

AMERICAN Scientist

For High Schools

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Teachers' Activity Guide

Article: Is Wildlife Conservation Policy Based in Science?

From *American Scientist* 2019 January-February Issue

Author: Kyle A. Artelle



SIGMA XI
THE SCIENTIFIC RESEARCH HONOR SOCIETY

Teachers' Activity Guide

Article: Is Wildlife Conservation Policy Based in Science?
American Scientist 2019 January-February Issue

■ Content

Pre-Teach Activity: [A Snapshot of Wildlife Management](#)

Activity A: [Matching the Meaning](#)

Activity B: [Wildlife Poster using Mola art](#)

Activity C: [Designing Measurable Objectives](#)

Activity D: [Conservation Comparisons](#)

Activity E: [PSA on Wildlife Conservation](#)

Pre-Teach Activity:

A Snapshot of Wildlife Management

Teacher Activity Guidelines

Teacher Background: Biodiversity is important for the sustainability of our ecosystems. Despite current efforts to conserve wildlife, the number of endangered species is still increasing. Government policies are continually evolving, but are struggling to define a widespread management system. Looking over criteria for current wildlife management systems, there is concern about the lack of collaborative effort to develop a streamlined, science-based pathway to sustainable and effective conservation policies. The lack of a clear definition as to what constitutes a “science-based” system contributes to continued discrepancies in conservation management systems.

Vocabulary

Dierent - vicious or wounding in an exaggerated way

Ephemeral - lasting for a very short time.

Stewardship - the job of supervising or taking care of something, such as an organization or property.

Indigenous - originating or occurring naturally in a particular place; native.

NGSS Standard

HS-LS2-7

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity

Lesson Objective

Students will be able to

- Identify the seven tenets of the North American Model for wildlife management.
- Create a timeline showing significant impacts made throughout the history of conservation policy.
- Discuss discrepancies between policy and the seven tenets.
- Compare indigenous-led stewardship to the North American Model for wildlife management.

Materials

- *American Scientist* Article: *Is Wildlife Conservation Policy Based in Science?*
- technology device for timeline OR poster board/poster paper,
- Paper copy of resource: [A Conservation Timeline](#), highlighter

Instructions

As an introduction to the concept of wildlife management, this activity will only focus on the first seven pages of the article. It is important you have an understanding of the various shifts in the approaches to creating a comprehensive wildlife management program. Using the conservation timeline resource listed in 'materials,' highlight 10 significant conservation movements (dates) that, in your opinion, had a significant impact on the evolution of wildlife management. While reading about the early efforts of wildlife management dating back to the 1600's, do you see how a science-based pathway was used, or how it could help, to catapult the evolution of wildlife management?

In this activity, you will use the 10 dates you highlighted while reading about the evolution of wildlife management to create a timeline or infographic depicting the evolution of wildlife management. If you choose to create these digitally, you may use google slides to insert a diagram (timeline) or you may use Piktochart to create your infographic and/or timeline.

Discussion Questions

- What do you believe are some of the biggest human threats to maintaining biodiversity? Can you find examples of efforts to sustain biodiversity from the article?
- Thinking back to the grizzly bear story in the article, how can conservationists and policy makers ensure grizzly bears, and other hunted species, will not be hunted and exploited for human use?
- Why is indigenous-led stewardship beneficial in regards to wildlife management of certain species native to a particular area?
- How is having short-term policies in regards to wildlife management detrimental to forging a sustainable and science-based wildlife management system?

Conclusion Questions

- The article mentions conservationist Aldo Leopold. According to the conservation timeline resource, what contributions to wildlife management is he responsible for?
- The North American Model of Wildlife Conservation is mentioned in the article, as well as in the timeline resource. List the seven tenets to the Model and identify what is missing from the Model. Is there a primary focus, or is it a comprehensive science-based wildlife management system?
- As an extension to your timeline, research wildlife management policy changes or significant conservation efforts within the last decade? Is it easy to find this information? Why is it important to be aware of wildlife management and conservation efforts in your area?

Google Form Assessment over article

This is an optional-use assessment that contains questions over the article, NOT the individual activity. This assessment is NOT in quiz mode, so no point values or correct answers have been assigned. Once you click on the above link, it will force a copy that can then be edited by you as you see fit for your intended use. If needed, please see 'Biodiversity Unit Assessment Item Bank' for answers to multiple choice questions.

Pre-Teach Activity:

A Snapshot of Wildlife Management

Lesson Objective

Students will be able to

- Identify the seven tenets of the North American Model for wildlife management.
- Create a timeline showing significant impacts made throughout the history of conservation policy.
- Discuss discrepancies between policy and the seven tenets.
- Compare indigenous-led stewardship to the North American Model for wildlife management.

