

Fowl Play



Section 3 Wetland Activities WETLAND INHABITANTS

Grade: 6 - 12

State Standard: English/LA B-1;

NGSS: MS-LS2-1, MS-LS2-4,
MS-ESS3-4, HS-LS2-6, HS-LS4-5.

Subjects: science, language arts,
environmental studies

Skills: analysis, problem-solving,
group interaction, research,
discussion

Duration: 1 class period

Group Size: small groups

Setting: indoors

Topics: wildlife research,
environmental impact

Objectives:

Students will learn:

1. Some ways in which wildlife biologists and ornithologists conduct and analyze field research.
2. That there may be several causes for one problem.

Teaching Strategy:

Students will employ wildlife survey techniques to determine the cause of a drop in a waterfowl population.

Background

See INSIGHTS Section 2 Wetland Inhabitants “*Alaska’s Waterbirds and Wetlands*” and Section 4 Wetland Policy and Management “*Migratory Bird Management*”, and Section 3 Wetlands in a Changing World fact sheets.

Materials:

Copies of Puzzle Information Sheets for each of three groups; Survey Data Cards for each group in envelopes (need 9 envelopes total); Student Research Page for each group.

Procedure

The activity employs the following data cards:

Habitat Survey Data Cards include information collected from food analysis, and from studies on other animals trapped in the area.

Nest Survey Data Cards include information collected during migration and egg-laying, during incubation, and while the young are in the nest.

Bird Survey Data Cards include information collected from stomach content analysis, age and sex distribution analysis, and autopsy results.

1. Before class: Label three envelopes “Puzzle # 1 Dusky Canada Goose”, three “Puzzle #2 Pintail Duck”, and three “Puzzle #3 Aleutian Islands Canada Goose”. Label one of each Habitat Survey Data Cards, one Bird Survey Data Cards, and one Nest Survey Data Cards.

2. Make copies of the pages containing the Survey data cards; cut and laminate them; and place them in the appropriate envelopes. Keep the envelopes at your desk.



3. Students will work in groups. Make enough copies of each puzzle information sheet so that several students in each group have one.

4. Tell the students that they are going to be wildlife biologists trying to solve important puzzles regarding the bird populations in Alaska. You may want to spend some time introducing the scientific method, and the importance of objectivity and replication.

5. Divide the class into three groups, one for each of the three puzzles: Dusky Canada goose, Pintail Duck, and Aleutian Canada goose. If the class is large, you may want to divide the class into six groups, and have two of each. Give students copies of the Puzzle Information Sheets and the Student Research Page. Ask student to designate a note-taker for filling out the Research Page.

6. Introduce students to the puzzles by reading the following information:

Here are the puzzles: Populations of different types of geese and ducks in three locations in Alaska dropped dramatically during different time periods. The population declines at each location may or may not be related to each other. You must discover the reason for the decline at your location. (*Note: the population of the geese or duck in your area may have increased since the puzzle was “solved” by the biologists.*)

You can use three different kinds of surveys to help you solve the puzzle: Habitat Survey, Nest Survey, or Bird Survey.

Habitat Surveys can tell you the condition of food and water supplies and of other animals within the habitat. Nest Surveys can show whether or not adults are laying eggs, if the young are hatching out of the eggs, and if the young are surviving to adulthood. Bird Surveys may detect the presence of diseases, parasites, or poisons, and tell if the age and sex distribution (ratio of young to adult, male to female) of the population is normal or unusual.

7. Have each group first work together in their groups to develop five hypotheses for why the bird population dropped so dramatically at their location.

8. For each hypothesis, groups should decide and write down which of the three types of surveys they would like to use to start to gather information to prove the hypothesis.

9. Each group then decides which of the following three surveys they would like to conduct first: Habitat Survey, Nest Survey, or Bird Survey.

10. When groups are ready to “conduct a survey”, they can come to you and ask for one of the three types of survey data cards. Avoid giving groups more than one survey card envelope at a time. Rather, guide them to exhaust the analyses possibilities of one survey before they move on.

11. When students think they know what has caused the population drop, have them present their hypothesis to you. You can peek at the solutions to see if students are correct. You may need to tell the students to go back and re-analyze the data so that they can revise their hypothesis, or develop new hypotheses. Once the students seem to be honing in on the correct reason, show them the solution, which will tell them what they need to know to verify their hypothesis. The Student Research Page should help guide their investigations.

12. When all the students have solved their puzzles, engage in a class discussion:

- What was the first step each group decided to take to solve the problem? Why did each group choose that particular step?
- Now that you know what most likely caused the population decline, what clues do you see that you may have missed initially? How might you have conducted your study differently?
- What other tools do you wish had been at your disposal?
- Why is it important to try to solve puzzles such as this one?



