Ohio Wetlands

A Story of Ruin, Reintroduction, and Recovery

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Brief Introduction

to Problem-Based Learning

Ohio Wetlands: Ruin, Reintroduction, and Recovery is designed according to the problem-based learning (PBL) method of teaching. In 1995, the Center for Problem-Based Learning in Aurora, Illinois defined PBL as, "a curriculum development and instructional system that simultaneously develops both problem solving strategies and disciplinary knowledge bases and skills by placing students in the active role of problem solvers confronted with an ill-structured problem that mirrors real-world problems." Wow! but don't be scared off by such a lengthy definition.

We chose PBL as our instructional method because it is designed to engage students in the learning process. They are acquiring factual knowledge and problem-solving skills all at the same time. This method mirrors the way that we overcome problems in our day-to-day lives. It does require a lot of flexibility when used in the classroom because student questions and interests guide the direction of the lessons. By following a few simple steps, which figure prominently in the design of the lesson plans, the classroom teacher, along with the Zoo instructors, can become helpful guides to the students as they explore wetlands and the reintroduction of the trumpeter swan. Sometimes these steps might occur concurrently. Sometimes some steps may be excluded.

1 **Present the problem statement**
Each lesson includes a problem statement which is designed to get the students thinking about certain topics.

2 **List what is known**
Based on the problem statement, the students should be able to list some information that they already know that will help them solve the problem.

3 **Develop a problem statement**
Students should be able to refine the original problem statement based on their analysis of what they know.

4 **List what is needed**
Students will determine what information they still need in order to solve the problem and will search for the answers.

The problem-based design may make these lessons a challenge because the students may take many different paths in the solution of their problem. This is also the exciting part of the design because the sharing of ideas can be a learning experience for everyone involved.

Introduction to
the Lessons

The goal of this program is to get your students to answer one question — can the reintroduction of a wetland-dependent animal, such as the trumpeter swan, increase the level of conservation both for the habitat and the species? Of course this one question leads to a million other questions and that is the purpose of the lesson plans. We have tried to develop lessons based on some smaller questions that would eventually lead the student back to the larger problem they are trying to solve. Each lesson could easily last weeks on its own, depending on how far the students want to go. Each lesson could also head down a variety of different roads. Which of these lessons a teacher wishes to use, which direction that lesson heads, and how deeply involved in that topic the students become should be based on student interests and time constraints. Each lesson does start with a brainstorming session, which should give the instructor a good idea of what the students are interested in and which direction the lesson might head. Please be aware from the beginning that no one is expected to cover all of the lessons provided. Each lesson that is required will be pointed out, either because a videoconference revolves around it or because the information that is contained in that lesson is vital. Use the lessons as they work best for your school system and your students. The students will get more out of this program if they are involved in not only finding the answers, but finding the questions they feel need answered. This may be a difficult position for the instructor because of the loose structure, but we feel it will be beneficial to the students as they work their way through this real-world problem-solving situation.

5

List possible actions, recommendations, solutions, or hypotheses

Based on the information the students find, they should be able to come to some course of action as to how they would solve the problem.

6

Present and support the solution

Each lesson should allow for time to share information between student groups, with the teacher and with the Zoo instructor.

Wetlands Metaphors

Many of the major attributes of wetlands can be explored through the used of metaphors. Take a look at how the following everyday objects can be used to represent the natural functions of wetlands:

SPONGE absorbs excess water caused by runoff and retains moisture for a time even when standing water dries up. PILLOW provides a resting place for migratory birds. EGG BEATER mixes nutrients and oxygen into the water. CRADLE provides a nursery for young wildlife. SIEVE strains silt and debris from the water. FILTER filters smaller impurities from water. ANTACID neutralizes toxins. CEREAL provides nutrient-rich foods. SOAP helps cleanse the environment.

Part 1
Introduction to the Wetlands

During this segment of the program, the broad goal is to give your students an in-depth understanding of wetlands. The student's first exposure to this study of wetlands will be during the videoconference, when Zoo staff will complete the "Sense"ational Wetlands lesson. It is important for you to complete steps 1-5 of this lesson before the videoconference. The work required in the classroom before the videoconference is minimal. It involves a brainstorming session and a short paragraph by the students on wetlands (before they do any research!). Other suggested lessons include:

Why Trumpeter Swans?

Have your students conduct a public opinion survey to see if they can determine why trumpeter swans were chosen to be our wetlands ambassador.

Watery Work of a Wetland

Students will learn more about how wetlands function and about the experimentation process as they design their own wetlands experiments.

Exhibit ARKitecture

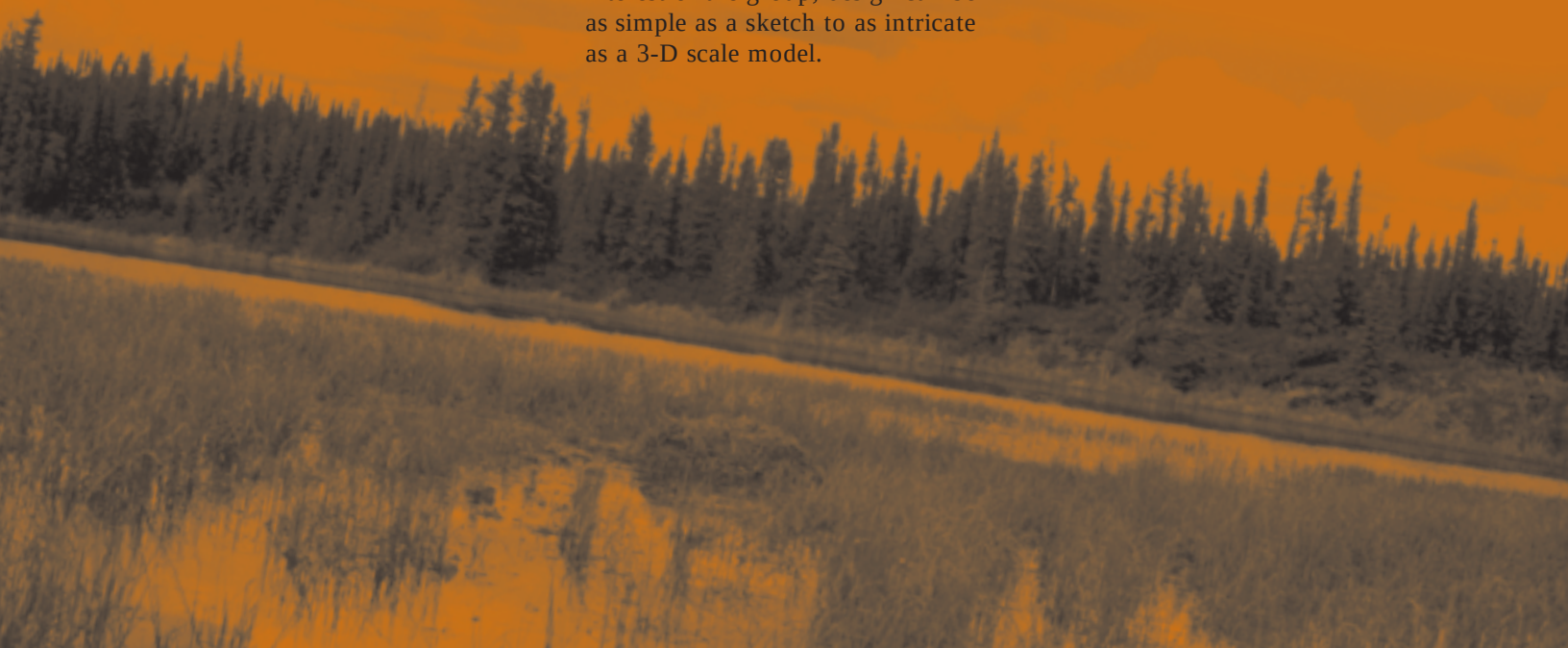
Always a popular choice, students can explore wetlands and a variety of zoo careers as they design their own zoo exhibit. Depending on the interest of the group, design can be as simple as a sketch to as intricate as a 3-D scale model.

Wade Through America's Wetlands

Although this lesson is written to be used in conjunction with Exhibit ARKitecture, it can easily be done on its own. Students get the chance to compare and contrast different types of wetlands that are found in North America.

Extension Ideas and Class Projects

- Create a wetlands terrarium in your classroom
- Build individual wetlands habitats in 2-liter bottles



"Sense"sational Wetlands

Goals

The students will develop an awareness of the components of a wetland.

Objectives

Students will use a variety of research materials to:
1. explore the topic of wetlands, and
2. recreate simulations of a wetland based on all of the senses.

Proficiency Correlations		
Grade	9th	12th
Writing	1	1
Reading	11, 16	12, 15
Science	13	5

Materials

resource box items to create simulations, water, something to protect desks and floors from potentially messy simulations

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

Several states in the midwest have implemented programs to reintroduce the trumpeter swan to their state in an effort to increase biodiversity. Ohio has decided to follow in their footsteps and you have been asked to be on the team working on this project. In addition to the research you need to do to get the project going, you must keep in mind that your final report must answer the question — can the reintroduction of a wetland-dependent animal, such as the trumpeter swan, increase the level of conservation both for the habitat and the species?

List what is known.

2. The instructor will work with the students as a large group to help brainstorm what types of information they will need to find out in order to get this project from start to finish. Keep the categories fairly broad at the beginning as they will be further developed during the course of this program.
3. The instructor will work with the students as a large group to determine which of these categories needs to be researched first, second, and so on. Determining what a wetland is should be somewhere near the beginning of the list.
4. Each student will write a short paragraph on their thoughts of what makes a wetland.

Develop a problem statement. List what is needed.

5. Students will be broken down into groups of 4-5. Students will compare their initial thoughts on what a wetland is and determine what they still need to know to become wetlands experts.
6. Students will participate in a live videoconference from Cleveland Metroparks Zoo to get them started on finding answers to their wetlands questions. During the videoconference, Zoo staff will be guiding the students through some sensory simulation exercises so that they can get a sense of what it feels like to be in a wetland. (Does anyone remember Halloween parties where you were blindfolded and put your hands into a bowl of peeled grapes, only to be told they were eyeballs?) Students will be asked to step forward and help create these simulations during the videoconference, so please remind them that this requires audience participation.

List possible actions, recommendations, solutions, or hypotheses. Present and support the solution.

7. Following the videoconference, the instructor will work with the students as a large group to determine if there are still questions from their initial lists that remain unanswered. Students will need to do their own research on these questions if it prevents them from moving along on the project.
8. Students will write a descriptive paragraph on what a wetland is based on the information they received during the videoconference.

Evaluation

- Individual paragraphs on wetlands
- Instructor observation of participation in cooperative group
- Instructor observation of participation in videoconference

Why Trumpeter Swans?

Goals

The students will gain an awareness of the links between conserving an animal and a habitat.

Objectives

Students will develop reasons why the trumpeter swan may or may not be the best representative species to help the conservation of wetlands.

PROFICIENCY CORRELATIONS		
Grade	**9TH**	**12TH**
Reading	11	12
Citizenship	16	18
Science	–	8

Materials

various research materials, internet sites (if available)

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

Now that you have started working on this project, you are beginning to wonder why the trumpeter swan was chosen as the species that will help save wetlands. There must be other wetland species in your state that are endangered/threatened. Why would the trumpeter swan be chosen over these other species?

List what is known.

2. The instructor will work with the class as a large group to help brainstorm what they know about trumpeter swans and any other endangered wetland species that may help them solve this problem.

Develop a problem statement. List what is needed.

3. During the brainstorming process, the instructor will also work with the class to come up with a list of things that they still need to know in order to solve this problem. Many of the items in this list can probably be grouped into several problem statements that will help the students solve the larger problem.
4. Students will be broken into 5 small groups. These groups will research the answers to some of the smaller problem statements.

List possible actions, recommendations, solutions, or hypotheses.

5. Each small group will present to the class the list of other endangered/threatened wetland species that are found in the state and at least one reason for each species why the trumpeter swan would have been chosen instead. The students may believe that another animal on the list should have been chosen instead of the trumpeter swan. Those thoughts should be shared during the presentation. During the presentations, the instructor will keep a list of all the species the class found and the reasons why they were not chosen as the representative species for wetlands conservation.

Present and support the solution.

6. The instructor will review the entire list with the students and discuss some of the findings. If the students think the trumpeter swan was chosen over these other species because people are more interested in it, they may wish to do some further investigations (such as conducting a poll) and then present these results for discussion.

Evaluation

- Instructor observation of participation in cooperative group
- Group presentation

Watery Work of a Wetland

Goals

The students will gain an understanding of the functions of a wetland.

Objectives

Students will create their own experimental design that:
1. describes the ability of wetland soils to filter out silt, wastes, and toxins, and
2. describes the ability of wetland soils to absorb runoff.

PROFICIENCY CORRELATIONS		
Grade	**9TH**	**12TH**
Writing	1	1
Science	2,3,4	8,12,13

Materials

copy of "Wetlands Metaphors" (see page 4), various soil samples, sponges, oasis, modeling clay, clear bottles or beakers, funnels, aluminum pans, water

Procedures

Present the problem statement.

1. Students should be introduced to "Wetlands Metaphors."
2. At the beginning of the lesson, students will be presented with the following problem:

Students in the local middle school heard that you are working on the wetlands/trumpeter swan project and asked you to speak at their school. To help the students understand the functions of a wetland, you used "Wetlands Metaphors." The students seemed to enjoy the activity, but had problems understanding some of the more complex concepts, such as how a wetland absorbs runoff and how a wetland can filter silt, wastes, and toxins out of the water. These are very important concepts for the students to understand, so you decide to create two experiments, one for each of the above concepts, so that the middle school students can visualize how a wetland works.

List what is known.

3. The instructor will work with the class as a large group to help brainstorm what information they already know about wetlands that may help them demonstrate the sponge effect and the filter effect of a wetland.

Develop a problem statement. List what is needed.

4. Students will be broken into four groups. Two of those groups will work on the experiment to demonstrate the sponge effect and two on the experiment to demonstrate the filter effect.
5. Small groups will list the information they still need to know in order to design their experiments. Their investigations will most likely center around the types of soil that are found in wetlands.
6. Small groups will come up with a list of materials needed to conduct their experiment. Some of these items may be in the resource kit, some of these items they may need to bring from home.