Vocabulary

Dierent:

Ephemeral:

Materials

- *American Scientist* Article: *Is Wildlife Conservation Policy Based in Science?*
- technology device for timeline OR poster board/poster paper,
- Paper copy of resource: [A Conservation Timeline](#), highlighter

Instructions

In this activity, you will use the 10 dates you highlighted while reading about the evolution of wildlife management to create a timeline or infographic depicting the evolution of wildlife management. If you choose to create these digitally, you may use google slides to insert a diagram (timeline) or you may use Piktochart to create your infographic and/or timeline.

Discussion Questions

1. What do you believe are some of the biggest human threats to maintaining biodiversity? Can you find examples of efforts to sustain biodiversity from the article?

2. Thinking back to the grizzly bear story in the article, how can conservationists and policy makers ensure grizzly bears, and other hunted species, will not be hunted and exploited for human use?

3. Why is indigenous-led stewardship beneficial in regards to wildlife management of certain species native to a particular area?

4. How is having short-term policies in regards to wildlife management detrimental to forging a sustainable and science-based wildlife management system?

Conclusion Questions

1. The article mentions conservationist Aldo Leopold. According to the conservation timeline resource, what contributions to wildlife management is he responsible for?

2. The North American Model of Wildlife Conservation is mentioned in the article, as well as in the timeline resource. List the seven tenets to the Model and identify what is missing from the Model. Is there a primary focus, or is it a comprehensive science-based wildlife management system?

3. As an extension to your timeline, research wildlife management policy changes or significant conservation efforts within the last decade? Is it easy to find this information? Why is it important to be aware of wildlife management and conservation efforts in your area?

Activity A:

Matching the Meaning

Teacher Activity Guidelines

Teacher Background: Biodiversity is important for the sustainability of our ecosystems. Despite current efforts to conserve wildlife, the number of endangered species is still increasing. Government policies are continually evolving, but are struggling to define a widespread management system. Looking over criteria for current wildlife management systems, there is concern about the lack of collaborative effort to develop a streamlined, science-based pathway to sustainable and effective conservation policies. The lack of a clear definition as to what constitutes a “science-based” system contributes to continued discrepancies in conservation management systems.

Vocabulary

Quantitative Data - data in the form of counts or numbers where each data-set has a unique numerical value associated with it.

Qualitative Data - describes qualities, observations, or characteristics.

Mortality limits - the number of species hunted and/or killed in populations which government biologists have deemed sustainable.

Indicator Criteria - empirical baseline needed to establish science-based protocols including: measurable objectives, evidence, transparency and independent review.

Running Vocabulary

Dierent - vicious or wounding in an exaggerated way.

Ephemeral - lasting for a very short time.

Stewardship - the job of supervising or taking care of something, such as an organization or property.

Indigenous - originating or occurring naturally in a particular place; native.

NGSS Standard

HS-LS2-7

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

Lesson Objective

Students will be able to

- Define science-based protocol.
- Describe the four indicators of a wildlife management system.
- Identify and discuss biases between conservationists and wildlife management.
- Use indicator criteria to create science-based measures for conservation efforts.

Materials

- *American Scientist* Article: *Is Wildlife Conservation Policy Based in Science?* Section: “What does science-based mean?”
- Refer to pages 13 - 15, for information about Beaver Conservation efforts. Using this information, complete the peardeck Matching Activity.
- Pear Deck: [Matching Activity](#)

Note: Examples of Student Responses

- Measureable: Conducting a survey of beaver population within a 2 mile radius
- Evidence: Graphical representation of data
- Transparency: Publish or present information at a public forum
- Independent Review: Form a panel consisting of hunters, conservation agency representative, general public representatives, local official

Teacher Instructions

Establishing criteria for science based wildlife management is the focus for this activity. Using the section, “What does science-based mean?” students will read pages 8-16 to recognize which indicators are used (expand on this...used by who? For what purpose?). Students will refer to the graphic on page 8 to complete the matching indicators to their accurate descriptions, as well as create examples for each indicator which could be applied to wildlife management systems.

Discussion Questions

- How does the article define science-based?
- What did their results find once indicator criteria were established and wildlife management systems were surveyed?
- How do beavers serve as textbook examples of the conflict between conservation and wildlife management objectives?

Conclusion Questions

- Do you think the four hallmark indicator criteria establish a valid science-based approach? Explain.
- What are the challenges that remain, even with these indicators in place?

Google Form Assessment over article

This is an optional-use assessment that contains questions over the article, NOT the individual activity. Once you click on the above link, it will force a copy that can be edited by you as you see fit for your intended use.

