

Program Title: Ivory ID Lab

Grade or Age Level/Audience: 5th -12th grade Duration:20-30 min

Web/Catalog Description:

Do you have what it takes to be an animal investigator? Can you tell the difference between Ivory, Vegetable Ivory (tagua), Plastic, or Bone? Through some hands on-activities students will be able to test their observation and critical thinking skills as we find the real pieces of ivory among the “fakes”!

Learning Objectives

1. Understand what the illegal wildlife trade is
2. Use observation and problem-solving skills to determine which pieces are ivory
- 3.

Abbreviated Outline

1. Introduction to the issue of Wildlife Trafficking and how it has caused the further endangered status of many species
2. Introduction to Ivory- what it is, what animals produce it and how it is manufactured/ worked into human objects.
3. Introduce ways to tell items apart.
4. Students will work in small groups of 2-3 students looking over 3-4 objects to determine which items are Ivory or a different material.

Instructor Notes and Set-up

- **Because this activity includes REAL IVORY specimens it cannot be left in a Zoo Camp or Class bin. It must be returned to the TUNDRA/ VAULT at the end of the day.**
- There are supplies for 6 groups of 2-3 students. Every group should have 1 piece of real elephant ivory and assorted other items. Refer to the guide/key to match the items to their real identities.
- Some of the items have been given “fake” ID numbers so the students don’t associate numbers with the “real” pieces. If the number is 29XX- its fake. No Biofacts in our system have 29XX numbers.
- The instructor will take the sample items out of the packaging and place them onto the tray- and will pack them back up.
- **Students should NEVER look directly into the UV lights (black lights)- to maximize the use of the UV/ Black light have the students hold the lights 1 foot away from the objects. (use included rulers 😊)**

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DETAILED OUTLINE:

1. What is the Illegal Wildlife Trade? (5 min)

Wildlife trade is any sale or exchange of wild animal and plant resources by people. Wildlife trade is an issue at the heart of the tension between biodiversity conservation and human development. Whether for medicine, construction, food or culture, a huge proportion of our trade, economy and way of life is entirely reliant upon wildlife products.

Wildlife trade is one of the world's most pressing conservation challenges, affecting hundreds of millions of people and thousands of wildlife species. TRAFFIC is a leading non-governmental organization working globally on trade in wild animals and plants in the context of both biodiversity conservation and sustainable development.

The legal trade in wildlife products is often overshadowed by wildlife crime and illegal trade. It involves thousands of different fauna and flora species, provides a source of income for millions of producers, raw materials for businesses and local collectors, and a staggering array of goods for hundreds of millions of consumers. It plays an undeniably fundamental role in regional, national, and international economies.

2. What is Ivory? (5 min)

Traditionally Ivory is from the tusks of elephants (both species). Essentially Ivory is any mammal tooth that is large enough to carve or scrimshaw. Today we consider elephant, hippopotamus, walrus, narwhal (rare) and larger pig tusks to be sources of Ivory. Mammoth and Mastodon are also considered Ivory. Mastodon tusks are rarely in good enough condition to be confused with present day ivory.

CITES Designations as of 2020 (show photos of animals either in power point or laminated)

Elephant Tusks-	African Elephant <i>Loxodonta Africana</i> CITES Appendix 1. Except for the populations of Botswana, Namibia, South Africa, and Zimbabwe, which are included in Appendix 2. Asian Elephant <i>Elephas maximus</i> CITES Appendix 1 Mammoth <i>Mammuthus</i> EXTINCT Not CITES Listed
Walrus Tusks	Walrus <i>Odobenus rosmarus</i> CITES Appendix 3 (Canada)
Sperm Whale	Sperm Whale <i>Physeter macrocephalus</i> CITES Appendix 1
Orca	Orca <i>Orcinus orca</i> CITES Appendix 2
Narwhal	Narwhal <i>Monodon monoceros</i> CITES Appendix 2
Hippopotamus	Hippopotamus <i>Hippopotamidae</i> CITES Appendix 2

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Warthog Warthog *Phacochoerus* Not CITES listed

Ivory Substitutes: (show photos of animals either in power point or laminated)

Bone- Compact/Dense bone is often highly polished and can resemble ivory.

Helmeted Hornbill- The casque of the Helmeted Hornbill (*Rhinoplax vigil*) can be carved and polished. This bird from Southeast Asia is listed as CITES Appendix 1. Also called “ho-ting” and “Golden Jade” or “Red Ivory”. It is critically endangered simply because of its “ivory”.

Vegetable Ivory- Vegetable Ivory is primarily from the nut of the Tagua Palm Tree (*Phytelephas macrocarpa*). The trees grow primarily in northern South America. The tagua nuts can reach the size of an apple and has a white, extremely hard kernel, which can be worked like ivory.

Plastic Can be molded and shaped into any shape or size- fake Schreger lines can be added, or texture simulated.