List possible actions, recommendations, solutions, or hypotheses.

7. Before conducting the experiment, each student will write a paragraph explaining the hypothesis of the experiment and the results they expect to find. Instructors should remind the students that experiments do not always yield the results you expect. Getting results you don't expect can often be just as useful to scientists as getting the results you do expect.
8. Small groups will conduct their experiment amongst themselves and make any adjustments they feel are necessary.

Present and support the solution.

9. Each small group will demonstrate their experiment for the class and discuss what it demonstrates about wetlands.
10. Following all four presentations, students may wish to discuss the pros and cons of their individual experiments and whether some of their ideas can be combined to make a better experiment.

Evaluation

- Instructor observation of participation in cooperative group
- Individual paragraphs describing the experiment
- Final experiment from the cooperative group

Exhibit ARKitecture

Goals

The students will develop an awareness of the components of a wetland.

Objectives

Students will select from a variety of research materials to:

1. explore the topic of wetlands, and
2. understand how the different components of an ecosystem work together and affect one another by creating a wetlands exhibit for a zoo.

Proficiency Correlations		
Grade	**9th**	**12th**
Reading	17	16
Math	6,7,8,10	3,4
Science	13,14,20	4,6,14

Materials

description of role playing groups (see page 10), various research materials, sketch paper, cardboard boxes (to use as frames for models), modeling clay, art supplies

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

At the same time that you are beginning to work on the wetlands/trumpeter swan project for the state of Ohio, your local zoo is thinking of constructing a North American wetlands exhibit based on a freshwater marsh. You have been asked to advise the Zoo's building committee and to come up with a model of the exhibit that can be presented to the board of directors. The zoo has sent you a list of the members of their building committee and their primary concerns to help you get started.

List what is known.

2. The instructor will work with the students as a large group to help brainstorm at least two pieces of information per category (animal keepers, horticulturists, etc.) that they already know about wetlands that will help that particular building committee member.

Develop a problem statement. List what is needed.

3. Students will be broken into six groups. Each small group will be assigned the task of advising one particular building committee member. All aspects of the exhibit must be accounted for, so all small groups must be working on a different part of the problem. The instructor will serve as the director of the project and will work with all of the small groups to keep them on task.
4. Small groups will brainstorm what information they still need to know about wetlands in order to best advise their particular building committee member.

At this point in time, please refer to "Wade Through America's Wetlands", as these two lessons will work somewhat concurrently.

5. Once the small groups have the information they need, students in the group will draw a rough sketch of their exhibit ideas from the perspective of their building committee member only. Basic labeling of the sketch is required so that others may easily understand the plan. (Examples: Students advising the animal keepers may have large spaces for animal quarters and no space left over for visitor walkways, while the students advising the guest services staff may have rather wide visitor walkways and smaller animal spaces.)

List possible actions, recommendations, solutions, or hypotheses.

6. All rough sketches should be hung at the front of the classroom. Students should be given several minutes to look at the plans of the other groups.
7. The instructor will lead the students in a discussion as to what aspects of each sketch must be kept in the final exhibit plan. Before beginning, remind the students that this is a process of give and take. They must argue for the things they feel are most important and let some of those that aren't as critical slide. Most likely, no one will get everything they want.

Present and support the solution.

8. Each student is required to complete a scale aerial drawing of what the finished exhibit will look like. Remind them that their artistic ability is not the critical part, but an accurate scale is most important.
9. Extension ideas: Students may also create several drawings of buildings in the exhibit, visitor viewing areas, etc. Students may also create as individuals, small groups, or a large class a three-dimensional model of their exhibit design.

Evaluation

- Instructor observation of participation in cooperative group
- Group rough sketch
- Individual sketch of exhibit design

Zoo Exhibit Design

Every time the Zoo gets ready to build a new exhibit, a committee representing all of the administrative divisions forms to discuss the building plans. Every division has it's own dreams of what this exhibit should look like and, after many months of meetings, these ideas will be merged to form the exhibit that finally gets built. Committee consists of:

Director

primarily has the final say on the project, may agree with or veto any of the ideas of the other committee members, keeps the committee on task

Animal Keepers

primarily interested in what animals are being kept in the exhibit and the requirements of those animals

Examples: Can you create mixed species exhibits? Can the animals escape extreme temperatures? How much space does an animal need?

Horticulturists

primarily interested in the types of plants that best represent the animal's natural home, but can still grow in local climate conditions (sometimes a difficult task when dealing with more exotic locales)

Examples: How thick or sparse does the vegetation need to be to most closely resemble natural habitat? Are there plants that need to be avoided due to toxicity? What types of plantings may best help to conceal some of the structural elements of the exhibit (such as fencing)?

Maintenance

primarily interested in ending up with an exhibit that can easily be repaired if things go wrong

Examples: Will the filtration systems in ponds and streams keep the water clear enough? Is the fencing and mesh secure enough to contain the animals and is it easily repairable if holes are found? Are all railings and signs and furnishings secure?

Education

primarily interested in providing interesting and educational signage, interactives, and exhibitry for the public

Examples: What are some of the most interesting facts to our visitors? How can the signs be made to blend in with the rest of the exhibitry? Are the low-tech interactives interesting to young children and pretty indestructible? Is the setting correct?

Marketing

primarily interested in finding a marketing theme that will be interesting to the public

Examples: What facets of the exhibit are the public most likely to already identify with or care about? Are there any themes that could be used in advertising?

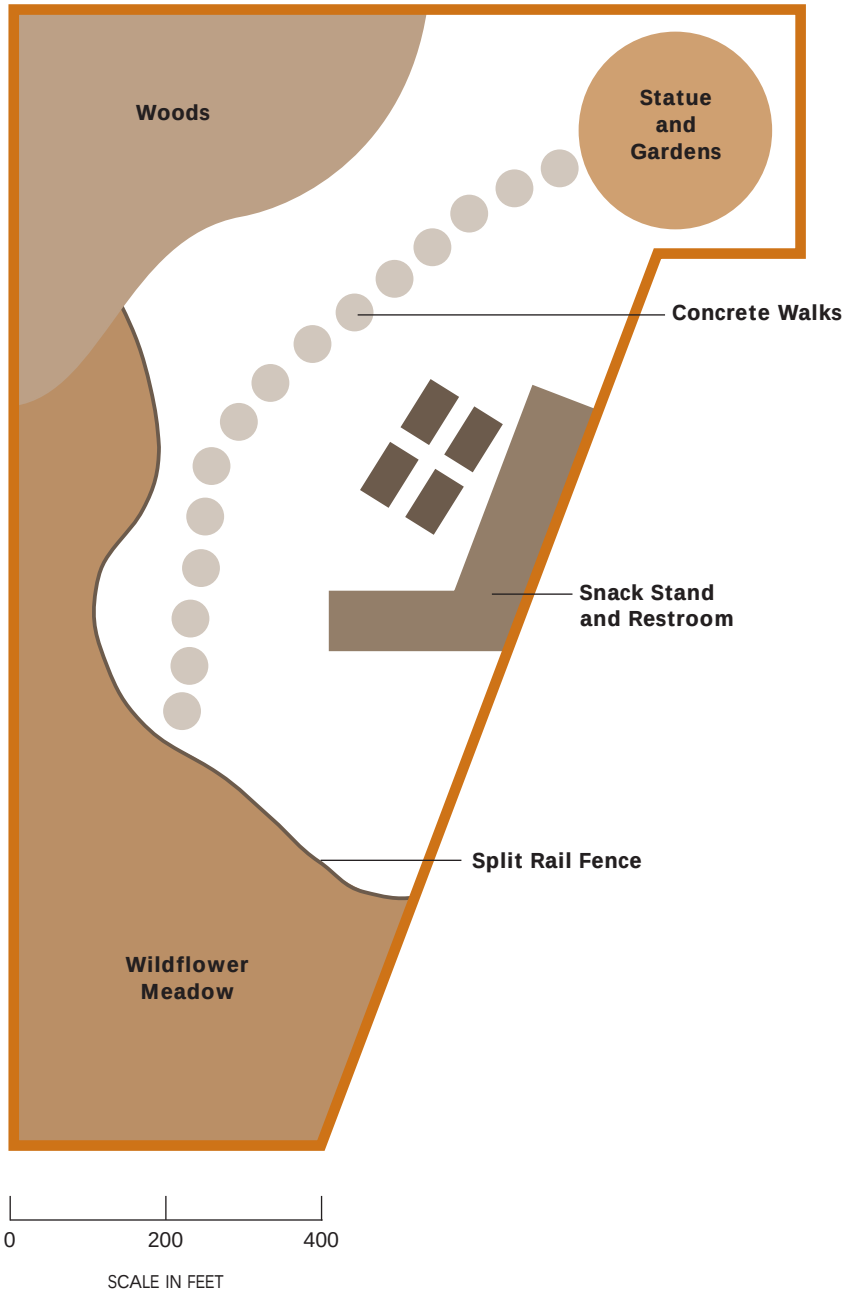
Guest Services

primarily interested in the comfort of the visitors

Examples: Are the paths and walkways wide enough for a crowd? Is there an easily identifiable traffic flow pattern so that crowds don't puddle? Are there restrooms and seating somewhere close by?

Design Specifications

- Perimeter and area of exhibit cannot be changed
- Any fixed objects within the area can be moved or removed



Wade Through America's Wetlands

Goals

The students will gain an understanding of the different types of wetlands.

Objectives

Students will create interactive exhibit signage based on the similarities and differences in North American wetlands.

Proficiency Correlations

Grade	9th	12th
Reading	3	21
Science	13, 15	14, 16

Materials

various resource materials

Procedures

Present the problem statement.

1. At the beginning of the lesson, students playing the role of the educators will be presented with the following problem:

One specific request of the zoo is that there be a low-tech interactive within the exhibit that will explain the different types of wetlands that can be found in North America. This is typically an educators job, but since the zoo is expecting your ideas ASAP, you decide to ask the other building committee members to help you.

List what is known. Develop a problem statement.

2. The educators, with the assistance of the instructor, will work with the rest of the students as a large group to help brainstorm what they currently know about the different types of wetlands in North America.
3. The educators, with the assistance of the instructor, will decide the best way to divide the work amongst the groups. (Example: each group may be assigned a different type of wetland, each group may need to come up with their own interactive, etc.)

List what is needed.

4. All groups research and work on their assigned portion of the task.

List possible actions, recommendations, solutions, or hypotheses.

5. The groups will present their findings to the educators. The educators will look through the information they receive and determine what they consider are the best plans for the interactive.

Present and support the solution.

6. The educators will thank all the groups for their assistance and briefly explain their conclusions.
7. All groups will continue with their exhibit plans.

Evaluation

- Instructor observation of participation in the cooperative group
- Presentation of ideas to educators

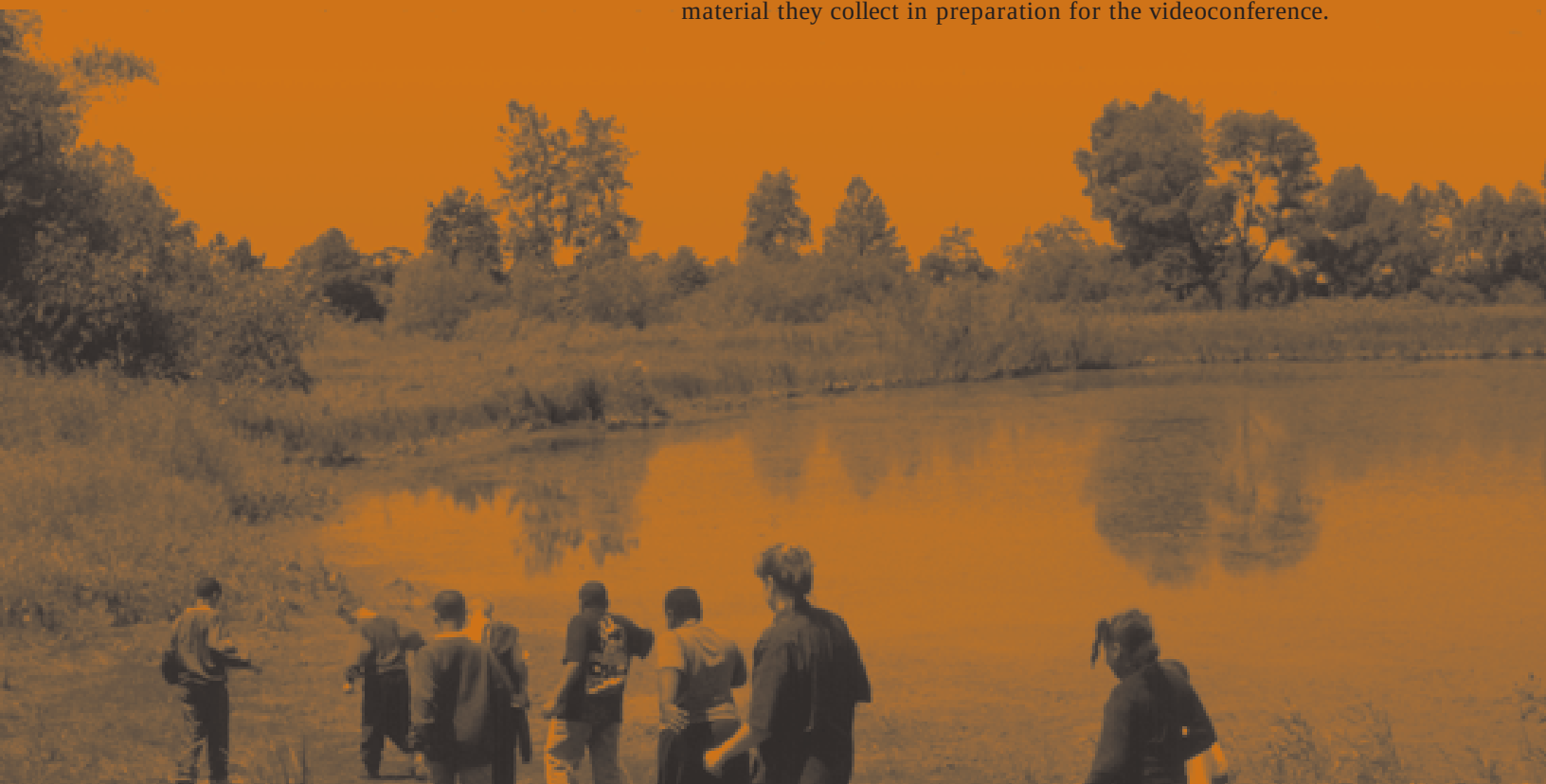
Part 2
Wetlands History

During this segment of the program, the broad goal is to understand the history of both wetlands and trumpeter swans in the state of Ohio and how this history affects current conservation efforts. The lesson that will start them off on their historical journey through the wetlands of Ohio is a required lesson, Habitat History. It will give your students some good background information as they move on to the second required lesson. Here Comes the Judge, Where Were the Swans?, revolves around the videoconference. This lesson is designed so that student presentations to the "judge" (Zoo instructor) take up most of the time during the videoconference so that they become comfortable interacting over the system and don't come to expect a videoconference to simply be a presentation from somewhere else. Other suggested lessons include:

Lost Wetland Wealth
Students will become more familiar with their own backyards as they explore the history of wetlands in their local community.