Activity A:

Matching the Meaning

Lesson Objective

Students will be able to

- Define science-based protocol.
- Describe the four indicators of a wildlife management system.
- Identify and discuss biases between conservationists and wildlife management.
- Use indicator criteria to create science-based measures for conservation efforts.

New Vocabulary

Quantitative Data:

Qualitative Data:

Mortality limits:

Indicator Criteria:

Vocabulary

Dierent:

Ephemeral:

Materials

- *American Scientist* Article: *Is Wildlife Conservation Policy Based in Science?*
- Section: "What does science-based mean?", pages 8 - 16
- Refer to pages 13 - 15, for information about Beaver Conservation efforts. Using this information, complete the peardeck Matching Activity.
- Pear Deck: [Matching Activity](#)

Instructions

After viewing the Pear Deck matching activity, use information from the article, pages 13 -15 regarding beaver conservation, to create examples for each of the indicator criteria. Write your responses in the table below.

Measurable Objectives:	Evidence:
Transparency:	Independent Review:

Discussion Questions

1. How does the article define science-based?

2. What did their results find once indicator criteria were established and wildlife management systems were surveyed?

3. How do beavers serve as textbook examples of the conflict between conservation and wildlife management objectives?

Conclusion Questions

1. Do you think the four hallmark indicator criteria establish a valid science-based approach? Explain.

2. What are the challenges that remain, even with these indicators in place?

Activity B:

Wildlife Poster using Mola art

Teacher Activity Guidelines

Teacher Background: Biodiversity is important for the sustainability of our ecosystems. Despite current efforts to conserve wildlife, the number of endangered species is still increasing. Government policies are continually evolving, but are struggling to define a widespread management system. Looking over criteria for current wildlife management systems, there is concern about the lack of collaborative effort to develop a streamlined, science-based pathway to sustainable and effective conservation policies. The lack of a clear definition as to what constitutes a “science-based” system contributes to continued discrepancies in conservation management systems.

Vocabulary

Wildlife Conservation - refers to the practice of protecting wild species and their habitats in order to maintain wildlife species or populations and to restore, protect, or enhance natural ecosystems.

Stewardship - responsible use and protection of the natural environment through conservation and sustainable practices.

Mola art - hand made art using different textures to describe a concept or illustrate a story.

Running Vocabulary

Quantitative Data - data in the form of counts or numbers where each data-set has a unique numerical value associated with it.

Qualitative Data - describes qualities, observations, or characteristics.

Mortality limits - the number of species hunted and/or killed in populations which government biologists have deemed sustainable.

Indicator Criteria - empirical baseline needed to establish science-based protocols including: measurable objectives, evidence, transparency and independent review.

Dierent - vicious or wounding in an exaggerated way.

Ephemeral - lasting for a very short time.

Stewardship - the job of supervising or taking care of something, such as an organization or property.

Indigenous - originating or occurring naturally in a particular place; native.

NGSS Standard

HS-LS2-7

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

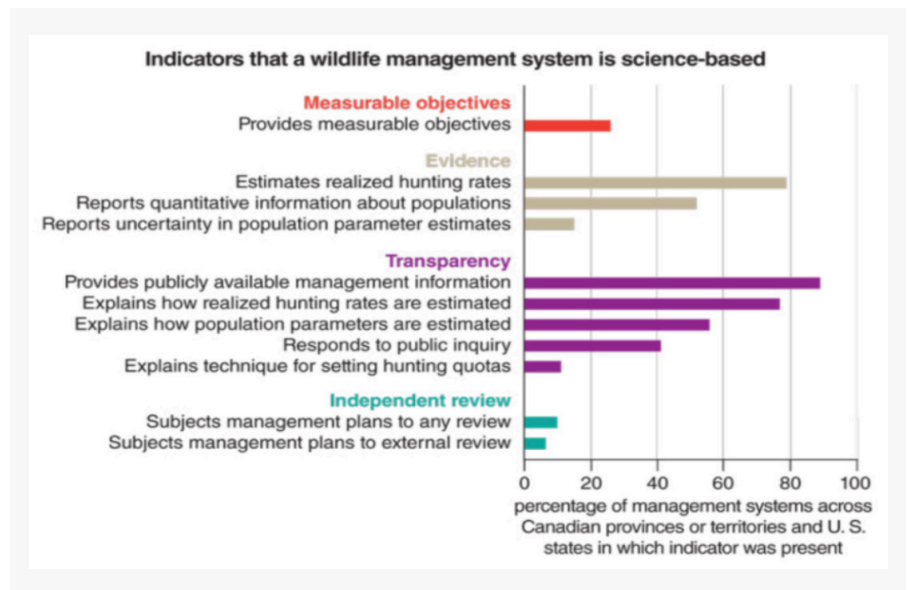
Lesson Objective

Students will be able to

- Create an art design that highlights current conservation efforts for a specific endangered species of the student's choosing
- Discuss biases which may exist between conservationists and wildlife management
- Compare the success rate of two indicator criteria over a period of time for a specific endangered species and provide a rationale for any differences