Evaluation

Students describe the challenges biologists come up against when conducting wildlife studies, and the tools biologists can use.

Critical Thinking

Discuss with students the pros and cons of conducting studies in a laboratory (controlled) situation, where variables can be isolated one at a time.

Credit:

CLASS Project. 1986. "Fowl Play."
National Wildlife Federation.

Curriculum Connections:

(See Appendix for full citations):

Books:

Wetlands (Finlayson and Moser, 1991).



TOOLS: STUDENT RESEARCH PAGE

Names of group members _____

Puzzle _____

Hypothesis	Supporting Data (from cards)	Negating Data (from cards)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		



PUZZLE # 1 Dusky Canada Goose

The Dusky Canada goose (*Branta canadensis occidentalis*) is a medium sized, dark brown sub species of the Canada goose. It nests in Alaska's Copper River Delta, and winters in the central valleys of Oregon and California.

THE PUZZLE YOU NEED TO SOLVE:

The population of Dusky Canada goose increased following the 1964 earthquake to near 25,000 due to short-term benefits of the habitat change. Their population declined in the early 80s, and since then has hovered between 10,000 and 18,000 individuals.

Why did their population decline?

RESEARCH METHODS YOU CAN CHOOSE TO USE:

1. Habitat studies, which may involve the following three surveys:

- Collection and analyses of samples of that particular animal's food
- Collection and analyses of the water that the particular animal is drinking
- Collection and analyses of other types of organisms that share the animal's habitat

Analyses of the above studies may tell biologists whether or not there are pathogens some where in the habitat.

2. Nest surveys. A wildlife biologist studying nesting success of birds might examine the nest at three different times:

1. during mating and egg-laying;
2. during incubation of the eggs;
3. while young are in the nest.

Examining nests during mating and egg-laying will illuminate whether or not eggs are even being laid. If there are no eggs, one conclusion could be that the females are infertile.

If eggs were laid, but were missing during incubation, one possible conclusion could be that a predator has stolen the eggs.

If eggs were successfully incubated and hatched, but young did not survive, then biologists may conclude that there is something affecting the ability of young to survive.

3. Bird Surveys. You have the ability to study your bird using three different studies:

1. analyses of the bird's stomach contents,
2. autopsies of birds that have recently died,
3. population analyses – looking at the age and ratio of males to females.

You will need to trap the birds to study their ages and sex. Abnormalities in the sex ratios are important clues because abnormal sex ratios could make it difficult for the population of birds to reproduce.

Autopsies and stomach analyses may tell you whether or not the birds have been poisoned, or if they have been afflicted with a parasite or disease.

WHAT YOU MUST DO:

Work as a group to develop and write down 5 different hypotheses that solve the puzzle.

Decide which of the three kinds of research listed above you want to do first, pick the corresponding Data Card. Discuss the information on the card and look for clues that may support your hypothesis.

You may find that you need to study all three data cards in one survey envelope to solve the puzzle. If you do not have all the data you need after you review the three data cards from one envelope, go to a different survey envelope.

TOOLS: STUDENT PUZZLE INFORMATION SHEETS

PUZZLE # 2 Pintail Duck

This medium-sized duck has narrow, pointed wings, a long neck, and very long and tapering tail. Pintails usually inhabit shallow freshwater marshes and open areas with ponds and lakes. They breed throughout the U.S. and Canada, from the northcentral U.S. as far west as the Aleutian Islands and north to Alaska's North Slope. They winter at wetlands throughout much of the United States. You are conducting your study at Minto Flats, a wetlands complex located in Interior Alaska (about 35 miles from Fairbanks) along a loop of the Tanana River.

THE PUZZLE YOU NEED TO SOLVE:

Pintail ducks (*Anas acuta*) declined to an all time low in 1991 – 50% of the population average for 1955 - 1988.

Why did their population decline so dramatically in 1991?

RESEARCH METHODS YOU CAN CHOOSE TO USE:

1. Habitat studies, which may involve the following three surveys:

- Collection and analyses of samples of that particular animal's food
- Collection and analyses of the water that the particular animal is drinking
- Collection and analyses of other types of organisms that share the animal's habitat

Analyses of the above studies may tell biologists whether or not there are pathogens some where in the habitat.

2. Nest surveys. A wildlife biologist studying nesting success of birds might examine the nest at three different times:

1. during mating and egg-laying;
2. during incubation of the eggs;
3. while young are in the nest.

Examining nests during mating and egg laying will illuminate whether or not eggs are even being laid. If there are no eggs, one conclusion could be that the females are infertile.

