

Science Research Mentoring Program

CONSERVATION BIOLOGY

The field of Conservation Biology uses scientific knowledge to study and protect the living world and its biological diversity. This discipline emerged over the last 40 years as a to address the alarming loss of biodiversity worldwide. Many threats to biodiversity are linked directly or indirectly to human activity. Educating people about this field and involving them in conservation activities is essential in order to stem habitat destruction and the loss of genetic and species diversity.

This course introduces students to the principal concepts and methods of Conservation Biology. They will then be able to apply this knowledge to analyze and address actual problems in ecosystems today.

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Session One: What is Conservation Biology?

LEARNING OBJECTIVES

Students will be able to:

- Define the scope of the field
- Identify the role and duties of a Conservation Biologist

KEY TOPICS

- Origins
- Scope
- What is a Conservation Biologist?

CLASS OUTLINE

TIME	TOPIC	DESCRIPTION
25 minutes	Introductions, Administration, Pre-Assessments	Instructor will 1) take attendance & have students create their name tents; 2) make introductions; 3) review the curriculum outline.
40 minutes	What is Conservation Biology? (Visit Hall of Biodiversity)	Ask students to describe the scope of Conservation Biology based on this Hall's permanent exhibit. They may work individually or in teams. Alternative: If there is no hall resource, instructors can lead a brainstorming session or have teams come up with definitions of conservation biology, and then discuss as below. Students can glean ideas from magazines, journals and websites (e.g. Conservation magazine, Conservation Biology, Society for Conservation Biology or NCEP).
20 minutes	Discussion: Conservation Biology Session I, Part I	Group discussion about the history of the awareness of human influence on the environment, limits of resource extraction/use, and the emergence of conservation biology.
20 minutes	Discussion: Conservation Biology Session I, Part II	Class discussion how conservation biologists are trained, what disciplines are involved, what they do, and what tools they use.
15 minutes	Wrap-up	Assign homework. Students have the opportunity to express questions, comments, criticisms, and concerns.

Session One: What is Conservation Biology (continued)

MATERIALS: None

PREP WORK: None

HALLS USED: Hall of Biodiversity

A/V NEEDED: None

HOMEWORK: Find and summarize a news article about an endangered species that interests you.

Session Two: What is Biodiversity?

LEARNING OBJECTIVES

Students will be able to:

- Explain how species diversity is measured
- Apply relevant genetic concepts
- Describe the importance of ecosystem diversity
- Compare and contrast food chains and food webs
- Describe the state of biodiversity worldwide

KEY TOPICS

- The Three Levels of Biodiversity
- The importance of genetic diversity
- Measuring species diversity
- What is a biological community
- Ecosystems and species relationships
- Biodiversity distribution

CLASS OUTLINE

TIME	TOPIC	DESCRIPTION
10 minutes	Conservation in the News	Read and discuss two articles that the students found.
15 minutes	Lecture: ConBio SRMP 2	Defining biological diversity / biodiversity.
1 hour	Endangered and Extinct Species	See activity.
15 minutes	Wrap-up	Assign homework. Students can ask questions, and express concerns.

MATERIALS USED: **None**

PREP WORK: **None**

HALLS USED

- Hall of African Mammals
- Hall of Asian Mammals

AUDIO-VISUAL NEEDED: **Computer access to the Red List at <http://www.iucnredlist.org>**

HOMEWORK

Read "What Is Conservation Biology?" by Michael E. Soulé (1985) and then identify and highlight the Postulates of Conservation

Session Two: What is Biodiversity?**Activity: Endangered and Extinct Species**

OVERVIEW

Students will walk through halls in groups of three and identify endangered or extinct specimens. They'll use the IUCN red list to identify the status of at least 15 species (critically endangered, endangered, vulnerable, etc.).

TIME FRAME

1 hour

PROCEDURE

1. In groups of three, students should proceed to the Akeley Hall of African Mammals.
2. Half of the class should take one side of the hall, and progress from downstairs to upstairs. Students should find any organisms listed on the IUCN red list and note their status (critically endangered, endangered, or vulnerable), common name, scientific name, and threats.
3. The instructor should circulate the room and use formative assessment to gauge progress and completion.
4. After 25 minutes, bring the class to the Hall of Asian Mammals and continue the exercise.