Imagine a Wetland
Creative writers in your class will enjoy this chance to create a visualization exercise about life around the wetlands of Ohio 200 years ago.

Swan Safety
The student research for this lesson, on what caused the extirpation of the trumpeter swan in Ohio, can easily be tied into the material they collect in preparation for the videoconference.



Habitat History

Goals

The students will develop an awareness of the loss of wetlands through the use of graphs and maps.

Objectives

Students will take statistical information on wetlands loss in Ohio and translate it into an information packet containing charts, graphs and accompanying text. Students will also be able to make predictions of future wetlands losses based on this information.

Proficiency Correlations		
Grade	9th	12th
Writing	1	1
Math	5, 12	5, 6

Materials

various data and research materials, internet sites (if available), graph paper

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

Uh oh. Even though your boss approved your participation in this project, the board of directors at your organization isn't sure the plight of the wetlands is worth the time and effort that you will have to invest. Your boss has asked you to put together some information for the members of the board to convince them that this project is important. Because the board covers a lot of subjects during its monthly meetings, you must make your information concise and to the point. (They like facts and figures.) You must show the historical loss of Ohio wetlands and provide information that wetlands are still disappearing in Ohio. You are limited to five pages of information, which includes any charts, graphs, and maps you wish to provide.

List what is known. Develop a problem statement.

2. The instructor will work with the students as a large group to help brainstorm what types of information they will want to include and some ideas on how to best present it. (The instructor should guide the students to think about how charts and graphs can provide information in a visual and easily understandable way.)

List what is needed.

3. Students will be broken into five small groups. Each group will research the data they need to present and will cooperatively determine how to present the information in a chart or graph.

List possible actions, recommendations, solutions, or hypotheses.

4. Each group will cooperatively create the charts and graphs for the information packet they are putting together. Each student, however, is responsible for writing whatever accompanying text they feel is necessary (may be from a paragraph to a page).

Present and support the solution.

5. The students will present their information packets to the board of directors (the classroom instructor) for review.

Evaluation

- Instructor observation of participation in cooperative group
- Group charts, graphs, and maps
- Individual text to accompany visual aids

Here Comes the Judge, Where Were the Swans?

Goals

The students will explore the possibilities that trumpeter swans once existed in the state of Ohio.

Objectives

Students will investigate a variety of sources and weigh both solid and circumstantial evidence to determine if trumpeter swans once inhabited the state of Ohio.

Proficiency Correlations

Grade	9th	12th
Reading	8	14
Citizenship	16	18

Materials

various data and research materials, internet sites (if available)

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

Before you can firmly agree to reintroduce the trumpeter swan to Ohio, you need to find some sort of proof that it was here in the first place. Your project report must contain references to any evidence that would lead you to believe that trumpeter swans once lived within Ohio's borders. All evidence you find will be presented to a judge (Zoo instructor) during a live videoconference to decide if you have found sufficient reason to believe that trumpeters were once here.

List what is known. Develop a problem statement. List what is needed.

2. The instructor will work with the class as a large group to help brainstorm what types of evidence they might consider looking for that will be proof that trumpeter swans once were found in Ohio. (The list must contain at least five different avenues to explore, for the work will be divided amongst the cooperative groups.)
3. Students will be broken into five small groups. The groups will decide how to split up the potential evidence sources found on the list the class brainstormed. Each group will investigate its assigned portion of the list.

List possible actions, recommendations, solutions, or hypotheses.

4. Each cooperative group will evaluate the evidence found. Is it hard evidence that proves without a doubt that trumpeter swans were in Ohio? Can it be assumed from the evidence that swans were in Ohio, even if it does not firmly place them there? Does the evidence prove that trumpeters were not in Ohio? Each group must plan a strategy for presenting what was found before the judge.

Present and support the solution.

5. Each cooperative group will choose one person to present its material during the videoconference. Audiovisuals are most helpful, but not required. Each group will be limited to a maximum of 3 minutes of presentation time.
6. During a live videoconference from Cleveland Metroparks Zoo, the judge (Zoo instructor) will read a prepared statement from the opposition, claiming that there is no reason to believe trumpeters once inhabited Ohio. The students will then take turns with their presentations, remembering that they need to convince the judge that trumpeters were here.
7. The judge will weigh the evidence and make her final ruling. After the ruling, the students will be able to discuss with the judge their thoughts and feelings on the ruling.

Evaluation

- Instructor observation of participation in the cooperative group
- Presentations made during the videoconference

Lost Wetland Wealth

Goals

The students will develop an awareness of the loss of wetlands in their local area.

Objectives

Students will use personal observation and local historical reference to determine what areas in their vicinity used to be wetlands.

Proficiency Correlations

Grade	9th	12th
Reading	3, 22	23
Citizenship	5	4

Materials

various data and research materials, internet sites (if available)

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

A class at one of the middle schools near your organization has become quite interested in your project. The students in that class have decided they would like to make a video for the other students in the school. Their topic will focus on the wetlands in your local area. They have asked for your help in determining what areas in your vicinity (city, county — borders of this area may be determined by the instructor and the students) were historically wetlands and where wetlands still exist. They might also find it helpful to know what kinds of clues will determine if an area was once a wetland.

List what is known. Develop a problem statement.

2. The instructor will work with the students as a large group to help brainstorm what kinds of clues there may be to determining if areas were once wetlands and where to go to find information specifically for your area. (The instructor should invite the students to use personal observation, such as areas where they may have seen cattails growing or areas that they know are flood-prone, when trying to determine wetland areas in their vicinity.)

List what is needed.

3. Students will be broken into five small groups. Each group will research the data it needs to present to the students and will cooperatively determine how to present the information to middle school students.

List possible actions, recommendations, solutions, or hypotheses.

4. Each group will put together its information on the history of wetlands in their area and a list of at least 3 clues that an area may have once been a wetland.

Present and support the solution.

5. The student groups will compare their information and discuss what may account for any differences they found.

Evaluation

- Instructor observation of participation in cooperative group
- Group information on history of wetlands in your area
- Group list of clues that an area was once a wetland

Imagine a Wetland

Goals

The students will develop an appreciation for the struggles of the pioneers who filtered into wetland areas.

Objectives

Students will use historical information on the Great Black Swamp to create a visual image of what life was like for the pioneers who lived there.

PROFICIENCY CORRELATIONS		
Grade	**9TH**	**12TH**
Writing	1	1

Materials

various data and research materials, internet sites (if available)

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

Once again, your local middle school is looking to you for help. Since the students have only ever seen wetlands in small isolated pockets, they are having trouble understanding what large expanses of wetlands are really like for those people who first arrived there. A teacher has asked if you would come to the school and lead the students through a guided imagery activity to give them a better understanding of what life was like for those pioneers trying to make it in wetland areas. And if they are looking for a large expanse of wetlands in Ohio's history, you know just the place to take them on their visualization!

List what is known.

2. The instructor will work with the students as a large group to help brainstorm what large areas of wetlands may have been like for the pioneers in Ohio.

Develop a problem statement. List what is needed.

3. Students will be broken into five small groups. Each group will develop a list of things they still need to know in order to create the guided imagery activity. They must also determine what large expanse of wetlands in Ohio's history should be the focus of the activity. (The largest expanse of wetlands was found in northwestern Ohio and was called the Great Black Swamp. Foreboding, isn't it? The instructor should guide students to this information if they have trouble.)

List possible actions, recommendations, solutions, or hypotheses.

4. Student groups will gather any further information they can find to help them create a historically accurate guided imagery activity.
5. Student groups will discuss the information they found and decide what parts are most important to include for historical reasons and what parts are most important to include for fun and exciting reasons. (Remember, guided imagery happens with your eyes closed. You want to make sure you have some "Oh wow!" type images scattered throughout so that no one falls asleep!)

Present and support the solution.

6. The students will be responsible for writing their own versions of the guided imagery activity. The students may then pair up with another student in the class or with students from a different class to test the activity they created.

Evaluation

- Instructor evaluation of participation in cooperative group
- Individual guided imagery activities

Swan Safety

Goals

The students will predict the environmental threats to a particular species based on dangers that existed in the past.

Objectives

Students will:
1. investigate the reasons for the extirpation of the trumpeter swan in the state of Ohio,
2. research whether those reasons still exist, and
3. determine if there are new threats to the trumpeter swan once they are released into Ohio.

PROFICIENCY CORRELATIONS

Grade	9TH	12TH
Reading	13	16
Science	13, 20	4, 6, 14

Materials

various data and research materials, internet sites (if available)

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

In addition to determining that trumpeter swans once existed in Ohio, you must also assure yourself that the extirpation of them in the state does not happen again. Your final project report must assure the funders of this project that there will not be a repeat occurrence. It would be helpful in your report to identify the following: what caused the original disappearance of the trumpeters, whether there are vehicles in place to prevent a repeat occurrence, and any new pressures on the trumpeters that need to be addressed before they are released.

List what is known. Develop a problem statement.

2. The instructor will work with the students as a large group to help brainstorm what types of information they will need to make this kind of assurance. (Examples will include what caused the original disappearance of the trumpeters in the state, are there vehicles in place to prevent the same from happening again, are there any new pressures on the swans that need to be addressed, etc. The instructor should not offer these ideas until the students have generated some ideas of their own.)

List what is needed.

3. Students will be broken into five small groups. Each group will further discuss what information they feel is important to include in their final report.

List possible actions, recommendations, solutions, or hypotheses.

4. Each group will research the information that it decides is the most important to include and will determine the best way to present the information, both to their fellow students and in written form for the report to their funders.

Present and support the solution.

5. The students will briefly present their information to the class as a large group and the groups will discuss any differences they may find. The information packets created by the students will be presented to the instructor for review.

Evaluation

- Instructor observation of participation in cooperative group
- Group information packet

Part 3
Egg Collection and Incubation/ Hatching

During this segment of the program, the broad goal is to give your students a basic understanding of the trumpeter swan egg collecting trip and the incubation/hatching as it is conducted by Zoo staff. The lesson that gives them their introduction to these concepts is a required lesson, "How Do I Get There From Here?" The information presented in this lesson is vital to this portion of the project and isn't covered in any of the other lessons. The other required lesson is, "Hatching How To's." While part of this activity is conducted by Zoo staff as a videoconference, there is a good deal of classroom work that needs to take place before the conference. Your students should become familiar with their field incubator before the videoconference, as we will be comparing that equipment with the permanent equipment found in the incubator room at the Zoo. Other suggested lessons include:

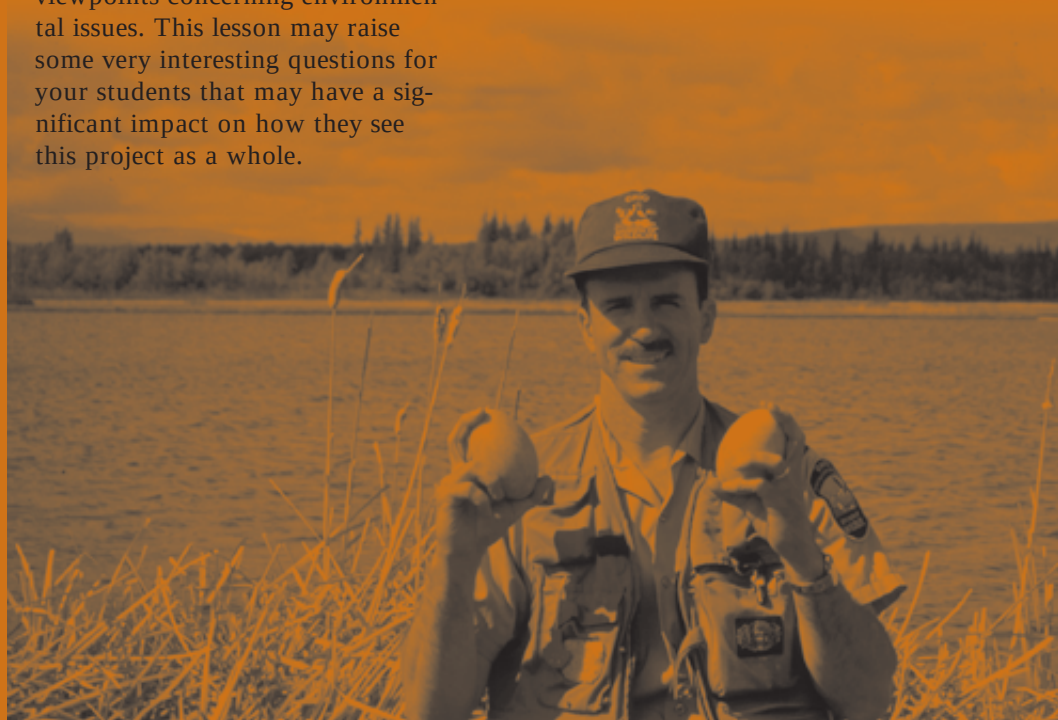
Habitat Mapping of Alaska
Creating a habitat map gives students the opportunity to see the wide variety of habitat in our 49th state.

Totem Poles Tell Tales
Students can get creative by designing their own totem pole and writing the mythical story that tells the story of its design.