Materials

- American Scientist Article: Is Wildlife Conservation Policy Based in Science?
- School approved technology device for researching different Mola art (i.e.: iPad, computer, phone, etc.)
- Various colors of construction paper and/or Card stock, blank paper and pencils for sketching of animal, scissors, glue.
- Different mediums may be used for enhanced texture such as yarn, velvet, fleece, sandpaper, foil, toole, satin, silk, cotton fabric, wool fabric, etc.
- You may want to consult your art teacher for scraps or recycled materials, as well as collaborating to create a cross-curricular activity.
- [How to Mola art video](#)
- [Wildlife extinction list](#)



Teacher Instructions

This activity will provide students with a concrete visual regarding the importance of wildlife management/conservation on animals currently on the extinction list. Through the art medium of a Mola art, students will create a visual representation of an animal that is on the endangered species list and efforts to maintain their animal through wildlife conservation methods and policies. Students will then present their Mola, discuss current wildlife conservation efforts for their animal, and explain how science based conservation methods are successful.

Discussion Questions

- How does art influence culture?
- What do you believe are some of the biggest human threats to maintaining biodiversity? Are any of these caused by the diversity in culture? Can you find examples of efforts to sustain biodiversity from the article?
- Thinking back to some of the population examples in the article, such as the grizzly bear and beaver, how could an art exhibit have altered the outcome?
- How is indigenous-led stewardship related to culture? Is it beneficial in regards to wildlife management of certain species native to a particular area?

Conclusion Questions

- As an extension to your Mola, research more recent policy changes, or significant conservation efforts, within the last decade. Were these changes brought about due to cultural awareness? Explain.
- Why is it important to be aware of wildlife management and conservation efforts in your area?
- How does the use of cultural artistry enhance the development of wildlife management systems?

Google Form Assessment over article

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Activity B:

Wildlife Poster using Mola art

Lesson Objective

Students will be able to

- Create an art design that highlights current conservation efforts for a specific endangered species of the student's choosing
- Discuss biases which may exist between conservationists and wildlife management
- Compare the success rate of two indicator criteria over a period of time for a specific endangered species and provide a rationale for any differences

New Vocabulary

Wildlife Conservation:

Stewardship:

Mola art:

Running Vocabulary

Quantitative Data:

Qualitative Data:

Measurable Objectives:

Evidence:

Transparency:

Independent Review:

Materials

- *American Scientist* Article: Is Wildlife Conservation Policy Based in Science?
- School approved technology device for researching different Mola art (i.e.: iPad, computer, phone, etc.)
- Various colors of construction paper and/or Card stock, blank paper and pencils for sketching of animal, scissors, glue.
- Different mediums may be used for enhanced texture such as yarn, velvet, fleece, sandpaper, foil, toole, satin, silk, cotton fabric, wool fabric, etc.
- You may want to consult your art teacher for scraps or recycled materials, as well as collaborating to create a cross-curricular activity.
- [How to Mola art video](#)
- [Wildlife extinction list](#)

Instructions

After creating your Mola Art on your selected animal, fill in the chart below in preparation for your presentation to the class.

Selected animal :

What are some efforts that have been made through conservation or management methods or policies in regards to your animal?

What part(s) of the world is/was your animal native to?

Why did you choose to decorate your Mola Art as you did?

Discussion Questions

1. How does art influence culture?

2. What do you believe are some of the biggest human threats to maintaining biodiversity? Are any of these caused by the diversity in culture? Can you find examples of efforts to sustain biodiversity from the article?

3. Thinking back to some of the population examples in the article, such as the grizzly bear and beaver, how could an art exhibit have altered the outcome?

4. How is indigenous-led stewardship related to culture? Is it beneficial in regards to wildlife management of certain species native to a particular area?

Conclusion Questions

1. As an extension to your Mola, research more recent policy changes, or significant conservation efforts, within the last decade. Were these changes brought about due to cultural awareness? Explain.

2. Why is it important to be aware of wildlife management and conservation efforts in your area?

3. How does the use of cultural artistry enhance the development of wildlife management systems?

Activity C:

Designing Measurable Objectives

Teacher Activity Guidelines

Teacher Background: Biodiversity is important for the sustainability of our ecosystems. Despite current efforts to conserve wildlife, the number of endangered species is still increasing. Government policies are continually evolving, but are struggling to define a widespread management system. Looking over criteria for current wildlife management systems, there is concern about the lack of collaborative effort to develop a streamlined, science-based pathway to sustainable and effective conservation policies. The lack of a clear definition as to what constitutes a “science-based” system contributes to continued discrepancies in conservation management systems.

