Student Pages: Group Activity

Grizzly Bear Science Team 2

For this activity, your group is the "Grizzly Bear Science Team #2". Your team is responsible for scientifically evaluating whether or not the GYE grizzly bear population has met **Demographic Recovery Criterion #2**.

To do this, we should take another look at **Demographic Recovery Criterion #2:**

"Sixteen of 18 bear management units within the Recovery Zone must be occupied by females with young, with **no two adjacent bear management units unoccupied, during a 6-year sum of observations.** This criterion is important as it ensures that reproductive females occupy the majority of the Recovery Zone and are not concentrated in one portion of the ecosystem."

Your team needs to scientifically evaluate this Demographic Recovery Criterion. So, you need to use the scientific process, which includes at least the following steps:

1. Develop Hypotheses
2. Use hypotheses to develop predictions
3. Design a scientific study to rigorously evaluate predictions
4. Collect data
5. Analyze and evaluate data
6. Use results from data evaluation to draw conclusions, and to inform new hypotheses
7. Share findings with peers and the public

Unfortunately, we don't have time to design field studies, determine statistical estimators, and tromp around in the mountains following grizzly bears to collect data. The IGBST gets to do all that fun stuff! Lucky for us, the IGBST has shared their data, so your team CAN participate in Steps 1, 2, 5, 6, and 7.

Let's get started with hypotheses:

Hyp 1: The grizzly bear population has met Demographic Recovery Criterion #2

There's a competing alternative hypothesis, what is it?

Hyp 2:

_____

Great! Okay, let's go back to Hypothesis 1. If Hypothesis 1 is correct, what predictions would you make about the data you evaluated in Dataset 4 and Figure 1?

Example of one prediction:

Prediction 1A: Sixteen of 18 bear management units within the Recovery Zone have been occupied by females with young during the last 6-year sum of observations.

What would prediction 1B be (hint: it has something to do with "adjacent BMUs")?

Prediction 1B:

_____

_____

If Hypothesis 2 is correct, what predictions would you make about the data you evaluated in Dataset 4 and Figure 1?

Prediction 2A:

_____

_____

Prediction 2B:

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Okay, it's time for Step 5 of the Scientific Process (i.e., Analyze and Evaluate Data).

Hmmmmmmm.....some of the information in Dataset 4 might not be completely clear, and this might make it difficult to evaluate your predictions. In the following paragraphs, you will find some information that should help:

What exactly is a BMU? BMU stands for Bear Management Units, which were identified to provide a basis for ensuring that habitats for bears were well distributed across the recovery area. The GYE recovery area was divided into 18 BMUs.

What rules does the IGBST use to evaluate BMU occupancy over a 6-year sum of observations?
The IGBST looks to see if 16 of the 18 BMU's are occupied by females with young, and they evaluate over the most current 6-year time period. So for example, right now the IGBST looks at BMU occupancy during 2009-2014.

- For 16 of the 18 BMUS, there must be occupancy by females with young during at least 4 of the 6 years
- Of the 16 occupied BMUs, any particular BMU can be unoccupied 2 years in a row as long as it was occupied 4 out of 6 years.
- Two adjacent BMUs can be unoccupied during only 1 of the 6 years

Why use a 6-year sum of observations? The breeding and cub cycle of grizzly bears is, on average, once every three years. So the 6-year sum includes 2 normal cycles that an independent female could produce cubs. This 6-year sum has value when looking at long-term trends in production and survival. There is always information that is unknown: for example a female can lose cubs to various causes during a "with cub" cycle and therefore fall out of sync in what we think was the normal cycle and potentially be observed 2 years in a row with new cubs. For example, if biologists do NOT observe females with COY in a particular BMU for a few years, it might just indicate that the female is with older cubs or in transition of no cubs to new cubs. The 6-year sum helps smooth out high and low counts of unduplicated females with COY from these type of cub observations and give a more accurate sense of how females are producing and rearing cubs.

How did the IGBST collect data to document information regarding Demographic Recovery Criterion #2?
Dispersion of reproductive females throughout the ecosystem is assessed by verified observations of female grizzly bears with young (COY, yearlings, 2-year-olds, and or young of unknown age) by BMU. Usually 2 rounds of **observation flights** are conducted annually, covering all 18 BMUs and the subunits within. The time it takes to conduct observation flights for each year can be significant. For example, during 2012, the observation flight time was 95 hours for Round 1 and 74 hours for Round 2.

Since your team will be responsible for Demographic Recovery Criterion #2, it makes sense that you guys have some information about **grizzly bear habitat.**

What is habitat? Habitat provides all the resources an animal needs to survive and reproduce. What resources do grizzly bears need to survive and reproduce? At a minimum, grizzly bears need food resources, water, den sites, and mates. Usually, the space needed to meet these habitat requirements is large relative to that for most other

wild species. Broadly speaking, grizzly bear home ranges usually include diverse forests interspersed with moist meadows and grasslands in or near mountains.