If eggs were laid, but were missing during incubation, one possible conclusion could be that a predator has stolen the eggs.

If eggs were successfully incubated and hatched, but

young did not survive, then biologists may conclude that there is something affecting the ability of young to survive.

3. Bird Surveys. You have the ability to study your bird using three different studies:

1. analyses of the bird's stomach contents,
2. autopsies of birds that have recently died,
3. population analyses – looking at the age and ratio of males to females.

You will need to trap the birds to study their ages and sex. Abnormalities in the sex ratios are important to clues because abnormal sex ratios could make it difficult for the population of birds to reproduce.

Autopsies and stomach analyses may tell you whether or not the birds have been poisoned, or if they have been inflicted with a parasite or disease.

WHAT YOU MUST DO:

Work as a group to develop and write down 5 different hypotheses that solve the puzzle.

Decide which of the three kinds of research listed above you want to do first, pick the corresponding Data Card. Discuss the information on the card and look for clues that may support your hypothesis.

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PUZZLE # 3 Aleutian Cackling Goose

The Aleutian cackling goose (*Branta hutchinsii leucopareia*) is one of the smallest of the Canada geese. It breeds on the Aleutian Island chain, and winters in Oregon, Washington, and California.

THE PUZZLE YOU NEED TO SOLVE:

The Aleutian cackling goose population dropped to perilous numbers by the 1970s, and the animal was placed on the endangered species act. Since the onset of recovery efforts, the population has increased – so much that the species was removed from the endangered list in 2001. **What made their population plummet in the 1970s?**

RESEARCH METHODS YOU CAN CHOOSE TO USE:

1. Habitat studies, which may involve the following three surveys:

- Collection and analyses of samples of that particular animal's food
- Collection and analyses of the water that the particular animal is drinking
- Collection and analyses of other types of organisms that share the animal's habitat

Analyses of the above studies may tell biologists whether or not there are pathogens some where in the habitat.

2. Nest surveys. A wildlife biologist studying nesting success of birds might examine the nest at three different times:

1. during mating and egg-laying;
2. during incubation of the eggs;
3. while young are in the nest.

Examining nests during mating and egg laying will illuminate whether or not eggs are even being laid. If there are no eggs, one conclusion could be that the females are infertile.

If eggs were laid, but were missing during incubation, one possible conclusion could be that a predator has stolen the eggs.

If eggs were successfully incubated and hatched, but young did not survive, then biologists may conclude that there is something affecting the ability of young to survive.

3. Bird Surveys. You have the ability to study your bird using three different studies:

1. analyses of the bird's stomach contents,
2. autopsies of birds that have recently died,
3. population analyses – looking at the age and ratio of males to females.

You will need to trap the birds to study their ages and sex. Abnormalities in the sex ratios are important to clues because abnormal sex ratios could make it difficult for the population of birds to reproduce.

Autopsies and stomach analyses may tell you whether or not the birds have been poisoned, or if they have been inflicted with a parasite or disease.

WHAT YOU MUST DO:

Work as a group to develop and write down 5 different hypotheses that solve the puzzle.

Decide which of the three kinds of research listed above you want to do first, pick the corresponding Data Card. Discuss the information on the card and look for clues that may support your hypothesis.

You may find that you need to study all three data cards in one survey envelope to solve the puzzle. If you do not have all the data you need after you review the three data cards from one envelope, go to a different survey envelope.