ALTERNATIVE

Alternative: If no similar physical resource is available (such as a zoo), students can use resources like videos, books, posters/photo printouts or websites.

Students can also be broken up into groups and assigned a region of the world or taxonomic group to examine. The IUCN Red List search can be filtered in many ways, including location, Red List status, habitat type, taxonomic group, threats faced, etc., which may need to be incorporated into the search, otherwise it may generate an unmanageable number of results. Once the groups have gathered their lists, have them share how many Critically Endangered, Endangered or Vulnerable species they found and identify the major threats that 3-5 of those species face.

Session Three: Conservation and Policy

LEARNING OBJECTIVES

Students will be able to:

- Identify a Conservation Issue Requiring or Affecting Policy Decisions
- Recognize all Stakeholders for a Particular Conservation Policy Issue
- Create a Conservation Plan for a Species or Habitat

KEY TOPICS

- Stakeholders
- Dealing with Scientific Uncertainty
- How Do Laws Protect Species and the Environment?
- Creating a Conservation Plan

CLASS OUTLINE

TIME	TOPIC	DESCRIPTION
15 minutes	Conservation in the News	Read and discuss two articles found by students.
15 minutes	Review Soule (1985) Reading Homework	Instructors will review the Postulates of Conservation Biology and work through examples for each. Students can ask questions and talk about what they learned.
15 minutes	Final Project Introduction	Students should pair up based on a species of shared interest; these will be final project partnerships. Instructors will introduce the final project to students.
10 minutes	Conservation Policy Primer	Present concepts of conservation policy in PowerPoint; introduce activity below.
40 minutes	Conservation Plan Activity	See activity.
15 minutes	Wrap-up	Solidify teams for final project. Assign homework for final project.

MATERIALS: None

PREP WORK: printouts of background articles for species in activity

HALLS USED: None

A/V NEEDED: laptops/computer access for further research on species in activity

HOMEWORK: Final Project- Endangered Species - Groups of two will pick a species and select two relevant articles.

Session Three: Conservation and Policy**Activity: Species Conservation Plan**

OVERVIEW

Students will assess current stakeholders, legislation, IUCN status and range for their organism, and work in groups to devise a conservation plan.

TIME FRAME

40 minutes

MATERIALS

- PowerPoint slide with Species Worksheet to guide research
- Laptops for internet research
- Provided background article

PROCEDURE

1. The instructor should split the students into five groups.
2. Each group will be assigned an endangered species of commercial value or that is of special concern as a resource for humans (cultural value, subsistence, etc.).
3. Group will use article and species worksheet as a jumping off point to begin searching online for more information on their species and any policies or regulations affecting it.
4. Groups will be asked to present a conservation plan to the class. Each member is asked to speak.
5. The instructor should circulate the room and use formative assessment to gauge progress and completion.
 - There is no right or wrong as many situations and scenarios will sit within more than one value bin.

Session Four: Species Extinctions and Discoveries

LEARNING OBJECTIVES

Students will be able to:

- Define and illustrate extinction and speciation
- Link human activities to increase in rates of extinction
- Describe what the scientific discovery of new species entails

KEY TOPICS

- Mass Extinction Episodes
- Speciation rate vs. extinction rate
- Evidence of human activity correlated with decreases in biodiversity
- Global patterns of net change in overall extinction
- Species-area relationship
- Extinction Vortex

CLASS OUTLINE

TIME	TOPIC	DESCRIPTION
15 minutes	Conservation in the News	Read and discuss two articles found by students.
15 minutes	Complete group presentations from Conservation Plan Activity	Students describe conservation efforts for five cases.
5 minutes	Watch "How to Survive the Next 100,000 yrs"	New Scientist, Deep Future, How to Survive the Next 100,000yrs. (http://bcove.me/mymns6qd)
25 minutes	Presentation on Extinction and Discovery	The instructors will lead a discussion on past and present extinction patterns. Topics will include the relationship between extinction and speciation; how new species are discovered and recognized; and the implications of species extinction and discovery for conservation biology.
30 minutes	Speciation Activity	See activity.
20 minutes	Team Building & Final Project Presentation	Assemble teams for final project and assign species if the choice is not clear. Hand out Final Project description. Describe how IUCN works.
10 minutes	Wrap-up	Assign homework. Students can express questions, criticisms, and concerns.

