in a discussion of the location of boreal forests, and the communities of animals and plants that live in the boreal forest. It should also provide a context for class discussion of other forests (most notably the temperate forest) and the transition zones between the two. The concept of elevation functioning as a surrogate for latitude should also be discussed (e.g., mountaintops in southern VT will have a forest similar to lower elevations farther north). A discussion of the potential effects of climate change on these isolated high elevation pockets should be discussed, as well as a discussion of how precious and fragile these environments are (necessitating management measures including boardwalks and reduced recreational use on VT’s peaks).

- Picture ID: Present a picture (in color) of a mature male and a mature female and ask students to distinguish the male from the female.

This quick picture ID should raise issues of courtship and mate attracting behaviors and characteristics. An interesting discussion is likely to arise when the issue is brought up in the human context. Furthermore, it would be interesting to have the students research whether males are generally “flashier” and more “glamorous” than females in general in the avian world and in other animal groups (this question returns in another way in the post-viewing section). This would also be an apt place to discuss grouse courtship rituals and compare them to human rituals or those of other species (e.g., cherry bomb mufflers and loud radios on teenagers’ cars/ trucks). Pictures can be found on Internet – try Google images – (color is important!). It may also be helpful to include some pictures of ruffed grouse (AKA partridge) so the students can compare them. Alternatively, have the students find the pictures and prepare a few posters or slides in Microsoft PowerPoint showing males and females and describing their differences.

- What is a species “range?” What is a “home range?” What is the species range/home range for spruce grouse?

See “New England Wildlife: Habitat, Natural History, and Distribution,” by Richard DeGraaf and Mariko Yamasaki (p. 125). Answers to both are suggested in the video as well. Students should understand the species range and home range for spruce grouse and also be able to determine whether a new population in the Victory Bog area could have gene flow with the existing population in the Nulhegan Basin area. This requires using a map and learning to estimate the area covered by a certain amount of acres and/ or hectares.

- What is the leading cause of decline for the spruce grouse?

Some students may think it is over-hunting due to the tameness of the spruce grouse (hence the nickname, “fool’s hen”). If they were paying close attention, however, they will know that logging (loss of habitat) accounted for the decline. It should be noted, however, that logging also helps to improve and create healthy habitat for spruce grouse. If they were really paying attention, they should also be able to note that the spruce grouse is at the edge of its range here as well, which may account for its sensitivity. This question could open up an exciting can of worms about the pros and cons of timber harvesting. Additional questions would include “what would this land look like if it was not previously owned by large timber companies?” This follow-up question should result in discussions of private landownership, forest fragmentation, land parcelization, and the impact of land subdivision.

- What are some of the characteristics of spruce grouse habitat?

Students should be able to come up with a few habitat requirements from the video including: thick softwood cover (with live branches and needles extending all the way to the ground) and berries such as blueberries. Students may be able to infer that they require wetlands such as bogs and swamps – they utilize the open areas created by those wetlands. This question is a good lead-in to defining the terms “softwood” and “conifer”,

and introducing student to the basic differences between the two major types of softwoods in spruce grouse habitat: spruce and fir. Note: Some students may be under the false assumption that these are all “pine” trees. Samples of each can be brought to class for the students to feel, smell, and see the differences up close. Pictures can also be used from any field guide or from the Internet. Remember to show pictures of the whole tree as well as parts (bark and tree form – particularly at the tree top are as important as needles, cones, and buds for differentiating these tree types). I wouldn’t suggest trying to teach the differences between red and black spruce, however, as the distinctions can be quite fine (in fact the two species hybridize at times to produce individuals that are hard to identify as one or the other).

- What did the scientists do to the grouse before releasing them, and why?

Answers should include both the tagging and the radio collaring. The tags are visual ID’s that allow the researchers to identify individuals and the radio collars allow the researchers to track their movements (until the battery wears out). This data could be used to gauge the success of the reintroduction effort. It could also allow researchers to improve their technique for future reintroductions (e.g., what if they find that only the mature birds survive the reintroduction). It could also show the researchers what areas of Victory Bog the birds utilize. This could be important information for planning management practices (e.g., logging locations, nature trails, fishing accesses etc.) in the Victory area. This question could lead to students researching other animals that have been studied with radio collars (e.g., bobcat, wolves, bears, etc.) and the reasons for these studies.

- What is a “mature” male?