Indigenous stewardship has been suggested when developing future wildlife management systems. Having people who are native to the land are critical when considering preservation of local species. Citizens that are native to the area have an understanding of the history and culture that could play a role in development of a more focused conservation plan.

Vocabulary

Quantitative Data - as the value of data in the form of counts or numbers where each data-set has a unique numerical value associated with it and is measurable.

Qualitative Data - describes qualities or characteristics (senses)

Measurable objective - is a goal or purpose statement that is measured with data and repeated trials to provide empirical evidence.

Running Vocabulary

Wildlife Conservation - refers to the practice of protecting wild species and their habitats in order to maintain wildlife species or populations and to restore, protect, or enhance natural ecosystems.

Stewardship - responsible use and protection of the natural environment through conservation and sustainable practices.

Mola art - hand made art using different textures to describe a concept or illustrate a story.

Mortality limits - the number of species hunted and/or killed in populations which government biologists have deemed sustainable. **Indicator Criteria** - empirical baseline needed to establish science-based protocols including: measurable objectives, evidence, transparency and independent review.

Dierent - vicious or wounding in an exaggerated way.

Ephemeral - lasting for a very short time.

Indigenous - originating or occurring naturally in a particular place; native.

NGSS Standard

HS-LS2-7

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

Lesson Objective

Students will be able to

- Discuss the importance of indigenous stewardship when developing a wildlife management program.
- Describe the fragility and uniqueness of local species
- Create measurable objectives based on current conservation efforts concerning their selected endangered species.

Materials

- American Scientist Article: Is Wildlife Conservation Policy Based in Science?
- Section: "Is policy due for a change?"
- World Wildlife Endangered Species list: [Species List | Endangered, Vulnerable, and Threatened Animals | WWF](#)

Teacher Instructions

Within ecosystems there is always a delicate balance that must be maintained. When considering this balance, the guiding voices to lead this next chapter in wildlife management must be rooted in its past. It is important to be familiar with the species and their interdependence on all the biotic and abiotic factors within their environment when developing a wildlife management system. The article discusses how indigenous stewardship may be the future of wildlife management. The North American Model does not provide a framework that is all-inclusive, taking into account the natural intricacies of our North American ecosystems. In this activity students will choose an endangered species and establish feasible measurable objectives based on the current conservation methods within that ecosystem. Looking over the first indicator, measurable objectives, consider the endangered species list and their native ecosystem to create three valid measurable objectives.

Example: *Decrease the poaching and black-market trafficking of the rhino horn by ____ in the next decade.*

Discussion Questions

- What is a measurable objective and how does that help support a science-based framework for a wildlife management system?
- What is the difference between qualitative and quantitative observations? Which one is measurable?
- Which observation method do you think is more effective for wildlife management and why?
- Who should be involved in creating a local wildlife management system?

Conclusion Questions

- Do you believe indigenous stewardship is the future of wildlife management? Why or why not?
- In reading the following statement, "Insight and governance from a broader suite of people than is currently the norm might prove critical", who else should be included in the discussion and why?

Google Form Assessment over article

This is an optional-use assessment that contains questions over the article, NOT the individual activity. Once you click on the above link, it will force a copy that can be edited by you as you see fit for your intended use.

Activity C:

Designing Measurable Objectives

Lesson Objective

Students will be able to

- Discuss the importance of indigenous stewardship when developing a wildlife management program.
- Describe the fragility and uniqueness of local species.
- Create measurable objectives based on current conservation efforts concerning their selected endangered species.

New Vocabulary

Quantitative Data:

Qualitative Data:

Measurable objective:

Indigenous:

Running Vocabulary

Wildlife Conservation:

Stewardship:

Mola Art:

Mortality limits:

Indicator Criteria:

Dierent:

Ephemeral:

Materials

- *American Scientist* Article: Is Wildlife Conservation Policy Based in Science?
- Section: "Is policy due for a change?"
- World Wildlife Endangered Species list: [Species List | Endangered, Vulnerable, and Threatened Animals | WWF](#)

Instructions

After you have completed your research over your selected animal, create your measurable objective based on current conservation efforts concerning your animal. Be sure to describe the fragility and uniqueness of your animal and the importance of animal stewardship in relation to wildlife conservation (write your notes below).

Data from research (find at least three statistics/facts that can help you form measurable objectives)

Formulate a Measurable Objective based on your data research (see example below*)

Describe the uniqueness and fragility of your animal (habitat, food sources, 'Why is it dependent on this particular ecosystem?')

What is the Importance of stewardship and wildlife conservation efforts for your animal?