Session Four: Species Extinctions and Discoveries (continued)

MATERIALS USED: None

PREP WORK: None

HALLS USED: None

AUDIO-VISUAL NEEDED: Computer & projector to watch video

HOMEWORK

Assign students to continue work on their final projects.

Read "Deep Future: Will there be any nature left?"

Session Four: Species Extinctions and Discoveries**Activity: Natural Selection & Isolation**

(based on <http://www.indiana.edu/~ensiweb/lessons/quick.speciation.html>)

OVERVIEW

Natural selection constructs complex systems piece by piece, often building on previous changes to enable new functions. The purpose of this lesson is to experience one way in which speciation might occur.

TIME FRAME

30 minutes

MATERIALS

- Large plastic cups of different colors (e.g. red = all the mothers in the population, green = all the fathers)
- ~100 beads, 50 each of 2 colors (e.g. red and green)
- Small white cups, one per person in the class = babies

PROCEDURE

1. Put the beads in the large plastic cups, with even numbers of each bead color in each parent cup. This represents the genetic makeup of a hypothetical population.
2. Distribute one of the smaller "baby" cups to each student. Have students select a bead from each cup without looking, and place the two beads into their child cups. (Each "take" represents a pair of alleles received in a random "mating" from the population's "gene pool", and the cups are their "babies".)
3. Tally the number of "babies" that are green/green, green/red and red/red. Ask everyone with two green beads (alleles) to raise their hands. Note where raised hands are concentrated. If no concentration, ask all with two red beads to do the same.
4. Look for pathways between clusters of students with unusually high concentrations of one color or the other. Start moving through that pathway. Ask the students to suggest a barrier that might separate the two populations (e.g. a river, mountains, or rising sea level creating islands). Inform students that the "populations" with a high proportion of one color are now permanently separated from the parent (or other) population, and can no longer interbreed.
5. Due to a higher proportion of (green) genes, this little population has longer legs than the parent population, so they can run faster and escape predators, so they survive, and over many generations evolve into a new species with typically longer legs and accompanying features. The proportions of the genes in the isolated population should be distinctively different from the parent population. Tally of total number of green beads in each population, then the number of red beads in each population, and note the different proportions in each. Gene selection can be repeated one more time (will be a smaller number of individuals, since this will be only the offspring of the offspring) to get an idea of how the children's genetic makeup will change.

If time remains and computer access is available, you can review speciation with the modules here: <http://ats.doit.wisc.edu/biology/ev/sp/sp.htm>

Session Five: Conservation Genetics

LEARNING OBJECTIVES

Students will be able to:

- Review genetics and basic conservation genetics techniques
- Describe what a conservation genetics lab in the AMNH does
- Differentiate between species and population level genetics

KEY TOPICS

- Describe what a conservation genetics lab in the AMNH does
- Differentiate between species and population level genetics

CLASS OUTLINE

TIME	TOPIC	DESCRIPTION
15 minutes	Conservation in the News	Read and discuss two articles found by students.
15 minutes	Homework Discussion “Deep Future - Will There Be Any Nature Left?”	Discuss speciation and extinction in the context of the homework article and the Deep Future video. What species do students think will survive alongside humans?
25 minutes	Presentation on Conservation Genetics	A lecture on basic genetics and techniques (sequencing, microsats, BLAST) used in conservation biology. They will address different uses of genetics (e.g. population management, captive breeding, population bottlenecks, health, movement between populations and different habitats), using case studies where applicable.
50 minutes	Population Genetics: Diversity Within Versus Among Populations	NCEP module on population genetics and how it can be applied to conservation priorities *NCEP modules are free, but you must register for a free account to be able to download them. This course uses several.
15 minutes	Wrap-up	Review final project groups and check on progress of Worksheet A. Assign Homework. Students have the opportunity to express questions, criticism, and concerns.