Students should recognize that maturity (as defined by a wildlife biologist) is primarily related to an individual’s ability to breed. Students should recognize that with many species, the ability to breed does not necessarily mean that the individual will breed. Complex social behaviors often control this discrepancy for the benefit of the entire population. Wolf social structure could provide an interesting demonstration of this. Deer and moose can also provide valuable insights. This could be a good lead-in to different social breeding structures including monogamous (both yearly and lifetime) and harem-type structures. Students could analyze the pros and cons of different structures. This could lead further to studying the number of young different species tend to have, the timing of their birthing, and the length of time and amount of energy that the parent(s) spend raising the young before they are independent. Students should recognize that species have evolved very specific strategies balancing the risks of having few children vs. lots of children, and expending little or no energy in their post-birth lives vs. expending much energy feeding, sheltering, and educating their young. Examples could also extend into the plant kingdom, comparing trees that produce a lot of small seeds yearly to trees that produce fewer seeds that are larger, contain more energy, and are produced in cycles of several years.

- Why are the researchers planning on transplanting 60 spruce grouse?

This is a complex question that needn't be explored in too much depth (that would be better for a college-level conservation genetics course). However, the students should recognize that there is a trade-off between what is feasible and economically viable and what is necessary for the population to succeed without having inbreeding depression. They should also recognize that the type of breeding structure (see "what is a mature male") could influence the minimum population size. This question could be followed up with some basic population modeling exhibiting the differences between linear and exponential growth in simple terms. Basic algebra and graphing skills are required. The model should include births and deaths. This could also be done over a fixed number of generations (e.g., 10) using chips or M&M's in a jar to illustrate the population size.

### **Post-Viewing Activities**

- Define "fauna."

Students may not know the meaning of the terms "flora" and "fauna" (mine did not).

- Are males "flashier" looking than females in general in the avian world?

Do some research on this topic and compare and contrast avian gender-based differences in appearance, song, and courtship displays to human gender-based differences in appearance and actions.

This question/ writing activity is a good lead in for discussing the topic of "nature vs. nurture." Having students examine teenager behavior in different societies could lead to some interesting conclusions on what is cultural vs. what is instinctual. Studies on young birds hatched in captivity and separated from parental influence might provide useful fodder for this conversation. The book "Time, Love, Memory, A Great Biologist and His Quest for the Origins of Behavior," by Jonathan Weiner provides some excellent reference material for this subject matter (it's also a great read!).

- Can you think of other methods (besides trap and transfer) that could be used to revitalize VT's population of spruce grouse?

This is a good place to discuss the pros and cons of trap and transfer vs. a captive breeding program, and when it is appropriate to use one vs. the other. It should be emphasized that while spruce grouse are rare in VT, they are common farther north. This may affect the chosen method. What else may influence the wildlife biologists' chosen method? Some answers could include money, time, preexisting facilities/ experience, genetics, diseases, etc.

- When is the best time to transfer the grouse and why?

This question is intended to get the students thinking about some of the decisions that the wildlife biologists have to make. In particular, the students should recognize that wildlife

biologists have to have an in-depth knowledge about the natural history of the species, as well as knowledge about the seasonal variations in food, water, and shelter. It would be interesting to think about how the timing might vary for other “trap and transfer” species, particularly a species that stores its winter food supply (e.g., beaver).

### **Extensions**

- The video segment mentioned the unique courtship displays of spruce grouse but didn't give much detail about what makes them unique. Research spruce grouse (perhaps also ruffed grouse) courtship rituals. The class could also research the “broken wing” display that a parent grouse uses to lure predators away from their young. If the class would be into it, it may be fun to act them out!
- Ruffed grouse bury themselves in the snow in the winter. Perhaps spruce grouse do, too. Students could research this behavior and then attempt it themselves (wintertime only...bring a thermometer and a shovel).
- Spruce grouse have an interesting (and fitting) nickname: “fool hen”. Have students come up with a list of other descriptive nicknames or names we apply to species/ individuals (including pets and people). Some VT species with descriptive names/ nicknames include woodpecker, woodchuck, rock maple, jack in the pulpit, lady slipper, pitcher plant, muscle wood, moosewood, striped maple, alternate-leaved dogwood, beaked hazelnut, hay scented fern, colt's foot, ironwood, jewel weed, maidenhair fern, poison ivy, sunflower, and almost anything with a color in its name (e.g., red maple, silver maple). There are lots of them and it can be fun and educational to make a long list.
- Previous success stories with the reintroduction of species in VT using the trap and transfer technique include beaver and wild turkey. Have your students break up into two groups. One group should research wild turkey and the other group should research beaver. They should collect information (library, internet, whatever is available) about the history of this species in VT (including reintroduction and population sizes) and its natural history. The students should “teach” the other half of their class about their respective species. Their presentations can be compiled in Microsoft PowerPoint (if computers are readily available), poster displays, or however else the students may wish to present their materials. It would be interesting to have a turkey hunter and/or beaver trapper come to the classroom to talk about their experiences (especially if the individual is from the local community).

### **Vermont Teaching Standards**

#### Science

7.1, 7.2, 7.5, 7.8, 7.11, 7.13, 7.14, 7.15, 7.16, 7.18