Ethics of Reintroduction
Through a mock public forum, students will come to understand that individuals have many differing viewpoints concerning environmental issues. This lesson may raise some very interesting questions for your students that may have a significant impact on how they see this project as a whole.

Extension ideas and class projects

- Hatch some eggs in your field incubator
- Submit your travel plans to Zoo administrators to see which trips would actually get approved
- Create a habitat map of Ohio
- Create a 3D model of your totem pole



How Do I Get There From Here?

Goals

The students will develop an awareness of environments other than their own through a travel planning exercise.

Objectives

Students will use various maps (geographic, topographic, etc.), travel guides, internet sites, and other reference materials to:

1. choose appropriate methods of transportation from their hometown to Lake Louise Lodge in Alaska,
2. plan a time line for the trip,
3. prepare a budget for the trip, including: transportation, lodging, meals, miscellaneous, and
4. make a list of things to pack.

PROFICIENCY CORRELATIONS

Grade	9TH	12TH
Reading	20, 22	19, 23
Math	–	5
Citizenship	5	4

Materials

various maps, travel guides, internet sites (if available)

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

In your efforts to reintroduce the trumpeter swan to your home state, you are working with the U.S. Fish and Wildlife Service in Alaska during the egg collection part of your project. Your contact at USFWS tells you that, weather permitting, he will collect eggs with you on June 17th and that he will meet you at Lake Louise. In order to go on this trip, you must present to your boss a detailed budget (so she knows how much it will cost) and a timeline (so she knows how long you will be gone). You will also need to make a list of the items you need to take with you, keeping in mind that you will also be bringing back an incubator full of trumpeter swan eggs. How do you get there from here, in the most cost-effective and timely way possible?

List what is known.

2. The instructor will work with the students as a large group to help brainstorm what types of information they will need to find out in order to create this travel plan. (Examples include what the weather will be like, how much a typical meal will cost, etc. The instructor should not offer these examples until the students have come up with some ideas of their own.)

Develop a problem statement. List what is needed.

3. Students will be broken down into groups of 4-5. Student groups will work together to determine what problem they are trying to solve and what information they still need to solve that problem. The answers to their questions may be found in the library, on-line, in your resource box, with outside experts, etc.

List possible actions, recommendations, solutions, or hypotheses.

4. The group will work together to create both the budget and timeline.
5. Each student is responsible for his/her own list of items needed to be packed.

Present and support the solution.

6. Students will come back together in a large group to discuss the pros and cons of each group's travel plan.

Evaluation

- Instructor observation of participation in cooperative group
- Travel budget
- Timeline
- Individual lists

Hatching How To's

Goals

The students will understand the real-life complexities of conservation field work.

Objectives

Students will use various field collection supplies, books, and internet resources to create the plan to collect 50 trumpeter swan eggs in Alaska and transport them for hatching in Ohio.

PROFICIENCY CORRELATIONS		
Grade	9TH	12TH
Math	1, 11, 14	3, 5
Science	10	14

Materials

field incubator, motorcycle battery, thermometer, Trumpeter Swans: First Step Towards Recovery

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

Before leaving on the trip to Alaska, you order new field incubators. You would like to test them to make sure they are working before you ship them off to your collection site, to make sure any bugs are worked out before you have to do a real collection in the field. Once you've done your tests, you make your plans for the collection of 50 trumpeter swan eggs in Alaska.

List what is known.

2. The instructor will work with the students as a large group to help brainstorm what types of information they will need to find out in order to successfully hatch a clutch of swan eggs. (Examples include temperature of the incubator, how long the incubators take to heat up, how to set up the incubator, what to do if the incubators do break while in the field, how many incubators do we need to take, etc. The instructor should not offer these examples until the students have come up with some ideas of their own.)

Develop a problem statement. List what is needed. List possible actions, recommendations, solutions, or hypotheses.

3. Students will be broken down into groups of 4-5. Each of the groups will work on finding the information required for the hatching of trumpeter swan eggs as well as planning what sorts of tests it needs to do to make sure the incubator is working properly.
4. The student groups will need some time to examine the field incubator to determine the types of tests they need. The instructor should make sure that the students groups connect the incubator to the battery properly before they attempt to turn it on to prevent shorting out the system.
5. Once the incubator is hooked up, students can begin working on any of the tests they designed. They may take turns doing their tests as a small group or they may discuss their ideas with the entire class and work on a few of these tests as a large group.
6. When the students have sufficient results from their tests, the small groups will continue working together to develop their collection plan. This plan should carry them through from the moment the incubators are readied in Alaska until the eggs hatch at the Zoo. This is an ideal time to show the video "Trumpeter Swans: First Step Towards Recovery."

Present and support the solution.

7. During a live videoconference from Cleveland Metroparks Zoo, students will present their collection plans. They will be able to go behind-the-scenes into the incubator room at the Zoo to see the facilities and make comparisons between their field incubators and the more permanent equipment found here. They will be able to share information with other groups working on this project and ask questions of the experts if they still have some problems to solve. The experts may also pose some additional questions to the students to get them to further think of problems that may arise during this collection.
8. Once back in the classroom, student groups may rework some of their collection plan based on the information they received from the Zoo expert or from discussions they had with other participating groups.
9. Students will come back together in a large group to discuss the pros and cons of each group's collection plan.

Evaluation

- Instructor observation of participation in cooperative group
- Collection plans
- Instructor observation of participation in videoconference

Habitat Mapping of Alaska

Goals

The students will develop an awareness of environments other than their own through habitat mapping of the state of Alaska.

Objectives

Students will use various maps (geographic, topographic, etc.), travel guides, internet sites, and other reference materials to:
1. locate the habitat/range of a particular animal,
2. create visual images representing a particular habitat, and
3. draw conclusions as to the limiting factors for certain plants or animals.

PROFICIENCY CORRELATIONS

Grade	9TH	12TH
Reading	22	23
Citizenship	5	4
Science	6	14, 16

Materials

various maps, travel guides, internet sites (if available), list of selected animals of Alaska

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

Several of your colleagues who study wildlife that is native to the state of Alaska have heard about your trip. They know that in the future, they will also have to travel to Alaska to complete some of their research. They are hoping, since you have already done some planning for your trip, that you could make some recommendations for them. They would like to know if they should also go to Lake Louise or if there is a better site for them, how the conditions (climate, daylight hours, habitat) may differ from yours, and what might be the best time of year for them to go. You've decided that the best way to provide so much diverse information is by habitat mapping.

List what is known. Develop a problem statement. List what is needed.

2. Students will be broken down into groups of 2-3. Each group will be assigned a different animal by the instructor. Members of the group will work together to locate the needed information.
3. Once the small groups have narrowed in on a particular region of the state, they will join with the other groups also investigating that region, based on the following divisions: arctic, western, eastern, southwestern, southcentral, southeastern, or Aleutians.

List possible actions, recommendations, solutions, or hypotheses.

4. Each regional group will work together to create symbols of their region (their assigned animals plus four others) that will visually describe the habitat of that region. Examples of symbols include tall trees, scrub plants, ice floes, glaciers, etc.

Present and support the solution.

5. All groups will apply their symbols to a map of Alaska.
6. The instructor will guide a discussion on trends that are found on the habitat map and reasons behind these trends. (Ex. Smaller plants the further north you go – due to shorter growing season, less precipitation, etc.)

Evaluation

- Instructor observation of participation in cooperative group
- Habitat map of Alaska

Animals of Alaska

- Grizzly bear
- Black bear
- Caribou
- Moose
- Bald eagle
- Polar bear
- Dall sheep
- Humpback whale
- Walrus
- Puffin
- Musk ox

Totem Poles Tell Tales

Goals

Students will gain a basic understanding of native Alaskan cultures through the creation of an "authentic" totem pole.

Objectives

Students will use various fictional and nonfictional reading materials to understand the native cultures of Alaska, their attitudes towards wildlife, and their use of these animal images in their artwork. Then, focusing on the trumpeter swan, they will:

1. create a sketch of their own totem pole, using the trumpeter swan at least once in the pole, and
2. write a one page fictional story explaining the myth of their totem pole.
3. Extension idea: Create a scale model of their totem pole.

PROFICIENCY CORRELATIONS

Grade	9TH	12TH
Writing	1	1
Reading	5, 12	2, 13
Citizenship	2	2
Art	–	–

Materials

various reference books, sketch or graph paper, various art media

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

During your recent trip to Alaska, you fell in love with the artwork of the native tribes. Being somewhat handy with carving tools, you decide to create a totem pole for your own home. You would like to make the pole as authentic as possible, out of respect for the native people, yet you would also like to use a trumpeter swan somewhere on your pole since that is the reason you went to Alaska in the first place.

List what is known. Develop a problem statement.

2. The instructor will work with the students as a large group to help brainstorm what types of information they will need to find out in order to create an "authentic" totem pole. (Examples include what tribes lived in the regions inhabited by trumpeter swans, did those tribes make totem poles, are there examples of trumpeter swans in their art, etc. The instructor should not offer these examples until the students have come up with some ideas of their own.)

List what is needed.

3. The instructor will break the students into small groups. Each group is responsible for researching one of the aspects of the project that was developed during the brainstorming session and then reporting its findings back to the entire class. The small groups will be investigating things such as what native Alaskan tribes were found in areas where trumpeter swans are common, how the design of a totem pole is decided, animal myths of various native Alaskans, etc.
4. Student groups will report their findings back to the entire class. Students should make sure to question one another if there is something they do not understand because they may need this information when creating their totem pole and myth.

List possible actions, recommendations, solutions, or hypotheses. Present and support the solution.

5. Each student will create a sketch, to scale, of his/her own totem pole and will write at least a one page myth to accompany the details on the totem pole.
6. Extension idea: Students can create a scale model of their individual totem poles out of a variety of artistic media or they may choose to work as a group on one of the totem poles designed by their classmates.

Evaluation

- Instructor observation of participation in cooperative group
- Individual sketch of totem pole (scale is more important than artistic ability)
- Individual myth to accompany totem pole

Ethics of Reintroduction

Goals

The students will draw their own conclusions concerning the ethics of reintroducing animals to a habitat based on arguments heard during a mock public forum.

Objectives

Students will use a variety of data and research information to research their role in a mock public forum.

PROFICIENCY CORRELATIONS		
Grade	9TH	12TH
Reading	13, 20	19
Math	1, 5, 12	2, 6
Science	13,15,19,20	6,14,17

Materials

various data and research information, internet sites (if available)

Procedures

Present the problem statement.

1. At the beginning of the lesson, the instructor will assign or allow students to choose the following roles:
   - Swan reintroduction expert-4 students
   - Bald eagle reintroduction expert-2 students
   - River otter reintroduction expert-2 students
   - Animal rights activist-4 students
   - Common citizen-4 students
   - Government officials-5 students

2. Based on their roles, students will be presented with one of the following problems:

Just before the egg collection trip is about to take place, a public forum is called to decide whether this reintroduction should be allowed to take place. Government officials will hear the various points of view and will then make their final ruling.

Swan reintroduction experts: To save your project you must be able to convince the majority of the panel that reintroduction of the trumpeter swan is a good thing.

Bald eagle and river otter reintroduction experts: You have been asked to provide information on both the problems with and benefits of reintroductions that have already occurred in our state.

Animal rights activists: Some organization members are against the idea of reintroduction, some think the idea is fine as long as the animal is treated well. You will attend the forum to make sure the animals' rights are represented.

Common citizen: You decide to attend this forum because you have found little information on the subject and have many unanswered questions.

Government official: You have read the reintroduction plan but need more information before you can make your decision. You have decided, along with the other officials, to take a vote after conducing a public forum concerning this issue.

List what is known.

3. Based on their own individual feelings, students will write a short paragraph on whether or not they personally believe animal reintroductions are ethical.
4. Each student role-playing group will work together to list what they know about the scenario.

Develop a problem statement. List what is needed.

5. Student groups will work together to determine what problems they are trying to solve and what information they still need. The answers to their questions may be found in the library, on-line, in your resource box, with outside experts, etc.

List possible actions, recommendations, solutions, or hypotheses.

6. The students will test what they have learned through a mock public forum. Structure of the public forum is as follows: Trumpeter swan experts will briefly explain the project to the rest of the audience, officials will then ask questions of the expert, and the floor will be opened for rebuttal and questions from the audience.

Present and support the solution.

7. At the end of the forum, the public officials will meet to determine whether or not to allow the trumpeter swan project to continue. They must list at least three reasons supporting their decision.
8. Students will now read the short paragraph they wrote before this lesson began and will add a new paragraph explaining whether the public forum changed or strengthened their views on animal reintroductions.

Evaluation

- Paragraphs from before and after the lesson
- Instructor observation of participation in public forum

Part 4
Two Years in Training

In the videoconference that accompanies this segment of the program, students will test their developed site evaluation method by reviewing three proposed sites, asking questions, and then ranking the sites using their evaluation method and any information they gain through interaction with Wilds staff. After students select their preferred site, they will see the actual swan management facility and have opportunities to interact with animal management staff about swan husbandry at the Wilds.

Trumpeter Swans Free to a Good Home

Goals

Students will create an understanding of different perspectives and develop their own conclusions about a wildlife conservation facility's decision to participate in a species reintroduction project.

Objectives

1. Students will model a wildlife management facility and identify variables necessary to evaluate the suitability of their organization's participation in the reintroduction project.
2. Students will understand different perspectives of an organization and develop method to work through differences of opinion.

PROFICIENCY CORRELATIONS

Grade	9TH	12TH
Citizenship	6, 16	18

Materials

the Wilds video, mission statement, organizational chart, research materials: books, periodicals, on-line sources

Procedures

Present the problem statement.

1. You are the management team for a wildlife conservation facility. Your board of trustees has decided there are many good reasons for you to become a part of a project to reintroduce trumpeter swans to Ohio. Some of you see the value of such a project, but others of you have real concerns. You are calling your first meeting to better understand the project, to learn what strengths your team and facility have to bring to the effort, to anticipate what obstacles the project may face, and to learn what else you need to know. Here is all you know about the project.

List what is known.

2. Duration of project: 3 years
   Age of swans when planned for release: 2 years

Develop a problem statement.

3. The instructor will work with the entire group to brainstorm a process for deciding what they will need to know about the reintroduction project before they can prepare a recommendation to the board about whether to participate.