MATERIALS: None

PREP WORK: None

HALLS USED: Hall of Biodiversity

A/V NEEDED: None

HOMEWORK: Conservation in the News Article

Session Six: Invasive Species

LEARNING OBJECTIVES

Students will be able to:

- Differentiate between exotic and invasive species
- Conduct both systematic and point sampling
- Report meaningful field data
- Use a field guide

KEY TOPICS

- Scale of invasive species
- Causes and effects of invasion

CLASS OUTLINE

TIME	TOPIC	DESCRIPTION
10 minutes	Conservation in the News	Read and discuss one article provided by students found.
20 minutes	Lecture: Invasive Species	The causes, impacts, and prevalence of Invasive species
75 minutes	Outdoor Sampling Activity	Students will do point observations and systematic field sampling in Central Park, with special attention to invasive and exotic species. Alternative: Select an area close by to demonstrate systematic and point sampling and give students a chance to ID some invasive species
5 minutes	Wrap-up	Assign homework. Students have the opportunity to express questions, criticisms, and concerns.

MATERIALS

- Field measuring tapes
- iPads/iPhones with field sampling apps (if available – e.g. LeafSnap) or appropriate field guides
- Notebooks for recording data
- Appropriate clothing
- Binoculars (if available)

HALLS USED: **None**

A/V NEEDED: **None**

HOMEWORK

Find a news article about invasive species of Central Park or New York State (substitute other pertinent area as needed).

Continue working on Worksheet A and complete parts 5-6 for next session.

PREP WORK

Prepare excel sheet for students to fill in.

Session Seven: Wildlife Trade

LEARNING OBJECTIVES

Students will be able to:

- Analyze the main reasons, both legal and illegal, for wildlife harvest
- Connect the scale of harvests and international crime
- Design scientifically informed interventions against illegal wildlife trade
- Assess the impact of illegal trade on culture, economics, and ecology

KEY TOPICS

- Scale of wildlife trade
- Legal
- Illegal
- Wildlife Trade Hotspots
- Problems caused by wildlife trade

CLASS OUTLINE

TIME	TOPIC	DESCRIPTION
15 minutes	Conservation in the News	Read and discuss two articles found by students.
20 minutes	Discussion: Wildlife Trade	Discuss the locations of illegal wildlife trade hotspots worldwide, and the ecological, economic, and social problems effects of the illegal wildlife trade.
1 hour 15 minutes	Activity: CITES Listing Activity	The instructor will facilitate the CITES Listing Activity. See CITES Listing Activity procedures.
10 minutes	Wrap-up	Assign homework. Students have the opportunity to express questions, criticisms, and concerns.

MATERIALS: See activity

PREPARATION

- Print articles for activity
- Prepare name tags

HALLS USED: None

A/V NEEDED: None

HOMEWORK

Assign students to continue work on their final presentations and remind class that Part III and IV are due next session.

Session Seven: Wildlife Trade**Activity: CITES Listing Activity**

OVERVIEW

The students will role play UN professionals who will review the ecological, economic, and anthropological literature to decide if the species *Swietenia macrophylla* (Bigleaf Mahogany) should be reclassified under The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendix I. They will be divided into three groups of 6-7: the Conference of the Parties, the Standing Committee, and the Conference of the Parties.

1. The Conference of the Parties will investigate the issue through a question and answer period with the Bigleaf Mahogany Working Group of the Animals and Plants Committee.
2. The Standing Committee will devise a policy recommendation and budget.
3. The Conference of the Parties will accept or reject the policy recommendations and budget.

TIME FRAME: 90 minutes

MATERIALS

1. Stop clock/watch
2. CITES Name Tags
3. Group Source Material:
 - a. Each student should have about 2 pieces of literature each
 - b. Each student should be given readings that focus on a single area i.e. logging, international research, or genetics so that he or she will be the expert on that topic within their group.
 - c. CoP Sources
2 pieces/student = about 12-14 pieces of literature

This literature should date back to 2003 or earlier
 - i. 1-3 genetics related
 - ii. 1-3 ecology related
 - iii. 1-3 anthropology related (agriculture/history/cultural/language/medical)
 - iv. 1-3 forestry/logging industry related
 - d. Standing Committee Sources
 - i. 2-3 human health & ecosystem services related
 - ii. 2-3 a country level government reports i.e. department of forestry
 - iii. 2-3 timber industry market reports
 - e. ITTO Tropical Timber Market (TTM) Reports (from the ITTO Market Information Service (MIS))

Session Seven: Wildlife Trade**Activity: CITES Listing Activity - Continued**

MATERIALS - CONTINUED

- f. Hardwood Review Weekly
 - i. 2-3 forestry/logging related
 - ii. Copy of the IUCN Red List, *Swietenia macrophylla* website
- g. Bigleaf Mahogany Working Group of the Animals and Plants Committee Sources
 - 2 pieces/student = about 12-14 pieces of literature
 - this literature should be as recent as possible, and should include:
 - i. 2-3 genetics related
 - ii. 2-3 ecology related
 - iii. 2-3 anthropology related (agriculture/history/cultural/language/medical)
 - iv. 2-3 forestry/logging related
- h. 1-2 government, inter-agency, international produced

PROCEDURE

The instructor should ask the students not to read ahead or read material to which they are not assigned. This is important to maintaining the integrity of the process.

1. In the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Activity Packet have the students read the following sections:
 - a. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
 - b. How CITES Works
 - c. Appendices
 - d. Agenda
 - e. Rules
2. Split the students into three groups of 6-7:
(Conference of the Parties, Standing Committee, The Conference of the Parties)
3. Distribute country name plates to all of the students.
4. Have each group read over its:
 - a. Group description
 - b. Situation
 - c. Order of Business
5. Each group should create at least 10 questions and answers per person to questions they anticipate receiving, for a total of 60-70 points of inquiry and evidence.
6. Follow the agenda.
7. After the activity you may wish to debrief with students what insights they have gained.

Session Eight: Habitat Destruction and Fragmentation

LEARNING OBJECTIVES

- What is the difference between natural ecosystem fragmentation and human-mediated ecosystem fragmentation?
- Which species are most vulnerable? Are some species more sensitive to fragmentation?

KEY TOPICS

- Main disturbances caused by humans
- Ecosystem loss
 - degradation
 - fragmentation
- Global level threat to biodiversity
- Earth's major terrestrial biomes
- Area-Sensitivity
- Edge effects
- Population Isolation
- Management of Fragmented Landscapes
 - Corridors
 - Riparian zones

CLASS OUTLINE

TIME	TOPIC	DESCRIPTION
15 minutes	Attendance, Update on Classroom Etiquette & Conservation in the news	L.i.s.t.e.n. also spells silent. Time is money. Keep us updated! Missed classes = makeup homework. Read and discuss two articles that the students found.
15 minutes	Homework Talk: Permission Slips / Worksheets Part 1-2	
25 minutes	Presentation on Habitat Fragmentation and Restoration	Instructor will present about ecosystem degradation and loss.
60 minutes	Forest Fragmentation Exercise	
5 minutes	Wrap-up	Assign homework. Students have the opportunity to express questions, criticisms, and concerns.

Session Eight: Habitat Destruction and Fragmentation (continued)

MATERIALS: see activity

PREP WORK: Photocopy all the source materials

HALLS USED: None

A/V NEEDED: None

HOMEWORK: Find an article about Conservation Biology in the news; Figure out your Ecological Footprint Ecological Footprint Quiz by Center for Sustainable Economy www.myfootprint.org

Session Eight: Wildlife Trade**Activity: Forest Fragmentation and its Effects on Biological Diversity: A Mapping Exercise**

OVERVIEW

This exercise has two goals. The first is to use a mapping exercise to explore what happens to a forested landscape as it is fragmented. The second is to let students predict the effect of these changes on the biota within the landscape. The fundamental question is: Can landscapes be fragmented in a way that permits humans and biological diversity to coexist?