*Example of Measurable Objective: *Decrease the poaching and black-market trafficking of the rhino horn by ____ in the next decade.*

Discussion questions

1. What is a measurable objective and how does that help support a science-based framework for a wildlife management system?

2. What is the difference between qualitative and quantitative observations? Which one is measurable?

3. Which observation method do you think is more effective for wildlife management and why?

4. Who should be involved in creating a local wildlife management system?

Conclusion Questions

1. Do you believe indigenous stewardship is the future of wildlife management? Why or why not?

2. In reading the following statement, “Insight and governance from a broader suite of people than is currently the norm might prove critical”, who else should be included in the discussion and why?

Activity D:

Conservation Comparisons

Teacher Activity Guidelines

Teacher Background: Biodiversity is important for the sustainability of our ecosystems. Despite current efforts to conserve wildlife, the number of endangered species is still increasing. Government policies are continually evolving, but are struggling to define a widespread management system. Looking over criteria for current wildlife management systems, there is concern about the lack of collaborative effort to develop a streamlined, science-based pathway to sustainable and effective conservation policies. The lack of a clear definition as to what constitutes a “science-based” system contributes to continued discrepancies in conservation management systems.

New Vocabulary

Double bar graph - graph used to compare two different sets of data.

Inference - a conclusion based on evidence and reasoning using prior knowledge.

Running Vocabulary

Quantitative Data - as the value of data in the form of counts or numbers where each data-set has an unique numerical value associated with it and is measurable.

Qualitative Data - describes qualities or characteristics (senses).

Measurable objective - is a goal or purpose statement that is measured with data and repeated trials to provide empirical evidence.

Indigenous - originating or occurring naturally in a particular place; native.

Wildlife Conservation - refers to the practice of protecting wild species and their habitats in order to maintain wildlife species or populations and to restore, protect, or enhance natural ecosystems.

Stewardship - responsible use and protection of the natural environment through conservation and sustainable practices.

Mola art - hand made art using different textures to describe a concept or illustrate a story.

Mortality limits - the number of species hunted and/or killed in populations which government biologists have deemed sustainable. **Indicator Criteria** - empirical baseline needed to establish science-based protocols including: measurable objectives,

NGSS Standard

HS-LS2-7

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

HS-LS2-2

Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

Lesson Objective

Students will be able to

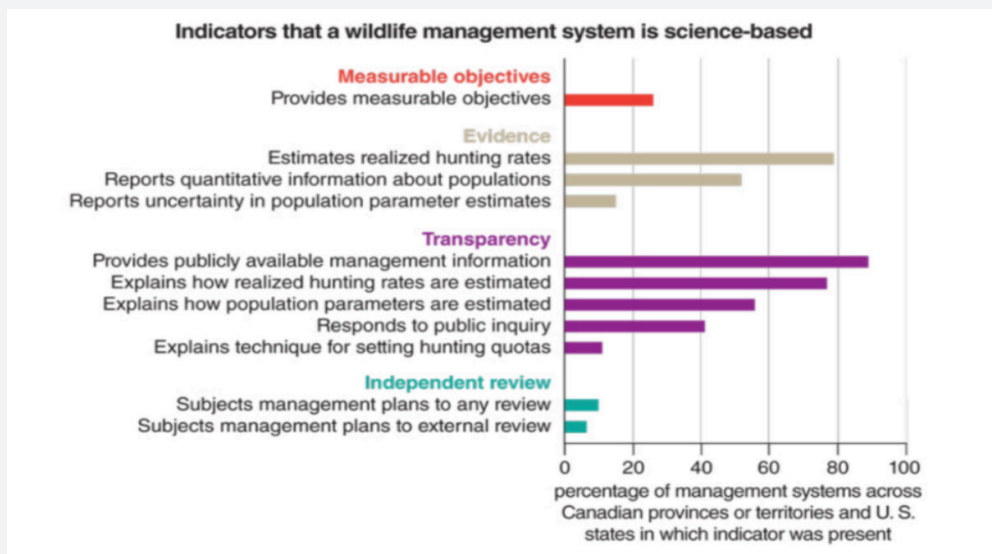
- Create a double bar graph from activity data with technology
- Compare success rates of wildlife conservation over a period of time using a specific endangered or extinct animal
- Identify short-term effects on animal conservation efforts highlighted in the article
- Research how data provides evidence to support science-based conservation efforts
- Apply descriptive statistics (mean, median, mode) from data derived from conservation efforts, including indicators

Materials

- American Scientist Article: Is Wildlife Conservation Policy Based in Science?
- Technology device for research and access to google slides or poster board/poster paper to create bar graph
- World Wildlife Endangered Species List: [Species List | Endangered, Vulnerable, and Threatened Animals | WWF](#)
- [Figure: Indicators that a Wildlife Management System is Science-based.](#)

Instructions

In this activity, you will identify short-term effects on animal conservation efforts highlighted in the article. Create a double bar graph illustrating your selected endangered species (see resource) success rate across indicators of choice from figure. Research how data (evidence) is collected for your chosen extinct animals. You will choose an indicator from the graph below and compare it to current success efforts for their animal using a double-bar graph. As an extension: students will compare all 4 indicators with current success efforts over a period of time.