List what is needed. List possible actions, recommendations, solutions or hypotheses.

4. Students may break into smaller groups, each representing views of staff members.
5. Students will prepare a list of information needed to evaluate the project and propose a method for deciding whether to proceed.

Present and support the solution.

6. The instructor will review the list and ask the group how they plan to proceed.

Optional Activity

7. Instructor may distribute the following role playing scenarios to encourage debate.

Evaluation

- Instructor will evaluate participation, contribution and continuity as model develops
- Instructor will evaluate participation and ability to stay within roles defined by scenario

Optional Role Playing Scenarios

Board of Trustees, President

Long range view
Keenly interested in conservation
Wants the Wilds to create jobs for the community
Insists that the Wilds keep within budget

Director of Animal Science

Interested in working with state agencies. Must delay work in another project to be able to pay for this project

Manager of Animal Care

Specialist in hoofstock and enjoys all the animal research projects currently in work. Only experience with waterfowl is hunting duck during season

Manager of Visitor Services

Wants the Wilds to put the swans on public display as a way to raise money to pay for the reintroduction project

Swan Supervision

Goals

Students will develop an understanding of the requirements for managing a species in captivity to reach an ultimate goal of preparing the animal for survival in the wild.

Objectives

Students will work to create a comprehensive understanding of the natural history of the trumpeter swan to serve as the basis for describing how a facility would meet animals' requirements while in captivity.

PROFICIENCY CORRELATIONS		
Grade	**9TH**	**12TH**
Math	12	6
Reading	22	23
Science	16	14
Writing	1	1

Materials

research materials: books, periodicals, videos, on-line sources

Procedures

Present the problem statement.

1. You are a research team that has been asked to provide a description of the needs of the trumpeter swan for a wildlife conservation facility in southeastern Ohio. This facility plans to manage these animals in such a way as to encourage the development of behaviors that will contribute to their survival when released from captivity. Most of you have devoted your careers to the study of the Canada Goose, and have published several related and well-respected articles in animal behavior journals and contributed to natural history texts. You believe you can draw on your experience for this project.

List what is known. Develop a problem statement. List what is needed.

2. Students may break into groups, each selecting a different topic to learn and report on the basic needs of this species. Each group will develop a written report.

List possible actions, recommendations, solutions, or hypotheses.

3. The groups will present their reports to one another and evaluate whether together their combined efforts represent a complete report. They may return to step (2) to add to their findings and return to step (3) to complete.

Present and support the solution.

4. The group will compile the final report of their research.

Evaluation

- Members within each group will evaluate other individuals participation, and each group will evaluate another group's written report on relevance, completeness and anticipated usefulness to the wildlife management facility. Instructor will evaluate each group for:

1. its ability to divide work, and
2. its ability to meet objectives in a timely fashion.

Fasten Your Seat Belts, Please

Goals

Students will develop their understanding of how a business may use its resources to offer a service and how competition influences outcomes.

Objectives

Students will identify and select from resources to model and price a business line to transport swans.

Proficiency Correlations		
Grade	**9TH**	**12TH**
Math	1, 6, 7	2, 3, 4
Writing	1	1
Citizenship	1	6

Materials

research sources: books, journals, on-line sources and interviews with similar businesses

Procedures

Present the problem statement.

1. You are a marketing manager for a transportation company that began its business hauling domesticated chickens for Big-Eye Egg (formerly Egg-a-General). You have a fleet of trucks of many sizes and body styles. You have been charged with developing some new lines of business that include transporting free range chickens to market. Because you have been so successful at that work, you believe you have an opportunity to build a line of business transporting wildlife. You plan to bid on a contract to provide transport for some trumpeter swans between the Wilds in southeastern Ohio and the release site when they are reintroduced at the age of two years. If you are successful in this endeavor, you will be the vendor of choice to transport the swans each year for the next two years. You will also have created a reference that would help in sales calls to zoos and wildlife agencies around the midwest. This could be a project that would deliver good public relations for your company, but it still needs to make money.

List what is known. Develop a problem statement.

2. The instructor will work with the students as a large group to help brainstorm what information will be needed to prepare a profitable, reasonable bid.

List what is needed.

3. Students will then split into two groups; one group will prepare an e-mail or letter to the Wilds and the other will prepare an e-mail or letter to the Cleveland Metroparks Zoo to communicate its interest, question which organization will make the buying decision, and list what is needed to proceed.

List possible actions, recommendations, solutions, or hypothesis. Present and support the solution.

4. A response from either the Cleveland Metroparks Zoo or the Wilds will indicate who is responsible and answer student questions. Students will reorganize into three groups to prepare confidential bids. Students will make assumptions about equipment available and the economics underlying their proposed method for transporting swans.

Evaluation

- Instructor will evaluate participation and contributions to group discussions
- Each group will evaluate the letter or e-mail of the other group for logic, clarity and appropriateness
- The Wilds or the Cleveland Metroparks Zoo will evaluate each of three bids and select one with acceptance letter and send two letters to the bids not selected with brief explanations

Where in the Wilds?

Goals

Students will create a tool with which to evaluate and choose from potential sites for raising swans to meet the objectives of a reintroduction project.

Objectives

Students will build upon learning in prior lessons to develop a method for evaluating alternative sites.

Proficiency Correlations		
Grade	**9th**	**12th**
Math	6	6
Science	13	14

Materials

results of Swan Supervision

Procedures

Present the problem statement.

1. You are on the animal management staff at the Wilds. You have been given the responsibility to locate a suitable site and design the facilities necessary for raising trumpeter swans from the age of 3 months until they are ready for release to wetlands around Ohio. Construction will proceed based on your recommendations to the director if your plans for development of the chosen site fall within capital budget limits.

List what is known. Develop a problem statement.

2. Instructor will lead students in brainstorming to identify issues for consideration. Students will break into groups specializing in one, or at most, two issues.

List what is needed. List possible actions, recommendations, solutions, or hypotheses.

3. Students will prepare a list of factors for consideration and develop a means for ranking each in importance relative to others. They will prepare a means for evaluating potential sites.

Present and support the solution.

4. Students will describe the ideal site and have a tool with which to evaluate proposed sites.

Teleconferencing session (4th in series).

- Ask students to present their proposed ideal site and their method for site evaluation.
- Propose clips of three sites with video descriptions of each. Take questions. Solicit and answer questions from students about sites.
- Ask students to rank sites when ready; choose one and justify it as recommended site.
- Identify actual site chosen.
- Compare and contrast actual site with student proposed site. Include care of birds at Wilds and information on preparing for release.

Evaluation

▶ Students will evaluate the videoconference for technical quality and effectiveness as a learning tool

▶ Criteria for evaluation may include:
- Start and finish on time?
- Understandable?
- Did episode increase relevance of learning, i.e., did it represent real world connection?
- Could this episode have been as effective in the classroom?
- Suggestions for improvement

▶ Instructor will evaluate students for retention, recombination and utilization of learning from prior lessons

Guess Who's Coming to Dinner?

Goals

Students will develop hypotheses that may provide the Wilds an alternative plan for addressing predation upon naive swans being managed in captivity for reintroduction.

Objectives

Research native Ohio wildlife in southeastern Ohio to create hypotheses about potential predators. Incorporate objectives of reintroduction plan into the development of possible action plans. Research journals to understand and write appropriately for different audiences.

PROFICIENCY CORRELATIONS		
Grade	**9TH**	**12TH**
Writing	1	1
Reading	7, 19	–
Science	2	8
Citizenship	–	18

Materials

animal mortality report, research sources: books, periodicals, on-line sources

Procedures

Present the problem statement.

1. You are in your second year of the trumpeter swan program and are discovering some predation occurring on your two year old sub-adults. In the past three months of late summer, you have found four swans dead and one swan with lacerations to the webbing on one foot and to the middle of one wing. You are compiling a report of possible predators and developing a hypothesis about which is the most likely cause of predation to the swans, and you are proposing an experiment to test that hypothesis. Once you have run the experiment, you must write a plan to deal with the predator. The director has asked that your plans include ethical considerations and that a plan for communicating and justifying your plans be included.

List what is known.

2. Instructor will brainstorm with students to summarize what is know about the site, possible predators and audiences for management plans.

Develop a problem statement. List what is needed.

3. Students will be broken into groups. The output of each group will be an input to another group. One group will research native wildlife and create hypotheses about possible predators. A second group will create an experiment that would test the hypotheses to identify the most likely predator.

List possible actions, recommendations, solutions, or hypotheses. Present and support the solution.

4. A third group will develop action plans for dealing with the most likely predator. A fourth group will identify ethical issues. A fifth group will write press releases for distribution to three different publications: a local newspaper, an animal rights newsletter, and a wildlife conservation science journal.

Evaluation

- Each group will evaluate the timeliness and completeness of the preceding group's contribution to their task. The first group will evaluate the work of the last group.
- Students will discuss as a group the final outcome and evaluate the appropriateness of the solution as reported to each of the three publications.

Part 5
Release and Tracking

During this segment of the program, the broad goal is for the students to understand that the success of the reintroduction program depends on the success of the released birds, and that there are several different methods of tracking this success. One of the required lessons in this segment is "Predicting Migration." During this lesson, your students should be able to create and compare several different methods of keeping track of the released swans. They can then compare what they have developed with the satellite tracking of two of the swans, which will be found on the Cleveland Metroparks Zoo's web page. This lesson is required because keeping track of the released swans is a vital part of the project and this information is not explored anywhere else. The other required lesson is "Ethological Endeavors," where the students will learn during a videoconference how to create an ethogram and what types of information may be gathered from this type of study. Zoo staff will conduct the lesson from the beginning, so there is no preparatory time required before the videoconference. Other suggested lessons include:

Liberation Locations
Have your students find suitable release sites for the swans by evaluating the size and quality of some of the wetlands found throughout our state.

Are You My Brother?
This lesson has your students reading the animal records of Cleveland Metroparks Zoo and the Wilds in order to follow specific birds all the way from Alaska to Ohio. It might also spark some discussion on what happened to some of those that didn't make it.

Not in My Backyard!
Students will think about some of the potential problems that may be associated with the release of the trumpeter swan and how this might affect the current ecosystem.

Extension ideas and class projects

- Compare the satellite tracking information on the trumpeter swans with the Andean condor (also found on the Zoo's web page).

Predicting Migration

Goals

The students will develop an understanding of the environmental factors that may cause an animal to migrate.

Objectives

Students will use a variety of research tools and materials to predict the migration patterns of the trumpeter swan based on the environmental factors that cause their migration.

PROFICIENCY CORRELATIONS		
Grade	**9TH**	**12TH**
Reading	11	13
Science	19, 20	14

Materials

various data and research information, internet sites (if available)

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

Once you release the trumpeter swans into the wild, you must somehow keep track of the birds in order to determine if you reach the goals of the reintroduction plan — to establish at least 15 breeding pairs of swans by the year 2006. If you can predict where the swans are going to be at a particular time, you should be able to develop a plan for keeping track of these birds.

List what is known. Develop a problem statement.

2. The instructor will work with the class as a large group to brainstorm what it already knows about migratory birds that might help them make predictions about the trumpeter swans.
3. The students will be broken into five small groups. Each group will brainstorm what it already knows about animal tracking that might help them make predictions about the trumpeter swans.

List what is needed.

4. The small groups will research information about trumpeter swan migration and methods of animal tracking that will help them develop a plan to keep track of the released swans.

List possible actions, recommendations, solutions, or hypotheses.

5. Each small group will create what it believes to be the best plan for keeping track of the released trumpeter swans. Each group will give a five minute presentation to the class to explain its plan and give supporting details.
6. The instructor will lead a discussion with the entire class as they talk about the pros and cons of their various tracking plans.

Present and support the solution.

7. The students will locate the trumpeter swan tracking information that is available on the Cleveland Metroparks Zoo web site. Does the information they find here support the tracking plans they developed?

Evaluation

- Instructor observation of participation in cooperative group
- Group presentation

Ethological Endeavors

Goals

The students will develop an understanding of how to conduct behavioral studies and how the studies can be useful in animal studies.

Objectives

The students will discover the study of animal behavior by:

1. creating ethograms for two different populations of trumpeter swans (native and reintroduced), and
2. discussing any differences found in the two populations and developing a hypothesis for why this is occurring.

PROFICIENCY CORRELATIONS		
Grade	**9TH**	**12TH**
Writing	1	1
Reading	11, 16	12, 15
Science	13	5

Materials

nothing needed

Procedures

Present the problem statement.

1. At the beginning of a live videoconference from Cleveland Metroparks Zoo or a selected release site, students will be presented with the following problem:

Now that the trumpeter swans have been released in this state, you would like to do some simple behavioral studies to see if there is any difference between native swan populations and a reintroduced population. Significant behavioral differences may mean problems for your project.

List what is known. Develop a problem statement. List what is needed.

2. The students will work as a large group with the Zoo instructor to brainstorm what types of behaviors they may expect to see from these swans. The Zoo instructor will guide the discussion towards behaviors the students may have missed.
3. The students will work with the Zoo instructor to set up an ethogram that will include all of the behaviors discussed, even those that may not be likely to occur.

List possible actions, recommendations, solutions, or hypotheses.

4. The students will spend 10 minutes conducting their behavioral study via pre-recorded video over the videoconferencing system.
5. The students will then spend 10 minutes conducting a behavioral study of native swans via video over the video conferencing system.
6. The Zoo instructor will lead a brief discussion about whether the results are as the students predicted. The live videoconference will end at this point.

Present and support the solution.

7. Each student will write a one page summary of his/her findings, including any necessary statistics to support the findings. If the students find significant behavioral differences between native and reintroduced swans, they need to supply a hypothesis as to why this difference is occurring.

Evaluation

- Completed ethograms for both data sets (native and reintroduced swans)
- One page paper

Liberation Locations

Goals

The students will develop an awareness of the differences between poor and good quality wetlands.

Objectives

Students will use a variety of research tools and materials to locate the high quality wetlands in the state of Ohio based on the life history requirements of the trumpeter swan.