TIME FRAME

60 minutes

MATERIALS

- Copies for each student of the NCEP Module "Forest Fragmentation and its Effects on Biological Diversity: A Mapping Exercise"
- Computers with Google Earth and Internet Access
- Excel spreadsheet - Mapping Exercise.xls

PROCEDURE

1. The instructor will place students in pairs. The three scenarios will be divided amongst the groups. Each group will be assigned two steps for its scenario, including one advanced step (4-6). Students are encouraged to try to complete as many steps as possible within a 20-minute time frame. Data will be uploaded to an excel document to enable discussion and analysis of group results.
2. In class the students should complete:
 - Part I: The Forest Fragmentation Process
 - Part II: Biological Implications of the Fragmentation Scenarios
 - Step 1. Landscape analysis and ecosystem diversity
 - Step 2: Changes in Ecosystem Function – Carbon Sequestration
 - Step 3: Changes in Faunal Diversity
 - Step 4: Population Viability of a Herding Species with a Large Home-range
 - Step 5: Mobile Species and Foraging Energetics
 - Step 6: Genetic Diversity in a Canopy Tree
3. Group discussion and analysis of results (20 mins).
4. Groups will use Google Earth to search for evidence of fragmentation. Each team will be assign to a continent (excluding Antarctica). Members will assess the impact and nature of the fragmentation.

Session Nine: Climate Change and Mitigation

LEARNING OBJECTIVES

Students will be able to:

- Name greenhouse gases and describe the “greenhouse effect”
- Compare rate of climate change now to climate change in the past and note why it is different
- Discuss the effects of climate change on biodiversity
- Engage in ways everyone can work to mitigate climate change at home
- Use vocabulary including: Greenhouse Effect, Greenhouse Gases, Ozone Layer, Sea Level Rise, Fossil Fuel, Renewable Energy

KEY TOPICS

- Greenhouse Effect and Gases
- Climate Change now compared to past rate of climate change
- Effects of Climate Change
- Mitigation of Climate Change - what you can do

CLASS OUTLINE

TIME	TOPIC	DESCRIPTION
15 minutes	Conservation in the News	Read and discuss two articles found by students.
20 minutes	Review Ecological Footprint Homework	Instructor will collect data from students, make a histogram, and calculate the average. Students will report their number and the personal major factors influencing it. We’ll create an excel file and project graph and results of mean for the group.
25 minutes	Climate Change Vocabulary and Discussion	Instructors will use the drawing board to introduce and review the Greenhouse Effect and review vocabulary.
45 minutes	Video on Climate Change	Instructors will show and discuss “Six Degrees Could Change the World”.
5 minutes	Wrap-up	Assign homework. Students have the opportunity to express questions, criticisms, and concerns.

MATERIALS: Films: “Frontline: Heat”- PBS 2008
 “Six Degrees Could Change the world” - National Geographic 2008

PREP WORK: Prepare excel sheet for students.

HALLS USED: None

A/V NEEDED: projector/method of showing films

HOMEWORK: Students should continue to work on their final presentations. Worksheet A parts 5 and 6 are due next session.

Find an article on parks and protected areas for the next session.

Session Ten: Parks and Protected Areas

LEARNING OBJECTIVES

Students will be able to answer or think critically about:

- What is a protected area?
- How is a protected area established?
- What should be protected?
- How much space is needed to adequately protect it?
- What are some ways to protect specific areas?

KEY TOPICS

- Defining priorities
- Terrestrial and marine protected areas
- Protected areas in IUCN Categories
- The Species, Ecosystem, and Hotspot Approach to setting conservation priorities
- Gap Analysis
- Criteria for optimizing biodiversity protection (four Rs)

CLASS OUTLINE

TIME	TOPIC	DESCRIPTION
15 minutes	Conservation in the News	Read and discuss two articles produced by students.
45 minutes	Parks & Protected Areas	Using case studies, instructors will discuss parks and protected areas, including their history, major national and international programs, and criteria for establishing them, IUCN categories, Gap analysis, and stakeholders.
40 minutes	Activity: Protected Areas and Biodiversity Conservation (NCEP Modules)	Complete the activities on reserve selection and design.
15 minutes	Activity: Final Presentation Work	Groups will work on their presentations, coordinating speaking roles and locating information and images.
5 minutes	Wrap-up	Assign homework. Students have the opportunity to express questions, criticisms, and concerns.