Discussion Questions

Data is frequently represented as “descriptive statistics”. However, descriptive statistics are more commonly referred to as mean (average), median (most frequent), and mode (norm).

- What are the mean, median, and mode of current conservation efforts not including the indicators? Show your work!
- What are the mean, median, and mode of current conservation efforts including the indicators? Show your work!

Conclusion Questions

- Is there a decrease between current conservation efforts versus indicators?
- Describe the difference between the current conservation efforts and efforts from the indicators? Why do you think there is a difference?
- How can you maximize the best effort to maintain your selected animal's conservation methods?

Google Form Assessment over article

This is an optional-use assessment that contains questions over the article, NOT the individual activity. Once you click on the above link, it will force a copy that can be edited by you as you see fit for your intended use.

Activity D:

Conservation Comparison

Lesson Objective

Students will be able to

- Create a double bar graph from activity data with technology.
- Compare success rates of wildlife conservation over a period of time using a specific endangered or extinct animal.
- Identify short-term effects on animal conservation efforts highlighted in the article.
- Research how data provides evidence to support science-based conservation efforts.
- Apply descriptive statistics (mean, median, mode) from data derived from conservation efforts, including indicators.

New Vocabulary

Double bar graph:

Inference:

Running Vocabulary

Quantitative Data:

Qualitative Data:

Measurable objective:

Indigenous:

Wildlife Conservation:

Stewardship:

Mola Art:

Mortality limits:

Indicator Criteria:

Dierent:

Ephemeral:

Materials

- American Scientist Article: Is Wildlife Conservation Policy Based in Science?
- Technology device for research and access to google slides or poster board/poster paper to create bar graph
- World Wildlife Endangered Species List: [Species List | Endangered, Vulnerable, and Threatened Animals | WWF](#)
- [Figure: Indicators that a Wildlife Management System is Science-based.](#)

Instructions

Create a double bar graph using the [blank graph template](#) or google slides. If using google slides, create a slide and 'insert' → 'chart.' Select 'column' from the chart options. Be sure to label your X and Y axis, title your graph, and create data from your comparison of success rates of wildlife conservation over a period of time using a specific endangered or extinct animal.

Describe short-term effects on animal conservation from the article

Mean (average)

Median (Most frequent)

Mode (Norm)

*Example of Measurable Objective: *Decrease the poaching and black-market trafficking of the rhino horn by ____ in the next decade.*

Discussion questions

- I. What are the mean, median, and mode of current conservation efforts not including the indicators? Show your work!

2. What are the mean, median, and mode of current conservation efforts including the indicators? Show your work!

Conclusion Questions

1. Is there a decrease between current conservation efforts versus indicators?

2. Describe the difference between the current conservation efforts and efforts from the indicators? Why do you think there is a difference?

3. How can you maximize the best effort to maintain your selected animal's conservation methods?

Activity E:

PSA on Wildlife Conservation

This is a summative activity and is intended to be used after completion of the entire Biodiversity Unit.

Teacher Activity Guidelines

Teacher Background: Biodiversity is important for the sustainability of our ecosystems. Despite current efforts to conserve wildlife, the number of endangered species is still increasing. Government policies are continually evolving, but are struggling to define a widespread management system. Looking over criteria for current wildlife management systems, there is concern about the lack of collaborative effort to develop a streamlined, science-based pathway to sustainable and effective conservation policies. The lack of a clear definition as to what constitutes a “science-based” system contributes to continued discrepancies in conservation management systems.

New Vocabulary

Indigenous - originating or occurring naturally in a particular place; native.

Wildlife Conservation - refers to the practice of protecting wild species and their habitats in order to maintain wildlife species or populations and to restore, protect, or enhance natural ecosystems.

Stewardship - responsible use and protection of the natural environment through conservation and sustainable practices.

Running Vocabulary

Double bar graph - graph used to compare two different sets of data.

Inference - a conclusion based on evidence and reasoning using prior knowledge.

Prior Vocabulary

Quantitative Data - as the value of data in the form of counts or numbers where each data-set has a unique numerical value associated with it and is measurable.

Qualitative Data - describes qualities or characteristics (senses).

Measurable objective - is a goal or purpose statement that is measured with data and repeated trials to provide empirical evidence.

