

USGS Data Exploration Unit: Lesson 1 Homework – Identifying Bias: DDT and Bald Eagles (KEY)

SECTION I: Dr. Mariana Relós writes science articles for a children’s science magazine. Recently, Dr. Relós decided to write an article on the return of the bald eagle in the United States. She conducted research to determine how bald eagles went from being threatened with extinction in the 1960s to their current population of 6000 breeding pairs. *Read the interview below with Dr. Relós and answer the questions that follow.*

Question: When confronted with conflicting scientific information, what process do you follow to determine what information most closely represents the truth or represents good science?

Dr. Relós: To answer this question, I will refer to the issue of how DDT affects bald eagle reproduction. I will refer to DDE in the remaining text since DDT turns into DDE in animal bodies.

While I was working on an article about the come back of the bald eagle, DDE came up as one of the causes of the birds’ decline. All my research indicated that one of the ways DDE negatively affected bald eagle populations was by causing eggshell thinning. When the eagles ate DDE-contaminated fish, DDE changed the eagles’ metabolic process that builds hard eggshells. DDE made the bald eagles lay eggs with thinner shells and these eggs broke easily when the parent eagle incubated them.

I had found at least 5 science articles that supported the eggshell-thinning effect of DDE in bald eagles when my editor sent me an article that contradicted the information I had. I took the following steps to resolve the conflict.

First: Always go to the original source. If you find in the news or in another information source evidence that conflicts with your research, check where the conflicting article got their information. Get a copy of the original source and read it. Does the original source really conflict with your research or did the news article misuse or misrepresent information from the original source?

Second: Find out where it was published. Some sources are better than others. If the source is a well-known science journal, it has my vote of confidence. However, if the source comes from a personal website on the Internet or a special interest group, I will check it thoroughly.

Third: Talk with experts. Today most science topics are highly specialized. One of the best ways to get up-to-date information is to interview at least 4 experts who work independently in the field.

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Question: How do you find experts?

Dr. Relós: To find the experts I look for the authors of science articles on the subject. One way to do this is by searching journal, magazine or book databases in the library or via the Internet. Many public libraries have subscriptions to science databases such as Medline, First Search and Electric Library.

When I find a journal article on a subject I am investigating, I write down the name and contact information of the author. Once I have their email address, I send them a message in which I introduce myself and tell them I am writing an article that touches their area of expertise and would like to ask them a few questions. Most scientists are very cooperative. I have been writing science articles for almost 4 years and have not found one uncooperative scientist.

In the case of DDT and bald eagles, I found experts through the process I just described at the Clemson Institute of Environmental Toxicology, the U.S. Fish and Wildlife Service, the USGS Patuxent Wildlife Research Center, and the Cornell University Laboratory of Ornithology.

I sent each expert copy of the conflicting article and asked them their opinion about it.

Question: How did the experts respond to the article claiming DDT is not harmful to bald eagle reproduction?

Dr. Relós: All the experts disagreed with the article that claimed DDT is not harmful to bald eagle reproduction. The scientists did not just say they disagreed; they provided me with copies of science papers to support their assertions. They showed with hard evidence how the conflicting article used research that did not directly apply to all types of birds and how the conflicting article had omitted research--available to everybody--that showed the negative effects of DDT.

Question: Are there clues in the language used or the way the information is structured that serve as "red flags" and cause you to suspect a particular account may be biased?

Dr. Relós: One big red flag is when the author does not include an experts name, affiliation, and where the research was published. Where did the information come from? The reader should be able to check the original source of information.

Another red flag is when the article does not talk about specifics, but generalizes. Generalizations might lead to the wrong conclusions. There are occasions when generalizations are possible, but if you are not an expert in the field, ask an expert's opinion before writing a generalization with your name on it.

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SECTION I: Follow-up Questions

1. What are three important steps that Dr. Relós takes when faced with contradicting information?
 1. *She goes to the original source.*
 2. *She finds out where the original source was published.*
 3. *She talks with experts.*

2. What are three steps Dr. Relós takes to contact expert scientists?
 1. *She searches journal, magazine or book databases in the library or via the Internet.*
 2. *She writes down the name and contact information of the authors for the journal articles she finds.*
 3. *Once she has their email address, she sends them a message in which she introduces herself and tells them she is writing an article that touches their area of expertise and would like to ask them a few questions*

3. Dr. Relós found several experts scientists. Where are two places that these experts work?

Any of these: the Clemson Institute of Environmental Toxicology, the U.S. Fish and Wildlife Service, the USGS Patuxent Wildlife Research Center, and the Cornell University Laboratory of Ornithology.