TOOLS: DATA CARDS FOR SURVEY ENVELOPES

PUZZLE #1 Dusky Canada Goose DATA CARDS

HABITAT SURVEY ENVELOPE for Dusky Canada Goose Puzzle	for Dusky Canada Goose Puzzle	BIRD SURVEY ENVELOPE for Dusky Canada Goose Puzzle
FOOD ANALYSIS DATA CARD An analysis of the favorite kinds of food of the geese shows nothing unusual. However, a review of aerial photographs shows that shrubs and trees have expanded into the nesting area by 20% since 1964. If you did not get the information you need from this analysis, perform another analysis. <i>Dusky Canada Goose Puzzle, Habitat Survey Envelope</i>	DURING MATING AND EGG-LAYING DATA CARD The geese are breeding. Fertile eggs are being produced at the normal rate, five to eight per nest. If you did not get the information you need from this analysis, perform another analysis. <i>Dusky Canada Goose Puzzle Nest Survey Envelope</i>	STOMACH CONTENTS ANALYSIS DATA CARD Nothing unusual is found in the stomachs of the geese. They are consuming the food common to geese. If you did not get the information you need from this analysis, perform another analysis. <i>Dusky Canada Goose Puzzle Bird Survey Envelope</i>
WATER ANALYSIS DATA CARD The water survey shows that the oxygen content is normal and the pH (acid level) is within acceptable ranges. There are no unusual chemicals in the water. If you did not get the information you need from this analysis, perform another analysis. <i>Dusky Canada Goose Puzzle, Habitat Survey Envelope</i>	DURING INCUBATION DATA CARD Most nests show a 50 percent decline in the number of eggs over the four-week incubation period. Broken shells are found in close proximity to many of the nests. If you did not get the information you need from this analysis, perform another analysis. <i>Dusky Canada Goose Puzzle Nest Survey Envelope</i>	AGE AND SEX DISTRIBUTION ANALYSIS DATA CARD Surveys show a very high number of adult birds and very few immature (young) birds. The sex distribution of the birds is normal. If you did not get the information you need from this analysis, perform another analysis. <i>Dusky Canada Goose Puzzle Bird Survey Envelope</i>
OTHER ANIMALS DATA CARD Since 1964, the gull population has increased by 40%, the bear population has increased by 25%, and the coyote population has increased by 34%. If you did not get the information you need from this analysis, perform another analysis. <i>Dusky Canada Goose Puzzle, Habitat Survey Envelope</i>	GOSLING DATA CARD The nest has fewer young than normal. However, the goslings that are there are healthy and doing well. If you did not get the information you need from this analysis, perform another analysis. <i>Dusky Canada Goose Puzzle Nest Survey Envelope</i>	AUTOPSY RESULTS DATA CARD An autopsy of several birds reveals nothing unusual. If you did not get the information you need from this analysis, perform another analysis. <i>Dusky Canada Goose Puzzle Bird Survey Envelope</i>



TOOLS: DATA CARDS FOR SURVEY ENVELOPES

PUZZLE #2 Pintail Duck DATA CARDS

HABITAT SURVEY ENVELOPE for Pintail Duck Puzzle	NEST SURVEY ENVELOPE for Pintail Duck Puzzle	BIRD SURVEY ENVELOPE for Pintail Duck Puzzle
FOOD ANALYSIS DATA CARD An analysis of the ducks' favorite kinds of foods shows nothing unusual. Vegetation and small insects are plentiful and show no diseases. If you did not get the information you need from this analysis, perform another analysis. <i>Pintail duck Puzzle Habitat Survey Envelope</i>	DURING MATING AND EGG-LAYING DATA CARD Surveys taken right after egg-laying show that females have laid eggs, but the average clutch size (the number of eggs in a nest) is less than normal. The eggs are normal. If you did not get the information you need from this analysis, perform another analysis. <i>Pintail duck puzzle Nest Survey Envelope</i>	BREEDING GROUND SURVEY The number of adult birds is much higher than average. You compare data with a refuge in the central U.S. and find out that the Minto Flats area has a much higher proportion of the total North American population of nesting Pintail Ducks than normal. If you did not get the information you need from the analysis, perform another analysis. <i>Pintail duck Puzzle Bird Survey Envelope</i>
WATER ANALYSIS DATA CARD The water survey shows that the oxygen content is normal and the pH (acid level) is within acceptable ranges. There are no unusual chemicals in the water. If you did not get the information you need from this analysis, perform another analysis. <i>Pintail duck Puzzle Habitat Survey Envelope</i>	DURING INCUBATION DATA CARD During the four-week incubation study, it is found that the adults are behaving normally and the female is sitting on the eggs. If you did not get the information you need from this analysis, perform another analysis. <i>Pintail duck Puzzle Nest Survey Envelope</i>	STOMACH CONTENTS ANALYSIS DATA CARD Nothing unusual is found in the stomachs of the ducks. They are consuming the food common to ducks. If you did not get the information you need from this analysis, perform another analysis. <i>Pintail duck puzzle Bird Survey Envelope</i>
OTHER ANIMALS DATA CARD A live-trapping survey shows that the populations of other duck species in Minto Flats, prime habitat for Pintails, has increased. Populations of other animals in the area are relatively stable and none are shown to be unusually large or small. If you did not get the information you need from this analysis, perform another analysis. <i>Pintail duck Puzzle Habitat Survey Envelope</i>	DUCKLING DATA CARD During the duckling-rearing period, brood surveys show that the number of ducklings corresponds to the number of eggs laid. If you did not get the information you need from the analysis, perform another analysis. <i>Pintail duck Puzzle Nest Survey Envelope</i>	AGE AND SEX DISTRIBUTION ANALYSIS DATA CARD Surveys show a very high number of adult birds and very few immature (young) birds. The sex distribution of the birds is normal. If you did not get the information you need from this analysis, perform another analysis. <i>Pintail duck puzzle Bird Survey Envelope</i>