3. How can we tell the difference between Ivory, bone, plastic, and other natural materials? (5 min)

- a. Real ivory is heavy for its size, has a smooth surface, and is typically a creamy color.
- b. Elephant Ivory has very distinctive pattern when looked at closely. They are called “Schreger Lines” (Shree-ger lines). These lines will appear as cross-hatching or stacked angles in elephant ivory. These lines can also be used to determine if the ivory is from a modern-day (extant) elephant or a Mammoth. (The difference between African and Asian elephants must be done with DNA analysis.)
- c. Ultraviolet light (black light)- the Chemical composition of Ivory, other teeth and bones will fluoresce brightly. Most plastics and resins will appear dark.
- d. Bone can be polished and worked to an ivory – like appearance. Compact bone will have a feature called Haversian Systems. These small canals permeate the bone and transfer fluids to the living tissue. Under a 10x hand lens- these canals appear as scratch-like irregularities.
- e. Vegetable Ivory- Tagua Nut may be hard to distinguish from ivory. It will fluoresce under a UV / Black light. An accurate test (we are not doing this test) is to drop a small amount of sulfuric acid onto the tagua nut. Tagua nuts will stain/turn pink after 10-12 minutes and will not come off, Ivory will not stain.
- f. Hot Needle Test (we are not doing this) Place a red-hot needle on the object:
 - i. If you smell burning- its bone
 - ii. If the needle makes an indent or melts the item- Its plastic
 - iii. If there is little to no effect, it is probably ivory

It is important to use a combination of many testing methods- using just one may lead to the wrong conclusion.

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4. Putting your skills to the test! (10 min)

- a. Separate the students into 6 groups, with 2-3 per group. Each group should get: Black Jewelry tray and liner, one of the plastic boxes with samples to identify, and (below) for conclusion.

KEY QUESTIONS FOR EVALUATION:

1. WHY IS IT IMPORTANT TO BE ABLE TO TELL THE DIFFERENCE BETWEEN REAL IVORY AND A FAKE? OR IVORY AND ANOTHER BIOLOGICAL ITEM?
2. HOW DOES ILLEGAL WILDLIFE TRADE AFFECT ANIMALS?

OPTIONAL ACTIVITIES:

1. XXXXX

DIFFERENTIATION/MODIFICATION SUGGESTIONS:

1. IF YOUR GROUP IS GOING TO BE LARGER THAN 16 INDIVIDUALS – YOU CAN INCREASE THE SIZE OF THE GROUPS OR GO THROUGH SELECT ITEMS ONE BY ONE AND GO THROUGH THE PROCESS AS A LARGE GROUP.
- 2.

VOLUNTEER TASKS:

1. NONE

MATERIALS/SUPPLIES:

1. 6 groups of sample materials- all contain at least 1 piece of ivory, bone, plastic,
2. 4 UV LIGHTS
3. 6 JEWELRY TRAYS WITH VELVET LINERS
4. ASSORTED GUIDES AND KEYS FOR ACTIVITY
5. IVORY BOOK FROM TRAFFIC WEBSITE

Conservation Learning Outcomes (select all that apply)		
INSPIRE/FEEL	TEACH/LEARN	ACT/DO
<i>Affective (emotions & attitudes)</i>	<i>Cognitive (facts & concepts)</i>	<i>Behavioral (actions & behavior changes)</i>
As a result of this program, my audience will...	As a result of this program, my audience will...	As a result of this program, my audience will...
☐ feel emotionally connected to animals.	☒ understand ecological principles that reveal the vital connections between humans, animals, and nature.	☒ make daily personal choices that benefit wildlife.
☒ feel inspired and empowered to act on behalf of wildlife.	☒ know what actions they can take to make a difference for wildlife.	☒ join collective efforts to save wildlife at the Minnesota Zoo and beyond.
☒ feel pride in the Minnesota		☒ advocate for wildlife

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Zoo and themselves for working to save wildlife.	☒ understand that the Minnesota Zoo saves wildlife.	conservation and the Minnesota Zoo.
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Core Competencies (select all that apply)

☐ Animals and Ecosystems	☒ STEM
☒ Animal Care and Conservation	☐ Connecting to Nature
☐ Minnesota's Natural Heritage	

BACKGROUND INFORMATION:

Vocabulary:

Cementum- A layer surrounding the dentine of tooth and tusk roots (external layer)

Dentine- A mineralized dental tissue that normally comprises most of the tooth mass

Haversian Systems- a series of canals through which fluid flows in compact bone

Pulp Cavity- The innermost part of the tooth which contains organic soft tissue called pulp

Schreger Lines- A diagnostic morphological feature seen in elephant and mammoth ivory cross sections.

Scrimshaw- Engraved or shallowly carved bone or ivory, traditionally on whale teeth

All the pieces in the activity are owned by the Minnesota Zoo- the Elephant Ivory

#1528,1531, 1533, 1566, 1558, 1939z are all USFWS confiscation pieces. The paperwork is included in the 3-ring binder for these pieces.

TECHNOLOGY INFORMATION:

1. If you had access to a projector or a TV you could show slides of the different animals, different products, and different types of Identification of Ivory- especially the Schreger Lines. SEE POWER POINT PRESENTATION. There will also be printed out examples of the slides.

Curriculum Contact

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Curriculum Feedback/Suggestions:		

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Last Updated:
G-Drive Link: