



US Army Corps
of Engineers
Louisville District

Teacher's Guide to Caesar Creek Lake



Table of Contents

	Page
Goals of the Teacher’s Guide to Caesar Creek Lake	i
Objectives of the Teacher’s Guide to Caesar Creek Lake	i
Introduction to the Teacher’s Guide.....	1
How this Guide is Organized.....	1
Planning a Visit to Caesar Creek Lake	1
Facilities at Caesar Creek Lake	2
Map of Corps Operations Area	4
Directions to Caesar Creek Lake Visitor Center	5
Map of Caesar Creek Lake	6
Teacher’s Checklist.....	7
Making Your Visit a Safe One	7
Subject Areas	9
1. The U.S. Army Corps of Engineers.....	9
Introduction	10
A Brief History.....	10
Important Concepts.....	11
Before Your Visit.....	12
Mission: Decode.....	12
During Your Visit	15
Ask the Visitor Center Rangers	15
Caesar Creek Lake Visitor Center.....	15
U.S. Army Corps of Engineers Films	15
Visitor Center Scavenger Hunt 1	16
Visitor Center Scavenger Hunt 2	20
After Your Visit.....	24
Visit Other Corps Lakes in the Miami River Area.....	24
Name the Missions of the Corps	25
2. Flood Control.....	27
Introduction	28

A Brief History.....	28
Important Concepts.....	28
Before Your Visit.....	29
Label the Dam and Outlet Works	30
During Your Visit	33
Ask the Visitor Center Rangers	33
Caesar Creek Lake Visitor Center.....	33
Control Tower Tour.....	33
After Your Visit.....	33
Build a Dam.....	33
3. Water Safety	35
Introduction	36
Important Concepts.....	36
Before Your Visit.....	37
Water Safety Scramble	38
During Your Visit	40
Caesar Creek Lake Visitor Center.....	40
Water Safety Films.....	40
After Your Visit.....	40
Saving Sam.....	41
4. Life in the Pond	42
Introduction	43
Important Concepts.....	43
Before Your Visit.....	43
Pond Food Chain Game	44
During Your Visit	45
Caesar Creek Lake Visitor Center.....	45
Pond Study.....	45
Kid’s Fishing Pond	46
After Your Visit.....	46
Make a Pond Critter Mobile	46
Draw a Food Chain.....	46

5. Ordovician Fossils	48
Introduction	49
Important Concepts.....	49
Before Your Visit.....	51
Official State Fossils.....	51
Impressions in Clay.....	51
During Your Visit	55
Ask the Visitor Center Rangers	55
Caesar Creek Lake Visitor Center.....	55
Fossil Scavenger Hunt.....	55
Check Out a Rock Box	55
Collect Fossils at the Emergency Spillway.....	55
After Your Visit.....	58
Draw the Ordovician Sea.....	58
6. Natural Resource Management.....	59
Introduction	60
Important Concepts.....	60
Before Your Visit.....	60
Natural Resource Identification.....	60
During Your Visit	62
Caesar Creek Lake Visitor Center.....	62
Take a Hike	62
Animal Checklist	62
After Your Visit.....	64
Fill in the Blanks Naturally	64

Goals of the Teacher's Guide to Caesar Creek Lake

The goals of the *Teacher's Guide to Caesar Creek Lake* are:

- To enhance general understanding of the role of the U.S. Army Corps of Engineers in development and administration of water resource projects.
- To enhance general understanding of the purpose and operation of Caesar Creek Lake, its man-made, natural and cultural features.
- To develop general appreciation for proper use of project resources in an effort to reduce overall project operation and maintenance costs.
- To aid project personnel in accomplishing management objectives such as increasing public understanding of management issues including reducing vandalism, reducing the number of drownings or other management problems in order to offset dwindling manpower resources.

Objectives of the Teacher's Guide to Caesar Creek Lake

1. To build an understanding of the Corps of Engineers and its missions, specifically flood control, resource management and recreation.
2. To explain the mechanics of and to explore the need for flood control, resource management and recreation in the region.
3. To increase participants' understanding of the cultural and natural history of Caesar Creek Lake and its environs through education and interpretation.
4. To explore the individual's relationship and responsibility in the use of resources.
5. To increase participants' understanding of their interrelationships with the Corps of Engineers and to encourage their future interest in the agency.
6. To reduce monetary and environmental losses by instilling in participants an ethic of stewardship and safety at U.S. Army Corps of Engineers areas.
7. To enrich participants experiences at Corps areas by making them aware of recreational facilities and opportunities at Caesar Creek Lake and the surrounding region.
8. To provide an educational experience for participants that is relevant to their lives and that supplements the curricula of regional educational institutions.