PROFICIENCY CORRELATIONS		
Grade	**9TH**	**12TH**
Reading	17	16
Math	1	2
Science	13, 20	4, 6,14

Materials

various data and research information, internet sites (if available)

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

The trumpeter swans at the Wilds are growing rapidly and you still haven't designated any release sites. You would like to begin with at least 5 confirmed release sites, with a list of other potential sites that can be evaluated later in the project. In addition to naming the sites, you will need to project a carrying capacity for each and list any potential threats that may still exist at each site. Several committees will be working on evaluating release sites and the final five sites will be selected by the entire group at a meeting.

List what is known.

2. The instructor will work with the students as a large group to help brainstorm what information they already know that will help them in choosing release sites. This may easily be broken down into three categories: swan life history information, where there are wetlands in Ohio, and what the potential threats to swans are.

Develop a problem statement. List what is needed.

3. Students will be broken into 4 small groups. Each group will determine what information it still needs to know in order to wisely choose five trumpeter swan release sites. Students in the small groups may wish to each investigate a different site or they may wish to divide the work along the three categories mentioned above (swans, wetlands, threats).
4. Students will research as many Ohio wetlands sites as they need in order to choose five that can serve as trumpeter swan release sites. The instructor may suggest to the students that they keep a list of all the sites they investigate, along with the pros and cons of each, before making their final choices.

List possible actions, recommendations, solutions, or hypotheses.

5. Student groups must turn in to the instructor a list of their five chosen release sites with the following information for each: location in the state, estimated carrying capacity, and a sentence or two as to why this site was chosen over others.

Present and support the solution.

6. Each student group will list the names of five chosen release sites on the board. Many of the sites may be the same, but there may also be some variation. The student groups will come together as a large class to determine the five final release sites. The students must be prepared to give reasons why they chose the sites they did or why they didn't choose some of the sites that the other committees did.

Evaluation

- Instructor observation of participation in cooperative group
- Group list of chosen release sites

Are You My Brother?

Goals

The students will begin to understand the complexities of moving a species from one state, through a variety of organizations, to another state.

Objectives

Students will track tagged swans being released in the wild back to their original Alaska nest by reading various bird logs and locating nest sites on geologic quadrangle maps.

PROFICIENCY CORRELATIONS		
Grade	**9TH**	**12TH**
Math	12	6
Citizenship	5	–
Science	1	–

Materials

egg log from Cleveland Metroparks Zoo, bird records from the Wilds, geologic quadrangle maps from Alaska, grease pencils

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

Just before the birds are about to be released, you decide that you may want to determine any sibling relationships in the birds in case you want to look at similarities in behavior after the release. You may also want to know where exactly in the Nelchina basin their nest was located.

List what is known. Develop a problem statement.

2. The instructor will work with the students as a large group to help brainstorm what they know that will help them track which birds are from which nests.
3. Students will be broken into five small groups. Each group will be assigned a certain number of birds to identify. (Each group will be working on different birds.)

List what is needed.

4. Students will identify the information they need to identify their birds and will identify sources for this information. Once locating the charts of information they need, students may need to discuss how to read these charts and how they work together.

List possible actions, recommendations, solutions, or hypotheses.

5. Students will track all of their birds back to their original nest in Alaska.
6. The instructor will post the Alaska quadrangle maps in the front of the classroom. Student groups will mark the nests where their birds originated on the laminated map with a grease pencil.

Present and support the solution.

7. The instructor will lead a discussion as the students discuss which birds from the different groups are siblings. The instructor may wish to also get the students to think about how to track the birds after they are released.

Evaluation

- Instructor observation of participation in cooperative group
- Correct placement of birds on the map

Not In My Backyard!

Goals

Students will develop an awareness of habitat loss and its effects on the human population.

Objectives

The students will explore some of the potential problems with the reintroduction of the trumpeter swan, how these problems may financially affect farmers, and some workable solutions to these problems.

PROFICIENCY CORRELATIONS		
Grade	**9TH**	**12TH**
Writing	1	1
Reading	13	13
Science	20	6

Materials

information on the Trumpeter Swan Management Project in the Comox Valley, various data and research materials, internet sites (if available)

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

You have heard rumors that there are farmers in your state who are upset about the release of the trumpeter swans. They have heard about some of the problems that farmers in Alberta, Canada are having when a large number of the birds migrate to the same location and damage the agricultural fields. They already have seen what the Canada geese can do to their fields, now you are asking them to deal with a bird that is even bigger. You decide to write a letter to the editor of their local paper in order to allay their fears of financial loss and to see the benefits of this release.

List what is known. Develop a problem statement.

2. The instructor will work with the students in a large group to brainstorm what kinds of damage large numbers of trumpeter swans may do to agricultural fields.

List what is needed.

3. Students will be broken down into 5 small groups. Each group will investigate the agricultural problems caused by trumpeter swans in Alberta, Canada and the ways in which those problems have been dealt with.

List possible actions, recommendations, solutions, or hypotheses.

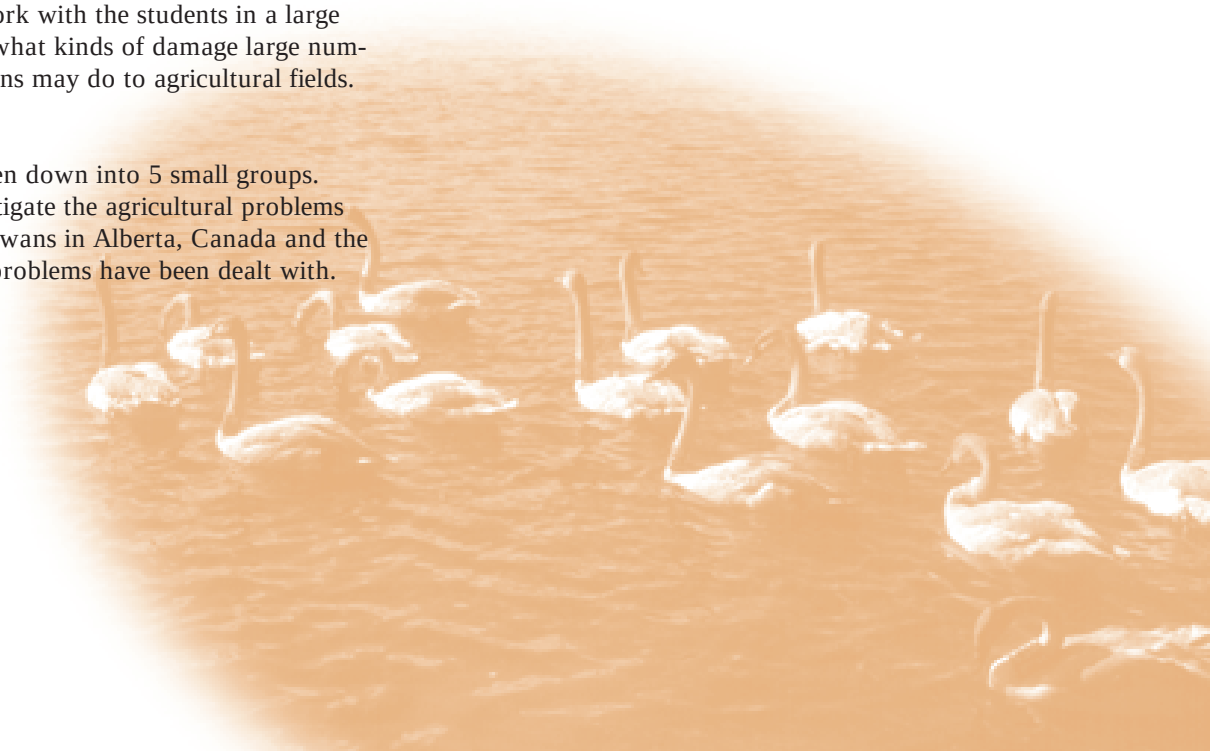
4. Students in their small groups will discuss the likelihood of similar problems happening here and management options should such problems arise.
5. Each student will write a persuasive letter to the editor, with a limit of 300 words since newspapers have only limited space. The letter should take the farmers from being fearful of financial loss due to the release to being understanding and supportive of the release.

Present and support the solution.

6. The instructor will work with the students in a large group to discuss some of their thoughts and feelings on whether the benefits of this reintroduction outweigh the problems that it might cause for farmers.

Evaluation

- Instructor observation of participation in cooperative group
- Individual letters to the editor



Part 6
Wetlands Conservation Wrap-Up

The last segment in this program is designed solely as a culmination to all the work your students have done in the previous weeks. The videoconference will not have any formal instruction, but will instead be a means for your students to discuss and share their thoughts and feelings on that original question they were to address – can the reintroduction of a wetland-dependent animal, such as the trumpeter swan, increase the level of conservation both for the habitat and the species? Even though your students have worked through the same lesson plans, it may be quite interesting to see the variety of different viewpoints they will now possess. Two suggested lessons have been provided as culminating activities if your students need that final closure or if they are so excited they don't want the project to end.

Property Problems

Your students will soon be in the position to vote for environmental issues that may affect habitats such as wetlands. Do they know what kind of decisions they will make? This lesson will get them thinking about the wide variety of possibilities that exist.

Music for the Masses

The creation of a music video with an environmental message could be a fun and educational way for your students to pass their new-found knowledge along to others.

Extension ideas and class projects:

- Contact your local PBS or cable TV station with the idea of having your students video shown.
- Attend city council meetings when you know that local environmental issues are being discussed

Property Problems

Goals

The students will learn how to weigh alternative viewpoints about environmental issues in their state.

Objectives

Students will explore the various aspects of citizen involvement in environmental issues.

Proficiency Correlations		
Grade	9th	12th
Writing	1	1
Citizenship	16	18

Materials

role playing biographies, various research materials, internet sites (if available)

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

One day, you get a phone call from a lawyer telling you that a relative you never knew you had has died. In her will, she left to you a 100 acre piece of property that is about 75% wetlands. In the month immediately following this windfall, you have received phone calls from developers, farmers, and wildlife officials, all of whom have plans for your newly acquired piece of land. You choose to hear them all out before deciding what to do with the land.

2. Six students are needed to portray the following roles: farmer, developer of a shopping mall, developer of a power plant, developer of residential property, county park official, and wildlife official.

List what is known. Develop a problem statement

3. The six students portraying the roles will read the information provided for them. (Students should be allowed to add other details to their role if they feel it makes it more believable.) The students will then decide for themselves what they already know that will convince the landowner to give the property to them.
4. The remaining students in the class will briefly discuss their thoughts and feelings about land use and its advantages and disadvantages to the people and the land.

List what is needed

5. The six students will research any other information they may need to convince the landowner to give the property to them.

List possible actions, recommendations, solutions, or hypotheses.

6. The six students will each present their case to the landowner, remembering that they are trying to convince the landowner that their plan is the most beneficial to all.
7. The remaining students will listen to all six presentations. They will then write a paragraph describing what they will do with the land and why.

Present and support the solution.

8. The instructor will work with the class as a large group to discuss the thoughts and feelings of all the students. Do they think they would have felt the same had they done this exercise at the beginning of this program series?

Evaluation

- Role playing presentations
- Written paragraphs from all of the landowners

Roles

Farmer

I currently have a small farm not too far away from this piece of land I would like to purchase. Business has been good for me and I would like to expand my farm. I also have two sons who are interested in staying in the family business and will soon be looking for some land of their own. If I were to be able to buy this land, I would drain it and be left with some very fertile soil on which to plant my crops.

Developer of a Shopping Mall

The development of a shopping mall would bring financial benefits into the area. About 200 permanent jobs would be created, as well as those construction jobs associated with the building of the mall. The wetlands on this property will have to be drained and filled in order to support the mall and parking lots, but I will purchase credits from a mitigation bank so that there is no net loss of wetlands within the state. This mall will be a tremendous convenience to the people of this town. The closest mall to this area is currently 20 miles away.

Developer of a Power Plant

I represent the Generic Power Company and we would like to purchase this land as a site for one of our newest power plants. This would be a facility of the future and would allow us to close down our out-dated plants that currently supply this area. About 75 permanent jobs would be created, as well as those construction jobs associated with the building of the plant. Only about half of the wetlands on the property need drained and filled, but the rest of the property will be off limits to the general public due to security reasons. This will be a very clean power plant and local residents should not have to worry about pollution.

Developer of Residential Property

This area is ripe for housing development — it is only 35 miles outside the city and still has its rural charm. This piece of land would be ideal for a single-family housing development, neighborhood pool and tennis courts, and a park with several ball fields. About 75% of the wetlands on the property will need to be drained and filled, because while we want to keep the "natural" feel of the area, areas of standing water need to be far enough away from the homes so that mosquitoes are not a problem. The building of the homes would provide construction jobs and the growing population would provide a boom for local businesses.

County Park Official

Our county parks are being used by increasing numbers of people, as the population continues to spread outward from the metropolitan area. About 10% of the land will be drained and filled for the creation of shelters and pavilions, hiking paths, parking lots, and ball fields. The rest of the land will be left in its natural state, with wooden boardwalks built over the wetland areas. Several permanent jobs will be created in maintenance and several seasonal jobs in education. The park will serve the tens of thousands of people who live in the nearby communities.

Wildlife Official

The wetlands on this area are of a very high quality. It provides a diversity of habitats for hundreds of species and may represent an important stop on the migration flyway. This land will be completely left in its natural state, with the exception of a small amount of fill used in the construction of dirt service roads around the property. This area may be used as a wetlands research site by graduate students from the local university, but there will be limited access for the general public as the noise may disturb the local wildlife.

Music For The Masses

Goals

The students will create a video designed to teach elementary school children about wetlands conservation.

Objectives

Students will combine their knowledge of wetlands conservation with video technology skills to create a product that presents an environmentally sensitive message to young children.

PROFICIENCY CORRELATIONS

Grade	9TH	12TH
Writing	1	1
Science	20	4, 6

Materials

camcorder and video tapes, tagboard, colored pencils or markers

Procedures

Present the problem statement.

1. At the beginning of the lesson, students will be presented with the following problem:

Your class is studying wetlands at the same time as one of the elementary grades. The teacher from that grade approaches you for help. Her students can't seem to remember why it is important to save wetlands and ways that this conservation can be done. All her students seem to remember are the stories from their favorite television shows or the words to the most recent music video they have seen. Can you come up with a short video that she can show to her class that may help them learn about wetlands conservation?