TOOLS: DATA CARDS FOR SURVEY ENVELOPES

PUZZLE #3 Aleutian Cackling Goose DATA CARDS

HABITAT SURVEY ENVELOPE for Aleutian Cackling Goose Puzzle	NEST SURVEY ENVELOPE for Aleutian Cackling Goose Puzzle	BIRD SURVEY ENVELOPE for Aleutian Cackling Goose Puzzle
FOOD ANALYSIS DATA CARD An analysis of the favorite kinds of food of the geese shows nothing unusual. Vegetation and small insects are plentiful and show no diseases. If you did not get the information you need from this analysis, perform another analysis. <i>Aleutian Cackling Goose Puzzle Habitat Survey Envelope</i>	DURING MATING AND EGG-LAYING DATA CARD The geese are breeding. Fertile eggs are being produced at the normal rate, five to eight per week. If you did not get the information you need from this analysis, perform another analysis. <i>Aleutian Cackling Goose Puzzle Nest Survey Envelope</i>	STOMACH CONTENTS ANALYSIS DATA CARD The geese were consuming the food most common to geese. If you did not get the information you need from this analysis, perform another analysis. <i>Aleutian Cackling Goose Puzzle Bird Survey Envelope</i>
WATER ANALYSIS DATA CARD The water survey shows that the oxygen content is normal and the pH (acid level) is within acceptable ranges. There are no unusual chemicals in the water. If you did not get the information you need from this analysis, perform another analysis. <i>Aleutian Cackling Goose Puzzle Habitat Survey Envelope</i>	DURING INCUBATION DATA CARD The number of eggs in nests declined by an average of 50% during the four-week incubation period. Broken shells were discovered nearby many of the nests. If you did not get the information you need from this analysis, perform another analysis. <i>Aleutian Cackling Goose Puzzle Nest Survey Envelope</i>	AGE AND SEX DISTRIBUTION ANALYSIS DATA CARD Surveys showed that the number of adult and immature (young) birds is lower than normal. The ratio of male birds to female birds is normal. If you did not get the information you need from this analysis, perform another analysis. <i>Aleutian Cackling Goose Puzzle Bird Survey Envelope</i>
TRAPPING OTHER ANIMALS DATA CARD Populations of other seabirds in the area have declined as well. Some arctic foxes were discovered living on the islands. These animals are not native to the area. If you did not get the information you need from this analysis, perform another analysis. <i>Aleutian Cackling Goose Puzzle Habitat Survey Envelope</i>	GOSLING DATA CARD Nests on average have fewer young than normal. Goslings that are present are healthy and doing well. If you did not get the information you need from this analysis, perform another analysis. <i>Aleutian Cackling Goose Puzzle Nest Survey Envelope</i>	AUTOPSY RESULTS DATA CARD An early summer autopsy of several birds reveals nothing unusual. If you did not get the information you need from this analysis, perform another analysis. <i>Aleutian Cackling Goose Puzzle Bird Survey Envelope</i>



DUSKY CANADA GOOSE

The Copper River Delta is located to the east of Prince William Sound. It consists of a large intertidal estuary system at the mouth of a large glacial river. In 1964, a large earthquake occurred, uplifting the area as much as six feet. Portions of the delta were uplifted beyond the reach of the tide. The wetlands dried out and shrubs and trees moved into the former wetlands. The new habitat is ideal for coyotes, bears, gulls, and jaegers who prey on eggs and goslings, and not so good for the Dusky Canada Goose, whose nests are vulnerable to such predators.

PINTAIL DUCK

Pintail ducks breed throughout the U.S. and Canada, from the northcentral U.S. up to the Aleutian Islands. However, habitat in the central prairie states has declined rapidly as humans have converted wetland habitat for other uses. Migration studies have shown that when habitat is limiting, some of the ducks that normally nest in the Central U.S. will fly all the way to Alaska to find good habitat. Unfortunately, not all of the birds are equipped to migrate the long distance, and they exhaust their fat reserves, compromising reproductive success. The result is a toll on the entire Pintail duck population. Meanwhile, important prairie wetland habitat for Pintails continues to be degraded in the central U.S. and Canada.

ALEUTIAN CACKLING GOOSE

In the 1930's, fox farmers introduced arctic foxes on the Aleutian islands for the fur trade. Formerly, the Aleutian cackling goose population had had no natural predators, but the introduced foxes preyed on the adult goose, as well as the goslings and the eggs. The Aleutian cackling goose has no defense against this introduced predator. Removal of foxes has since allowed the goose population to recover.