Indigenous - originating or occurring naturally in a particular place; native.

Wildlife Conservation - refers to the practice of protecting wild species and their habitats in order to maintain wildlife species or populations and to restore, protect, or enhance natural ecosystems.

Stewardship - responsible use and protection of the natural environment through conservation and sustainable practices.

Mola art - hand made art using different textures to describe a concept or illustrate a story.

Mortality limits - the number of species hunted and/or killed in populations which government biologists have deemed sustainable. **Indicator Criteria** - empirical baseline needed to establish science-based protocols including: measurable objectives, evidence, transparency and independent review.

Dierent - vicious or wounding in an exaggerated way.

NGSS Standard

HS-LS2-7

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

Lesson Objective

Students will be able to

- Design a public service announcement (digital or other media) conveying the importance of wildlife conservation or management efforts
- Incorporate items from the Biodiversity Unit, such as their Mola Art into their PSA
- Include data gathered from indicator criteria research, bar graph, conducted on selected animal (Activity D) into the PSA
- Present a public service announcement to the teacher and/or class

Materials

- *American Scientist* Article: Is Wildlife Conservation Policy Based in Science?
- technology device for PSA , poster or trifold for non-digital PSA's
- access to Flipgrid or Adobe Spark for video
- PSA [Rubric](#)

Teacher Instructions

In this activity you will create a maximum 3-minute public service announcement to raise the level of awareness of both short and long-term wildlife conservation efforts or wildlife management, and how these efforts impact the plants and animals within your local community. Use the rubric, located under materials, to be sure your PSA is all-inclusive; visuals such as charts or video clips, as well as statistical data to persuade action.

Discussion Questions

- What are some examples of short-term and long-term conservation, or stewardship, efforts? Which of the two types of efforts do you think are most effective in regards to conserving wildlife?
- How have certain species been affected by wildlife conservation policies?
- What has been an influential conservation campaign that left an impact on you? What made it stand out?
- What roles do zoos play in maintaining biodiversity in a species?

Conclusion Questions

- Do you believe it is important to have wildlife conservation stewardship? Why or why not?
- How important is it to have indigenous stewardship when developing a wildlife management program? Explain your answer.
- When developing a PSA, what are some key components you think are necessary for a PSA to be effective?
- How has social media shaped bias within conservation efforts?

Activity Extensions

We suggest you contact your local zoological and wildlife conservation society to inquire about their wildlife conservation campaigns.

Google Form Assessment over article

This is an optional-use assessment that contains questions over the article, NOT the individual activity. Once you click on the above link, it will force a copy that can be edited by you as you see fit for your intended use.

Activity E:

PSA on Wildlife Conservation

Lesson Objective

Students will be able to

- Design a public service announcement (digital or other media) conveying the importance of wildlife conservation or management efforts
- Incorporate items from the Biodiversity Unit, such as their Mola Art into their PSA
- Include data gathered from indicator criteria research, bar graph, conducted on selected animal (Activity D) into the PSA
- Present a public service announcement to the teacher and/or class

New Vocabulary

Indigenous:

Wildlife Conservation:

Stewardship:

Running Vocabulary

Double bar graph:

Inference:

Measurable objective:

Mola Art:

Quantitative Data:

Qualitative Data:

Mortality limits:

Indicator Criteria:

Dierent:

Ephemeral:

Materials

- *American Scientist* Article: Is Wildlife Conservation Policy Based in Science?
- technology device for PSA , poster or trifold for non-digital PSA's
- access to Flipgrid or Adobe Spark for video
- PSA [Rubric](#)

Instructions

In this activity you will create a maximum 3-minute public service announcement to raise the level of awareness of both short and long-term wildlife conservation efforts or wildlife management, and how these efforts impact the plants and animals within your local community. Use the rubric, located under materials, to be sure your PSA is all-inclusive; visuals such as charts or video clips, as well as statistical data to persuade action.

Rubric Checklist/Presentation Planner:

Use this to help ensure you have included all you need to do well in the presentation.

Design format

Unit items used

Data utilized

Presentation skills

Discussion Questions

1. What are some examples of short-term and long-term conservation, or stewardship, efforts? Which of the two types of efforts do you think are most effective in regards to conserving wildlife?

2. How have certain species been affected by wildlife conservation policies?

3. What has been an influential conservation campaign that left an impact on you? What made it stand out?

4. What roles do zoos play in maintaining biodiversity in a species?

Conclusion Questions

1. Do you believe it is important to have wildlife conservation stewardship? Why or why not?

2. How important is it to have indigenous stewardship when developing a wildlife management program? Explain your answer.

3. When developing a PSA, what are some key components you think are necessary for a PSA to be effective?

4. How has social media shaped bias within conservation efforts?