List what is known. Develop a problem statement.

2. The instructor will work with the students as a large group to help them brainstorm what types of information they know about wetlands conservation that could be taught to elementary students. Students may also want to generate a list of what can make a video interesting versus what can make a video boring. (Invite students to think of the most boring video they have had to watch at school and what made that video boring. Invite students who have seen shows such as Kratt's Creatures or Bill Nye the Science Guy to think of what makes those videos fun.)

List what is needed.

3. Students will be broken down into groups of 4-5. Student groups will work together to create their own video concept. Students may need to do some further investigation into what level of information is appropriate for elementary children.

List possible actions, recommendations, solutions, or hypotheses.

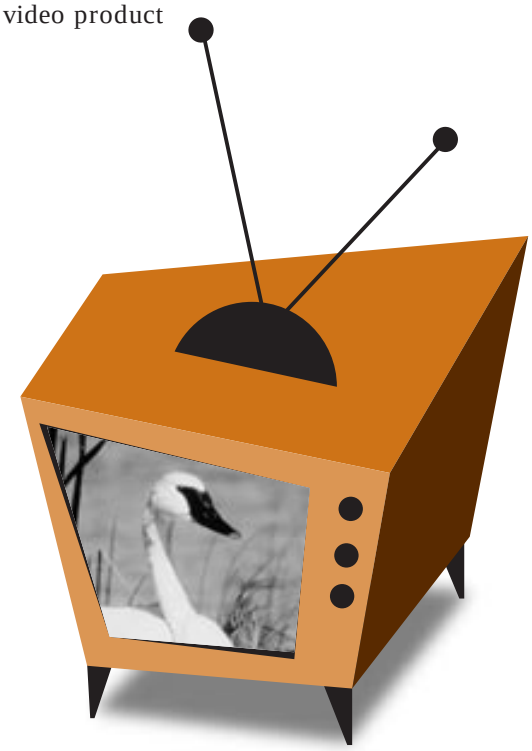
4. Student groups will write their script and create a storyboard to accompany that script. The script and storyboard must be approved and checked for misinformation by the instructor before any video is shot.
5. Students shoot video for their final script. Students create any needed animation or artwork, research or record any needed music, and edit their video for final presentation.

Present and support the solution.

6. Students show their videos.
7. Extension idea: Some students may wish to contact their local public broadcasting station with the idea of having their video shown on television.

Evaluation

- Video scripts
- Storyboards
- Final video product



Cross Reference by Proficiency Correlations

	Ninth Grade	Twelfth Grade
Writing	1 "Sense"ational Wetlands, Watery Work of a Wetland, Habitat History, Imagine a Wetland, Totem Poles Tell Tales, Swan Supervision, Fasten Your Seat Belts, Please, Guess Who's Coming to Dinner, Ethological Endeavors, Not in My Backyard!, Music for the Masses, Property Problems	1 "Sense"ational Wetlands, Watery Work of a Wetland, Habitat History, Imagine a Wetland, Totem Poles Tell Tales, Swan Supervision, Fasten Your Seat belts, Please, Guess Who's Coming to Dinner, Ethological Endeavors, Not in My Backyard!, Music for the Masses, Property Problems
Reading	3 Wade Through America's Wetlands, Why Trumpeter Swans, Lost Wetland Wealth 5 Totem Poles Tell Tales 7 Guess Who's Coming to Dinner 8 Here Comes the Judge, Where Were the Swans 9 Guess Who's Coming to Dinner 11 "Sense"ational Wetlands, Ethological Endeavors, Predicting Migration 12 Totem Poles Tell Tales 13 Swan Safety, Ethics of Reintroduction, Not in My Backyard! 16 "Sense"ational Wetlands, Ethological Endeavors 17 Exhibit ARKitecture, Liberation Locations 20 How Do I Get There From Here, Ethics of Reintroduction 22 Lost Wetland Wealth, How Do I Get There From Here, Habitat Mapping of Alaska, Swan Supervision	2 Totem Poles Tell Tales 12 "Sense"ational Wetlands, Ethological Endeavors 13 Why Trumpeter Swans, Totem Poles Tell Tales, Predicting Migration, Not in My Backyard! 14 Here Comes the Judge, Where Were the Swans? 15 "Sense"ational Wetlands, Ethological Endeavors 16 Exhibit ARKitecture, Swan Safety, Liberation Locations 19 How Do I Get There From Here?, Ethics of Reintroduction 21 Wade Through America's Wetlands 23 Lost Wetland Wealth, How Do I Get There From Here?, Habitat Mapping of Alaska, Swan Supervision
Math	1 Hatching How To's, Ethics of Reintroduction, Fasten Your Seat Belts, Please, Liberation Locations 5 Habitat History, Ethics of Reintroduction 6 Exhibit ARKitecture, Fasten Your Seat Belts, Please, Where in the Wilds 7 Exhibit ARKitecture, Fasten Your Seat Belts, Please 8 Exhibit ARKitecture 10 Exhibit ARKitecture 11 Hatching How To's 12 Habitat History, Ethics of Reintroduction, Swan Supervision, Are You My Brother? 14 Hatching How-To's	2 Ethics of Reintroduction, Fasten Your Seat Belts, Please, Liberation Locations 3 Exhibit ARKitecture, Hatching How To's, Fasten Your Seat Belts, Please 4 Exhibit ARKitecture, Fasten Your Seat Belts, Please 5 Habitat History, How Do I Get There From Here?, Hatching How To's 6 Habitat History, Ethics of Reintroduction, Swan Supervision, Are You My Brother? 16 Where in the Wilds
Citizenship	2 Totem Poles Tell Tales 5 Lost Wetland Wealth, How Do I Get There From Here, Habitat Mapping of Alaska, Are You My Brother? 6 Trumpeter Swans – Free to a Good Home 16 Why Trumpeter Swans?, Here Comes the Judge, Where Were the Swans?, Trumpeter Swans – Free to a Good Home, Property Problems	2 Totem Poles Tell Tales 4 Lost Wetland Wealth, How Do I Get There From Here?, Habitat Mapping of Alaska 6 Fasten Your Seat Belts, Please 18 Why Trumpeter Swans?, Here Comes the Judge, Where Were the Swans?, Trumpeter Swans – Free to a Good Home, Guess Who's Coming to Dinner, Property Problems
Science	1 Are You My Brother? 2 Watery Work of a Wetland, Guess Who's Coming to Dinner 3 Watery Work of a Wetland 4 Watery Work of a Wetland 6 Habitat Mapping of Alaska 10 Hatching How-To's 13 "Sense"ational Wetlands, Wade Through America's Wetlands, Exhibit ARKitecture, Where in the Wilds, Swan Safety, Ethics of Reintroduction, Ethological Endeavors, Liberation Locations 14 Exhibit ARKitecture 15 Wade Through America's Wetlands, Ethics of Reintroduction 16 Swan Supervision 19 Ethics of Reintroduction, Predicting Migration 20 Exhibit ARKitecture, Swan Safety, Ethics of Reintroduction, Predicting Migration, Liberation Locations, Not in My Backyard!, Music for the Masses	4 Exhibit ARKitecture, Swan Safety, Liberation Locations, Music for the Masses 5 "Sense"ational Wetlands, Ethological Endeavors 6 Exhibit ARKitecture, Swan Safety, Ethics of Reintroduction, Liberation Locations, Not in My Backyard!, Music for the Masses 8 Watery Work of a Wetland, Why Trumpeter Swans, Guess Who's Coming to Dinner 12 Watery Work of a Wetland 13 Watery Work of a Wetland 14 Wade Through America's Wetlands, Exhibit ARKitecture, Swan Safety, Hatching How To's, Habitat Mapping of Alaska, Ethics of Reintroduction, Swan Supervision, Where in the Wilds?, Predicting Migration, Liberation Locations. 16 Wade Through America's Wetlands, Habitat Mapping of Alaska 17 Ethics of Reintroduction

Learning Outcomes

Ninth Grade

Writing

1 The students will produce a piece of writing that:
   a. conveys a message related to the prompt (topic or description of a situation).
   b. includes supporting ideas or examples.
   c. follows a logical order.
   d. conveys a sense of completeness.
   e. exhibits word choice appropriate to the audience, the purpose, and the subject.
   f. includes clear language.
   g. contains complete sentences and may contain purposeful fragments.
   h. exhibits subject-verb agreement.
   i. contains standard forms of verbs and nouns.
   j. exhibits appropriate punctuation.
   k. exhibits appropriate capitalization.
   l. contains correct spelling.
   m. is legible.

Reading

Given a fictional selection, the student will demonstrate an integrated understanding of the language, elements of plot, possible themes, likely motives and traits of characters, and the effect of setting, by responding to items regarding

1. The meaning of an unfamiliar word (i.e., uncommon or low-frequency word).
2. The meaning of a multiple-meaning word.
3. Details (e.g., who, what, when, where, how, or problem/solution).
4. Sequence of time, places, events, and ideas.
5. Stated or implied main ideas.
6. Most-probable outcomes.
7. Cause-and-effect relationship.
8. The difference between statements based on fact and statements based on inference.
9. Predictions about whether certain information is likely to be included in material.
10. The identification of questions that will demonstrate comprehension of the main idea and supporting details.

Given a nonfictional selection, the student will demonstrate an integrated understanding of the major concepts, the evidence that supports those concepts, the possible application for the concepts, and the possible purposes the selection might serve, by responding to items regarding

11. Details (e.g., who, what, when, where, how, or problem/solution).
12. Stated or implied main ideas.
13. Cause-and-effect relationships.
14. The difference between statements based on fact and statements based on inference.
15. Whether a statement is a fact or an opinion.
16. Predictions about whether certain information is likely to be included in materials.
17. Details that either support of do not support the main idea.

Twelfth Grade

Writing

1. In a piece of writing, the student will:
   a. convey a message clearly related to the prompt (topic or description of a situation).
   b. establish a main idea.
   c. include relevant and clearly developed supporting ideas of examples.
   d. follow a logical order.
   e. use paragraphing to make the logical order clear.
   f. establish a smooth flow of ideas.
   g. convey a sense of completeness.
   h. choose words appropriate to the audience, the propose, and the subject.
   i. include precise language.
   j. use sentences of varied length and pattern.
   k. use language as an expression of self.
   l. produce complete sentences (although some purposeful fragments are acceptable).
   m. maintain subject-verb agreement.
   n. use standard forms of verbs and nouns.
   o. use clear pronoun references.
   p. use appropriate internal and end punctuation.
   q. use correct spelling and capitalization.
   r. use legible handwriting.

Reading

Given a fictional selection, the student will demonstrate an integrated understanding of language and elements of fiction by responding to items regarding

1. The meaning of an unfamiliar word (i.e., uncommon or low-frequency word).
2. Implied main ideas.
3. Most-probable outcomes.
4. Details that either support or do not support the main idea.
5. The best summary or paraphrase.
6. The identification of questions that will demonstrate comprehension of the main idea and supporting details.
7. The appropriate meaning for a word used in context when given a dictionary entry.
8. Structural elements of literature (e.g., plot, theme, character, mood, setting, point of view).
9. The comparison and contrast of characters, objects, or events.
10. Literary devices (e.g., metaphor, foreshadowing, flashback, allusion, satire, irony).
11. The recognition and interpretation of organizational patterns of writing (i.e., cause and effect, time order, comparison and contrast, simple listing).

Given a nonfiction selection, the student will demonstrate an integrated understanding of the major concepts, the evidence that supports those concepts, the possible application for the concepts, and the possible purposes the selection might serve, by responding to items regarding

12. The meaning of an unfamiliar word (i.e., uncommon or low-frequency word).
13. Implied main ideas.
14. The difference between statements based on fact and statements based on inference.
15. Predictions about whether certain information is likely to be included in material.

Ninth Grade

Reading continued

18. The author's purpose for writing the selection.
19. The best summary for a specific audience.
20. The author's attitude toward a topic.

Given everyday/functional reading materials, the student will identify, locate, and use information in items regarding

21. Directions of two or more steps.
22. The selection and use of appropriate reference sources and illustrative materials.
    a. Examples of reference sources/illustrative materials would be dictionary, encyclopedia, almanac, atlas, phone book, card catalog, periodical/newspaper, schedule, table of contents, and index.
    b. Examples of skills/processes would be using alphabetical order; skimming and scanning; reading charts, tables, diagrams, graphs, maps, labels, and signs.
23. The meaning of vocabulary words used on an application form.
24. The use of propaganda.

Math

The student will

1. compute with whole numbers, fractions, and decimals.
2. compare, order, and determine equivalence of fractions, decimals, percents, whole numbers, and integers.
3. solve and use proportions.
4. round numbers to the nearest thousand, hundred, ten, one tenth, and hundredth.
5. solve problems and make applications involving percentages.
6. select and compute with appropriate standard or metric units to measure length, area, volume, angles, weight, capacity, time, temperature, and money.
7. convert, compare, and compute with common units of measure within the same measurement system.
8. read the scale on a measurement device to the nearest mark and make interpolations where appropriate.
9. recognize, classify, and use characteristics of lines and simple two-dimensional figures.
10. find perimeters (circumference) and areas of polygons (circles).
11. find surface area and volumes of rectangular solids.
12. read, interpret, and use tables, charts, maps, and graphs to identify patterns, note trends, and draw conclusions.
13. use elementary notions of probability.
14. compute averages.
15. solve simple number sentences and use formulas.
16. evaluate algebraic expressions (simple substitutions).

Citizenship

The students will

1 Identify the major significance of the following historic documents: Northwest Ordinance, Declaration of Independence, Constitution, Bill of Rights.
2 Know that many different peoples with diverse backgrounds (cultural, racial, ethnic, linguistic) make up our nation today.
3 Identify various symbols of the United States: flag, national anthem, Pledge of Allegiance, Independence Day.
4 Locate the United States, the nation's capital, the state of Ohio, and Ohio's capital on appropriate maps of the nation, hemisphere, or world.
5 Demonstrate map-reading skills, including finding directions, judging distances, and reading the legend.

Twelfth Grade

16. Details that either support or do not support the main idea.
17. The author's purpose for writing the selection.
18. The best summary or paraphrase.
19. The author's attitude toward a topic, including possible biases.
20. The comparison and contrast of characters, objects, or events.
21. The recognition and interpretation of organizational patterns of writing (i.e., cause and effect, time order, comparison and contrast, simple listing).