MATERIALS: None

PREP WORK: None

HALLS USED: None

A/V NEEDED: None

HOMEWORK: Students continue to work on final presentations. Find an article in the news.

Session Ten: Parks and Protected Areas**Activity: Final Presentation Work**

OVERVIEW

Groups will work on their presentations, coordinating speaking roles, and locating information and images.

TIME FRAME

15 minutes

MATERIALS

- ConBio Oral Presentation Rubric
- ConBio Speaking Skills Rubric Scorecard

PROCEDURE

1. Each group should offer 15 total minutes of presentation.
 - a. Each member of the four-member team must participate (each should speak for about 2.5 minutes)
 - b. 5 minutes of Q&A
2. Presentation Content:
 - a. Introduction
 - i. Description of Critically Endangered species
 1. Taxonomic Classification
 2. Closest Relatives
 - ii. Area of distribution
 - b. Population Trends
 - c. Historical context
 - d. Present demographic trends
 - e. Main Threats
 - f. Conservation Efforts
 - g. Concluding Remarks

Session Eleven: Conservation Medicine

LEARNING OBJECTIVES

Students will be able to:

- Define the scope of and purpose of Conservation Medicine
- Articulate the links between human, wildlife and ecological health

KEY TOPICS

- Relationship between human health, other organisms, and the environment
- Traditional medicine
- Climate change and human/wildlife/ecological health
- International trade and human health, specifically the consumption of bushmeat
- Economic development and land use and human/wildlife health
- Changing ecosystems and human health impacts

CLASS OUTLINE

TIME	TOPIC	DESCRIPTION
15 minutes	Conservation in the News	Read and discuss two articles found by students.
30 minutes	Lecture: Conservation Medicine	Presentation about conservation medicine, a new field that examines the link between humans, wildlife and ecological health. Use case studies to illustrate concept of connectivity (e.g. deforestation -> Nipah virus outbreak).
60 minutes	Activity: Final Presentation Work	Presentation groups will work on their presentation.
15 minutes	Wrap-up	Assign homework. Students have the opportunity to express questions, criticisms, and concerns.

MATERIALS: **None**

PREP WORK: **None**

HALLS USED: **None**

A/V NEEDED: **None**

HOMEWORK: **Assign students to continue work on their final presentations.**

Session Eleven: Conservation Medicine**Activity: Final Presentation Work**

OVERVIEW

Groups will work on their presentations.

TIME FRAME

60 minutes

MATERIALS

- ConBio Oral Presentation Rubric
- ConBio Speaking Skills Rubric Scorecard

PROCEDURE

1. Each group should prepare 15 total minutes of presentation
 - Each member of the team should speak for roughly the same amount of time
 - 5 minutes of Q&A
2. Presentation Content:
 - Introduction
 - Description of Critically Endangered species
 - Taxonomic Classification
 - Closest Relatives
 - Area of distribution
 - Population Trends
 - Historical context
 - Present demographic trends
 - Main Threats
 - Conservation Efforts
 - Concluding Remarks

Session Twelve: Challenges Ahead/Final Presentations

LEARNING OBJECTIVES

Students will be able to:

- Use graphics, text, and speech to describe a comprehensive conservation case study
- Convey the importance of conserving a species

OVERVIEW

1. Each group should offer 15 total minutes of presentation:
 - a. Each Member of the team should speak for roughly the same amount of time 5 minutes of Q&A
2. Presentation Content:
 - a. Introduction
 - i. Description of Critically Endangered species
 1. Taxonomic Classification
 2. Closest Relatives
 - iii. Area of distribution
 - b. Population Trends
 - c. Historical context
 - d. Current demographic trends
 - e. Main Threats
 - f. Conservation Efforts
 - g. Concluding Remarks

TIME FRAME

90 minutes if there are 5 groups of 4 students

MATERIALS

See hand out "Guidelines for ConBio Final Presentations.docx"

PROCEDURE

1. Student groups present and take questions.
2. Students in the audience should complete the ConBio Oral Presentation Rubric for the presenting group.
3. ConBio Speaking Skills Rubric Scorecard for each member of the group.
4. Collect the both rubrics at the end of the class.