4. Name two red flags that cause Dr. Relós to suspect an article is biased?
 1. *When the author does not include an experts name, affiliation, and where the research was published.*
 2. *When the article does not talk about specifics, but generalizes*

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SECTION II: In this section you will put yourself in the role of a reporter who is writing a story on the connection between DDT and decline of bald eagle populations. Read each data source and answer the questions that follow. In Part A you will read a short introduction to DDT that is based on information from the United States Environmental Protection Agency. In Part B you will read an article, “DDT: Fact and Fallacy” that claims there is no connection between DDT and bald eagle reproductive success. (“DDT: Fact and Fallacy” was created for this activity. The news agency BeatNews and the author Dan Smith do not exist.) In Part C you will read the reaction of a bald eagle expert to that article. Finally, in Part D you will describe how you would write an article explaining the relationship between decline of bald eagle populations and DDT.

PART A: Background Information on DDT

DDT (Dichloro-diphenyl-trichloroethane), for many years was one of the most widely used **pesticides** in the United States, and was first made in 1874. During World War II, the U.S. began producing large quantities of DDT for control of mosquitoes that carry diseases such as typhus and malaria. After 1945, agricultural and commercial use of DDT became widespread in the U.S. The early popularity of DDT was due to its reasonable cost, effectiveness, **persistence**, and **versatility**. After 1959, DDT usage in the U.S. declined greatly, dropping from a peak of approximately 80 million pounds in that year to just under 12 million pounds in the early 1970s. The decline in DDT usage was the result of (1) increased insect resistance; (2) the development of more effective alternative pesticides; (3) growing public concern over **adverse** environmental side effects; and (4) increasing government restrictions on DDT use. Certain characteristics of DDT that contributed to the early popularity of the chemical, particularly its persistence, later became the basis for public concern over possible hazards involved in the pesticide's use. It was the publication of Rachel Carson's book *Silent Spring* in 1962 that stimulated widespread public concern over use of the DDT. In 1972 the United States Environmental Protection Agency banned the use of DDT in the United States.

Source: The Environmental Protection Agency of the United States Federal Government – <http://www.epa.gov/history/topics/ddt/01.htm>

PART A: Follow-up Questions

1. What are some uses of DDT?

Control mosquitoes and agricultural pests.

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2. Why did DDT use decline between 1959 and 1970?

- (1) *increased insect resistance*
- (2) *the development of more effective alternative pesticides*
- (3) *growing public concern over **adverse** environmental side effects*
- (4) *increasing government restrictions on DDT use*

3. What initiated public concern about the use of DDT?

Rachel Carson's book Silent Spring

4. In what year was a ban put on DDT?

1972

PART B: BeatNEWS

DDT: Fact and Fallacy

By Dan Smith

A

In the United States, West Nile Virus is spreading rapidly and endangering lives. In many developing countries millions of people die from malaria every year. The largest hurdle to the control of both of these diseases is the ban on DDT. DDT was banned in 1972 by the United States Environmental Protection Agency (EPA).

B

The EPA banned DDT based on exaggerated claims that DDT is harmful to bird reproduction. In her inflammatory book *Silent Spring* (1962), Rachel Carson aroused public criticism of DDT by stating that pesticides such as DDT were responsible for the decline in world bird populations. Contrary to Carson's book, in years of peak DDT use there were plentiful populations of pheasant, quail, doves, and turkeys.

C

Supporters of the ban on DDT claim that DDT causes eggshell thinning in birds. Numerous studies challenge this claim. Many of the studies used to demonstrate that DDT causes eggshell thinning exposed birds to levels of DDT that were higher than any they would encounter in nature.

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D

Other studies have found no relationship between DDT and eggshell thinning. In a study published in Poultry Science Robson et al (1976) found that quail fed DDT did not suffer from eggshell thinning. Additionally, Jeffries (1969) reported in the Journal of Wildlife Management that eggshells were 7% thicker after two years of eating a DDT diet.

E

Environmentalists also blamed DDT for the destruction of bald eagle populations in the United States. However, bald eagles were already threatened with extinction due to hunting as early as 1921.

F

The EPA ban on DDT marks a terrible day in United States history, a day when science gave way to mass panic and misinformation. No alternative to DDT has been developed to control malaria-spreading mosquitoes. As a result, millions have died and will continue to die because of the EPA ban. There are many lies about DDT floating around the scientific community. It is time for the EPA's policy on DDT to be based on fact, not fallacy.

Dan Smith is a regular contributor to BeatNews and works for the Good Consumer Research Institute. The Good Consumer Research Institute is funded by GoodChem Corporation, a major producer of agricultural chemicals.

PART B: Follow-up Questions

1. Pick out 4 words or phrases that are examples of strong language. Point out the word or phrases and the paragraph from which it came.

Paragraph A: spreading rapidly and endangering, largest hurdle

Paragraph B: exaggerated claims, inflammatory book, aroused, plentiful

Paragraph C: Numerous studies, higher than any

Paragraph F: terrible day, mass panic and misinformation, will continue to die, many lies

2. Other than writing for BeatNews, for what other organization does Mr. Smith write?

the Good Consumer Research Institute

3. What additional information would you need to know about this organization to more clearly understand the biases Mr. Smith may have?