Given everyday/functional reading materials, the student will identify, locate, and use information in items regarding

22. The intent or propaganda.
23. The selection and use of appropriate reference sources and illustrative materials.
    a. Examples of reference sources/illustrative materials would be dictionary, encyclopedia, almanac, atlas, periodical/newspaper, complex schedule, and Readers Guide to periodical literature.
    b. Examples of skills/processes would be reading charts, tables, diagrams, graphs, and maps; identifying alternative/additional reference sources for a specific topic.

The student will

1. compare, order, and determine equivalence of real numbers.
2. estimate answers, compute, and solve problems involving real numbers.
3. determine area and volume.
4. estimate and use measurements.
5. organize data into tables, charts, and graphs.
6. read, interpret, and use tables, charts, and graphs to identify patterns, note trends, draw conclusions, and make predictions.
7. determine probabilities of events involving unbiased objects.
8. translate verbal statements into symbolic language.
9. simplify algebraic equations.
10. set up and solve linear equations.
11. solve quadratic equations.
12. solve systems of linear equations with two variables.
13. graph linear functions.
14. use the laws of exponents (including scientific notation).
15. apply the Pythagorean theorem.
16. use deductive reasoning.
17. describe and apply the properties of similar and congruent figures.
18. determine slope, midpoint, and distance.
19. demonstrate an understanding of angles and parallel and perpendicular lines.

The students will

1. Understand the rationale, consequences, and applications of the Constitution, including the Bill of Rights and other amendments, as the supreme law of the land.
2. Identify factors which have contributed to America's cultural pluralism, including historical, racial, ethnic, religious, and linguistic backgrounds of this nations' people.
3. Locate major bodies of water, continents, and significant places in the United Stated, and important regions and countries of the world.
4. Read maps, charts, or graphs to draw conclusions regarding natural resources and topography of the U.S. and the world.
5. Understand that geographic locations affect the political and economic systems of the world.

Ninth Grade

Twelfth Grade

Citizenship continued

6 Know the following economic concepts:
- a. All levels of U.S. Government assess taxes in order to provide services.
- b. Individuals and societies make choices to satisfy wants with limited resources.
- c. Nations become independent through trade.

7 Identify the main functions of each branch of government (executive, legislative, judicial) at the national, state, and local levels.

8 Identify major economic systems: capitalism, socialism, communism.

9 Demonstrate an understanding of the concept of federalism by identifying the level of government (local, state, national) responsible for addressing the concerns of citizens.

10 Distinguish the characteristics, both positive and negative, of various types of government: representative democracy, monarchy, dictatorship.

11 Describe the process of making, amending, or removing law.

12 Know how the law protects individuals in the United States.
- a Give examples of the rights and freedoms guaranteed in the Bill of Rights.
- b. Apply the concept of justice, including due process and equity before the law.
- c. Know the importance of a learning or work environment free of discrimination against individual differences.
- d. Identify legal means of dissent and protest against violation of rights.

13 Understand the major role of political parties in a democracy is to provide a choice on governmental leadership (i.e., candidates and platforms).

14 Understand the role of public officials in government.
- a. Distinguish between elected and appointed officials.
- b. Describe the ways officials can be elected or appointed.
- c. Evaluate the actions of public officials on the basis of a given set of criteria.

15 Know that voting is both a privilege and a responsibility of U.S. Citizenship.
- a. Recognize that property ownership, race, gender, literacy, and certain tax payments no longer affect eligibility to vote.
- b. Identify the qualifications to vote.

16 Demonstrate the ability to use information that enable citizens to make informed choices.
- a. Use more than one source to obtain information.
- b. Identify points of agreement and disagreement among sources.
- c. Evaluate the reliability of available information.
- d. Draw conclusions by reading and interpreting data presented in charts and graphs.
- e. Identify and weigh alternative viewpoints.

17 Identify opportunities for involvement in civic activities.

6. Understand the following economic concepts:
   - a. Individuals and households exchange their resources for the income they need to buy goods and services.
   - b. Individuals and business firms use resources to produce goods and services and generate income.
   - c. Markets allocate goods and services.
   - d. Competition affects markets.
   - e. Local, state, and national governments play important roles in a market economy.
7. Understand principles of traditional, market, and command economies (as applies in nations of the world).
8. Distinguish the constitutional relationship among the several levels of government regarding reserved powers, delegated powers, concurrent powers, elastic clause, and powers denied the government.
9. Understand and apply the principles of separation of powers and checks and balances.
10. Compare and contrast the U.S. representative democracy with other types of governments around the world.
11. Understand that lawmaking is influenced through formal and informal processes (recall, referendum, initiative, legislative committees, lobbying).
12. Understand that the evolution of democratic principle (e.g., civil rights, widening franchise) can occur through civil disobedience.
13. Understand the roles of political parties in a democratic process.
14. Describe the ways officials can be elected, appointed, or removed from office.
15. Know the purposes of and the qualifications for voting in Ohio's primary and general elections.
16. Identify significant features of the 14th amendment (due process and equal protection of the law).
17. Identify the legal responsibilities of citizenship.
18. Demonstrate the ability to use information that enable citizens to make informed choices.
    - a. Analyze sources to obtain information.
    - b. Compare and contrast points of agreement and disagreement among sources.
    - c. Evaluate the reliability of available information.
    - d. Identify and weigh alternative viewpoints.
19. Recognize that local and national issues can be related to those confronting the global society.
20. Recognize that a nation's foreign policy may have a worldwide impact.

Science

1. Devise a classification system for a set of objects or a group or organisms. Use common characteristics to group items.
2. Distinguish between observation and inference given a representation of a scientific situation. Tell the difference between facts and assumptions.
3. Identify and apply science safety procedures. Identify the safety precautions needed when doing and experiment.
4. Demonstrate an understanding of the use of measuring devices and report data in appropriate units. Choose an instrument to make a certain measurement.
5. Describe the results of earth-changing processes. Describe changes taking place in the earth's surface.
6. Apply concepts of the earth's rotation, tilt, and revolution to an understanding of time and season. Explain how seasons change.

1. Trace energy transformations, and/or apply the principles of mass/energy conservation to physical and biological systems. Identify the changes in the forms of energy within a system.
2. Utilize models of atomic and molecular structures and/or interactions to explain, interpret, or predict experimental results. Explain how chemical reaction occurs on a molecular level.
3. Use fundamental forces to explain and make predictions about motions and changes in systems. Explain how the path of a thrown ball can be predicted and why the ball falls toward the ground.
4. Analyze the results of changing a component of simple systems. Explain and predict how a change can affect a system like a lake, a machine, or a mountain range.

SCIENCE CONTINUED

Ninth Grade

7. Describe interactions of matter and energy throughout the lithosphere, hydrosphere, and atmosphere. Explain materials cycles (water, carbon, nitrogen), currents, and weather on the land, in the water, and in the air.
8. Apply the use of simple machines to practical situations. Describe how a lever or pulley can make a task easier.
9. Apply the concept of force and inertia to predict the motion of objects. Describe the motion of a thrown ball.
10. Apply the concepts of energy transformations in electrical and mechanical systems. Describe how the energy in a flashlight battery is transformed into heat and light.
11. Apply concepts of sound and light waves to everyday situations. Describe how light and sound travel through different materials.
12. Describe chemical and/or physical interactions of matter. Describe how a cube of sugar dissolves in water, how metals rust, and how things burn.
13. Trace the flow of energy and/or interrelationships of organisms in an ecosystem. Identify the food chain in a lake.
14. Compare and contrast the characteristics of plants and animals. Tell how plants and animals are alike and different.
15. Explain biological diversity in term of the transmission of genetic characteristics. Explain why there are different breeds of dogs or kinds of plants.
16. Describe how organisms accomplish basic life functions at various levels of organization and structures. Describe a life function like digestion complete with the appropriate anatomy.
17. Describe the ways scientific ideas have changed using historical contexts. Describe how explanations of eclipses have changed over time.
18. Compare renewable and nonrenewable resources and strategies for managing them. Compare oil and sunlight as sources of energy.
19. Describe the relationship between technology and science. How do science and inventions affect each other.
20. Describe how a given environmental change affects an ecosystem. Describe how a flood of drought affects plant and animal life

Twelfth Grade

5. Relate structure and function in physical and biological systems. Use the structure of wings and feathers to explain why birds can fly.
6. Predict the effect on an ecosystem due to a given or proposed environmental change. Identify how an environmental change will disrupt the balance of an ecosystem.
7. Evaluate the scientific validity of data used in persuasive communication. Evaluate the advertising claim of a soap product.
8. Formulate an experimental design to test a given hypothesis. Design an experiment that will test an idea.
9. Demonstrate an understanding of the impact of natural phenomena on the earth's geological formations over short and long time spans. Explain how and why mountains, rivers, and lakes change.
10. Analyze and interpret meteorological data and predict weather for a specified location. Use data to predict weather.
11. Relate planetary cycles and observations to natural phenomena including seasons, tides, days/nights, phases of the moon and eclipses. Explain the tides of an eclipse of the sun.
12. Demonstrate an understanding of units of measure and precision by using an appropriate measuring device for an application. Identify the appropriate instrument needed to make a given measurement.
13. Identify the safety precautions that should be taken given a Manufacturers Safety Data Sheet (MSDS) or a product label with a key. Know how to interpret safety precautions given on a MSDS or a product label.
14. Relate the effects of biotic and abiotic factors to animal life including growth, reproduction, and behavior. Describe how living and nonliving (like fleas and floods) factors can affect animal life.
15. Demonstrate an understanding that scientific theories and methods have developed and continue to develop through time.
16. Relate the effect of light and other factors on various aspects of plant life and growth, including photosynthesis and respiration, germination, and tropism. Describe how light and water affect plants.
17. Relate patterns of diversity, extinction, adaptation, and speciation as a result of natural selection at the molecular and population levels. Explain why maple seeds that spin as they fall provide a survival advantage to the maple tree; Use DNA to explain how bulldogs and greyhounds are alike and different.
18. Relate biodiversity to the stability of ecosystems within biomes. Explain why a forest is more stable than a corn field when a plant disease occurs.

Resource Kit

The following is the list of supplies that will be loaned to you during the length of your participation in Ohio Wetlands-Ruin, Reintroduction, and Recovery. (This list is also included with the kit.) There are no fixed guidelines on how to use these items in your classroom. Some items are included to be used during specific lessons and this will be noted under the "Materials" portion of that lesson. Some items were included to be used as a general resources. And some items were included just because they are fun. Use those items that will prove to be the best resource for your particular class.

Books

- Book of Swamp and Bog by John Eastman
- How Birds Migrate by Paul Kerlinger
- Beastly Behaviors by Janine Benyus
- Wetlands by Max Finlayson and Michael Moser
- The Alaska Almanac
- Alaska Wildlife Viewing Guide by Michelle Sydeman and Annabel Lund
- Totem Poles by Pat Kramer
- Black Swamp Farm by Howard E. Good
- Ducks, Geese and Swans of North America by Frank C. Bellrose
- Guide to Better Hatching by Janet Stromberg
- Wildlife Conservation Magazine, January/February 1998

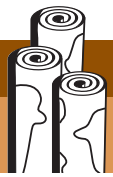
CD-Rom & Slides

- Digital Field Trip to the Wetlands
- General Chick Development Set

Videos

- Trumpeter Swan - First Steps To Recovery
- Trumpeter Swans - In Our Skies, Through Their Eyes
- A World in Our Backyard: (includes the Bill Nye the Science Guy video)
- A Place Called the Wilds
- Dateline: Trumpeter Swan

Maps



- Alaska Topographic Maps - set of 6 in a tube
- Atlas carrier with Alaska atlas and Ohio atlas
- US laminated map

Reprints

- America's Wetlands - Our vital link between land and water
- The Young Scientist's Introduction to Wetlands
- Ohio Trumpeter Swan Reintroduction Plan
- Hatching Manual
- The Heart of Flatness (Ohio Magazine, Oct. 94)
- 2 recipes for cattails
- Trumpeter swan egg log
- Swan records 10 Oct 97
- Swan management in the Comox Valley
- The Wilds Mission Statement/Organizational chart
- Trumpeter Swans Crates for Transport
- Big-Eye Egg Fleet Information
- The Wilds Animal Mortality Report

Fun Stuff

- Loon call
- Moose scat
- Soil tube
- Swamp in June cassette
- Swan tracks
- Goose skull
- Egg Candler
- Min/Max Panel Thermometer
- Field incubators
- Motorcycle battery
- Grease pencils to mark on laminated maps
- Peat soil sample
- Wetland mud soil sample
- Chest waders with suspenders

Instructions for the Soil Sampling Tube

1. Holding the tube in a vertical position, force it into the soil approximately six to nine inches. Leave about one inch of the cutaway portion of the tube showing above the surface of the soil. Deeper penetration will compress the soil in the tube, making it difficult to remove.

2. Twist the tube back and forth to sever the core.

3. Continuing to twist the tube back and forth with a rapid motion, lean the tube toward you with the cutaway portion facing up and slowly withdraw the tube from the soil. The twisting motion will insure that the tube is withdrawn without breaking soil or turf, resulting in a perfect soil sample. The wetter the soil, the more carefully these instructions must be followed.

4. Remove the soil sample through the cutaway portion of the tube. When soil tests are to be performed on sample taken from a particular depth (e.g., six to eight inches), simply measure downward from the top of the soil core to locate soil from the desired depth. Use a clean utensil to dislodge soil remaining in the tip of the sampler.

Instructions for the Loon Call

WAIL (to locate chick of mate)
Knob out – start by blowing softly, harder in middle (but not so ball tumbles) fading or softer at end.

TREMOLO (frightened/disturbed)
Knob out – blow hard enough so ball tumbles.

HOOT (maintain contact with family)
Knob in – short, soft puff, so ball does not tumble, a short "toot".

Important note: Please do not use any call near waters occupied by breeding pairs. Such apparent challenges to their territory may interfere with the delicate nesting cycle and prevent successful breeding.

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CLEVELAND METROPARKS ZOO

Can’t find the answers anywhere? The people on this list would be more than happy to help out.

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