Guidelines for ConBio Final Project

PART 1

Your task is to represent your chosen species at a Status Review hearing for the IUCN. Prepare your petition by following the instructions on worksheet A. Your presentation should demonstrate why such a status should be assigned to your species and suggest management and/or conservation efforts. This presentation will take place in front of a panel of peers.

CONTENT

1. Introduction
 - a. Description of species
 - i. Taxonomic Classification
 - ii. Closest Relatives
 - b. Area of distribution
2. Population Trends
 - a. Past situation
 - b. Present demographic trends
3. Main Threats
4. Conservation Efforts
5. Concluding Remarks

FORM

- Make a PowerPoint first and convert it to the Google Presentation
- Share the Google Presentation to amnhconservationbio@gmail.com

TIME

- 10 minutes of presentation
 - Each Member of the team has to participate (2.5 min/person)
 - 5 minutes of Q&A

PART 2

Raise awareness towards your species by creating a *Public Awareness Campaign*. Use your creativity to create a poster, a video, a song, a cartoon — something that will propel your species into the public eye and their hearts.

Final Project Prep: Worksheet A

Part 1: Find a Species

Part 2: Taxonomy

Look up the species **Integrated Taxonomic System** [itis.usda.gov]. List your organisms following categories:

Kingdom:

Phylum:

Family:

Order:

Genus:

Species:

Part 3: Status

Write down the status of your species and when it was last reviewed.

Part 4: Threat History

Describe the threat to your species by answering the questions below. Paragraphs are not always necessary. Use good judgment to decide between bullet points, lists or sentences. (Need more space? That's what google docs is for. Remember to share your notes with your teammate!)

1. Make a time-line of the threat history.
2. What is your species' Red List category and criteria?
3. How many individuals of the species are there now? How many populations?
4. Have there been any increases or declines in the species in the last 20 years? When and (+) or (-) by how much?

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Mark the best answer with a capital X in the box.

5. Is the population trend going in the same or different direction from the history of threats?
 Same or Different
6. What is the direction up or down?
 UP or Down
7. Is the population currently up or down? [population numbers? How is this different from #5?]
 UP or Down
8. What does the threat history show?
 Increase in the threat level
 Decrease in the threat level
 It's more complicated than that
9. If your answer is, "It's more complicated than that," explain.

10. List the major threats to your species and its habitat.

Part 5: General Species Information

1. Describe the range of your species. If there are many populations, do they or can they mix? How much space does each individual or group of individuals need? Is that space available?

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2. Describe the life cycle of your species (rate of reproduction, reproduction needs, etc.).
3. Describe what your species eats.
4. Describe your species in terms of Trophic level. Is it a keystone species?
5. List all of the significant locations where your species is found. (Include country. Think Stakeholders.)
6. Name any organizations working to conserve your species.
7. Does your species play a part in somebody's livelihood or culture?

Final Project Prep: Worksheet B

The second part of your final project is to produce an awareness campaign to educate the public about your species and the problems it faces. This can take whatever form you want (poster, video, pamphlet, jingle, petition, letter to a governmental or conservation agency, etc.).

Here are questions that your product should answer.

1. What is the name of your species?
2. Where does it live?
3. What's happening to it?
4. Why should we care? (How can you make your species attractive to the public?)
5. What can we do? Who can really help this species and how?
6. Where can we get more information about this species?
7. What's the name of your campaign? Do you have a catchy slogan?

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Other, more practical things to think about:

1. What format will you use?
2. What materials do you need for your campaign?
3. Can you produce them within your time frame?