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Well, the Good Consumer Research Institute is funded by GoodChem Corporation, a major producer of agricultural chemicals. Did GoodChem produce DDT pre-1972. Are they losing money as a result of the DDT ban?

4. For letters A-F in the right hand margin give the scientific reference Mr. Smith uses to make the statements that he does. If he provides no scientific reference, write NONE.

a) _____ NONE _____

b) _____ NONE _____

c) _____ NONE _____

d) _____ Poultry Science Robson et al (1976) and Jeffries (1969) _____

e) _____ NONE _____

f) _____ NONE _____

PART C: Expert Response

Analysis of DDT: Fact and Fallacy (2002)

Expert response by Stanley Weimeyer, U.S Fish and Wildlife Service

Mr. Smith provides some inaccurate information in the article *DDT: Fact and Fallacy*.

- A. Mr. Smith indicates that “The hurdle to the control of both of these (west Nile virus and malaria) diseases is the ban on DDT.” The truth is that insect pests built up **resistance** to DDT limiting the effectiveness of DDT as a control for mosquitoes. In addition, the EPA only banned the use of DDT in the United States. Other countries are free to use DDT.
- B. Mr. Smith also states that, “Many of the studies used to demonstrate that DDT causes eggshell thinning exposed birds to levels of DDT that were higher than any they would encounter in nature.” This statement is false. The following scientific journal article found

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similar concentrations of DDT in bird eggs collected from laboratory experiments as those in eggs found in the wild.

Wiemeyer, S.N. and R.D. Porter. 1970. DDE thins eggshells of captive American kestrels. *Nature*. 227: 737-738.

- C. Mr. Smith reported, "...there were plentiful populations of pheasant, quail, doves, and turkeys." Quail and pheasants are members of the Order Galliformes. Due to physiological differences between Galliformes and other Orders such as Falconiformes (Birds of Prey), Pelecaniformes (Pelicans), Ciconiiformes (Hérons and Egrets) and other Orders, Galliformes birds do not suffer reproductive failure from DDT.
- D. Mr. Smith reports that chicken and (other birds) did not suffer from eggshell thinning. However, chickens, like quail and pheasants are members of the Order Galliformes. Birds of this order are not susceptible to eggshell thinning due to physiological differences from birds in other Orders which include birds of prey and various fish-eating birds. Therefore, chickens are not appropriate test species for determining effects of DDT on these other groups of birds.
- E. Mr. Smith states that, "...bald eagles were already threatened with extinction due to overzealous hunters as early as 1921." This is false. While hunting contributed to the decline of bald eagle populations in some regions of the country, hunting does not explain why protected bald eagle populations continued to suffer from reproductive failure. Hunting also does not explain why other species that were not targeted by hunters such as pelicans and peregrin falcons suffered from reproductive failure during the DDT use era and for a period of time thereafter when residues in the environment remained high. See the following books for specific examples and more information:

Hickey, J.J. (editor) 1969. Peregrine falcon populations: the biology and decline. University of Wisconsin Press, Madison, Wisconsin. 596 pp.

Cade, T.J., J.H. Enderson, C.G. Thelander, and C.M. White. 1988. Peregrine falcon populations: their management and recovery. The Peregrine Fund, Inc. Boise, Idaho. 949 pp.

PART C: Follow-up Questions

1. Pick out 4 words or phrases that are examples of strong language. Point out the words or phrases and the paragraph where the word is found.

There really are no example of strong language. Perhaps "false" in paragraph B and E.

2. For what organizations does Mr. Weimeyer work? What interest might this organization have in DDT?

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For the US Fish and Wildlife Service. This organization is probably interested in protecting fish and wildlife from harm.

3. Other than writing for United States Fish and Wildlife Service, for what other organizations does Mr. Weimeyer write?

He wrote an article for the science magazine, Nature.

3. What additional information would you need to know about these organizations to more clearly understand the biases Mr. Weimeyer may have?

From where does the US Fish and Wildlife Service receive its funding, what is its mission?

From where does Nature magazine receive its funding? Is it a peer-reviewed journal? Does it have a good reputation?

(In fact Nature is peer-reviewed and highly respected.)

4. For letters A-F in the right hand margin give the scientific reference Mr. Weimeyer uses to make the statements that he does. If he provides no scientific reference, write NONE.

a) _____ NONE _____

b) _____ Wiemeyer, S.N. and R.D. Porter. 1970. _____

c) _____ NONE _____

d) _____ NONE _____

e) _____ Hickey, J.J. (editor) 1969. and Cade, T.J., et. al. 1988. _____

PART D: What would you report?

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If you were writing an article, what would you write about DDT and the bald eagle population decline?