Grizzly bear food resources

Grizzly bears are omnivores and eat a wide variety of green vegetation, wild fruits, berries, nuts, bulbs and roots, insects, and meat. Grizzly bears in the GYE appear to be more carnivorous than other grizzly bear populations, probably because there is so much prey available where they live. They eat winter-killed bison, elk, and deer carcasses, elk calves, and spawning cutthroat trout. They also eat a lot of army cutworm moths and white bark pine nuts.

Grizzly bear habitat in the GYE

The GYE consists of more than 5.8 million acres, encompassing parts of Montana, Wyoming, and eastern Idaho. Nearby there are 6 million additional acres of suitable grizzly bear habitat located on National Forest Service lands.

Important: while degradation of habitat is always a concern for wildlife, especially for populations that are listed as threatened or endangered, the Yellowstone ecosystem encompasses two national parks that serve as **a core of secure habitat** for grizzly bears.

Information about the 3 Habitat Recovery Criteria for GYE Grizzly Bears.

In 2007, the Recovery Plan for the GYE grizzly bear population was amended to also include 3 Habitat Recovery Criteria. So, before the GYE grizzly bear population can be delisted, it must meet all 3 Demographic Recovery Criteria AND all 3 Habitat Recovery Criteria.

Here's a list of the 3 Habitat Recovery Criteria:

Habitat Recovery Criterion 1

"Secure habitat standard: The percentage of secure habitat within each bear management subunit must be maintained at or above levels that existed in 1998. Temporary and permanent changes are allowed under specific conditions..".

Specific conditions are listed in the "Supplement to the Grizzly Bear Recovery Plan" signed in 2007.

Habitat Recovery Criterion 2

"Developed site standard: The number and capacity of developed sites within the Recovery Zone will be maintained at or below the 1998 level with the following exceptions: any proposed increase, expansion, or change of use of developed sites from the 1998 baseline in the Recovery Zone will be analyzed, and potential detrimental and positive impacts documented through biological evaluation or assessment by action agency.

A developed site includes but is not limited to sites on public land developed or improved for human use or resource development such as campgrounds, trailheads, lodges, administrative

sits, service stations, summer homes, restaurants, visitor centers, and permitted resources development sites such as oil and gas exploratory wells, production wells, plans of operation for mining activities, work camps, etc."

Habitat Recovery Criterion 3
"Livestock allotment standard: Inside the Recovery Zone, no new active commercial livestock grazing allotments will be created and there will be no increases in permitted sheep Animal Months (AMs) from the identified 1998 baseline. Existing sheep allotments will be monitored, evaluated, and phased out as the opportunity arises with willing permittees."

Okay, you should have enough information now to complete Step 5 of the Scientific Process (i.e., Analyze and evaluate the data) and complete Step 6 (i.e., Use results from data evaluation to draw conclusions). Which predictions did the data from Dataset 4 and Figure 1 refute?

Based on the scientific data you have, has Demographic Recovery Criterion #2 been met or has Demographic Criterion #2 NOT been met?

Time to work on Step 7 of the Scientific Process (i.e., share findings with your peers).

Your team will now prepare a presentation about Demographic Criterion #2 and your findings related to this criterion. Your team will give this presentation to the rest of the class (i.e., Grizzly Bear Science Team 1 and Grizzly Bear Science Team 3).

In this presentation, make sure to include AT LEAST the following:

1. What is Demographic Recovery Criterion #2?
2. Why is it important to know whether or not females with cubs are in at least 16 of 18 BMUs?
3. What are your hypotheses and predictions?
4. What does BMU stand for?
5. Talk about the rules that the IGBST uses to evaluate occupancy in BMUs over a 6-year sum of observations.
6. Present the bar graph you made that shows the number of years each BMU was occupied by females with young during 2009-2014 (6 year sum of observations). Explain to your classmates why the IGBST uses a 6-year sum of observations.
7. Show Figure 1 and explain to your classmates whether or not adjacent BMU's have been unoccupied by females with cubs since 1995. Have adjacent BMU's been unoccupied by females with cubs during the last 6 years? Has the adjacency rule been met during the last 6 years? Which BMU has been the LEAST occupied during 1995-2014?
8. What is habitat, and what does habitat mean for grizzly bears in the GYE?
9. How big is the GYE? What makes this particular ecosystem unique in terms of providing a core of secure habitat for the GYE grizzly bear population?

10. What are the 3 Habitat Recovery Criteria for the GYE grizzly bear population**?**

11. Which predictions did your data support**?**

12. What are your conclusions regarding the grizzly bear population in GYE with respect to Demographic Recovery Criterion #2**?**

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