Introduction to the Teacher's Guide

This is a collection of information and suggested learning activities for teachers and students. It is intended to enrich the experience of their visit to Caesar Creek Lake and increase their understanding of the Corps of Engineers.

How this Guide is Organized

To serve as a supplement to school criteria, the *Teacher's Guide* has been divided according to subject. Topics covered include: The Corps of Engineers, Flood Control, Water Safety, Life in the Pond, Ordovician Fossils and Natural Resource Management.

Each subject area provides factual information to the topic and suggested activities to be implemented before, during and after your visit. With this information, you will be able to design a tour to meet your individual needs. Additionally, this *Teacher's Guide* can be used as an information resource.

Planning a Visit to Caesar Creek Lake

In planning your visit to Caesar Creek Lake there are several decisions you must make. You must determine: if you want assistance from the Visitor Center ranger staff; what subjects are of most interest and what facilities at the lake you will visit.

Visiting Caesar Creek Lake on your own for the first time can be somewhat overwhelming. There is much to be seen and shown to your students. For that reason, trained Corps of Engineers staff members are available to lead you on special group programs. Once you feel comfortable, you can create and lead class activities at the Visitor Center, Spillway or one of the recreation areas.

If you plan to utilize the staff to lead your program, we ask that you contact the Visitor Center at least one month in advance to make a reservation for your group. If you plan to visit during April, May or October, which are our busiest months, you should call several months ahead to reserve the specific day you have in mind.

The reservation number is **(513)897-1050**.

When you call, please have the following information ready:

1. _____ The date of your visit to Caesar Creek Lake (have several possible dates to avoid a second call if there is a scheduling conflict).
2. _____ Which visitor facilities you would like to visit.
3. _____ How much time you will have to spend at Caesar Creek Lake and how long your program should last.
4. _____ The name and address of your school or organization.

5. _____ The name of the person in charge of the group, their email address and phone number.
6. _____ The number of people in your group, their age or grade level and how many supervising adults will accompany them.
7. _____ Which subject(s) you'd like to emphasize during your visit. This includes details of any specific activities you would like or special assistance you will require.

Please remember to call if you need to cancel your reservation so that we may use that time for other groups.

Facilities at Caesar Creek Lake

Once you have determined the date of your visit and whether or not you will personally lead the tour, it is important for you to consider which area(s) of Caesar Creek Lake you would like to visit. This will depend mostly on the subjects you wish to emphasize during your visit. Although Visitor Center rangers can assist you with this decision, this brief listing of facilities at Caesar Creek Lake and what subject(s) are most suited to each area may help. The map on page 4 will help you visualize the layout of the Corps Operations Area.

Caesar Creek Lake Visitor Center

The Visitor Center contains exhibits about the U.S. Army Corps of Engineers, flood control, Ordovician fossils and the natural and cultural history of the region; a *new* education classroom; a theater where several films are available; Friends of Caesar Creek Cooperating Organization run educational gift store and soda machines; a ¼ mile interpretive trail; a ¾ mile Adena Trace trail; a boat dock; a lake and dam overlook; a playground; two sheltered picnic areas; restrooms and sufficient parking for buses. Ramps, walkways and automatic doors make the Visitor Center building accessible to wheelchairs.

Spillway

The spillway is an emergency overflow channel for the lake. During the construction of the lake and dam, layers of dirt and rock were removed from this area to create a rock channel. In extreme flooding conditions the water from the lake would travel through the spillway to prevent water from going over the dam. This site has flat but rocky terrain consisting of Ordovician-age fossils in exposed limestone rock. There is sufficient parking at the spillway for buses; however, there are no restrooms or picnic shelters at this site. The spillway is on Clarksville Road slightly less than one mile south of the Visitor Center. Transportation is necessary from the Visitor Center to the spillway.

The Gorge Recreation Area

The Gorge (or Tailwater as it is also called) is located on the downstream side of the dam where visitors can witness the water in Caesar Creek Lake being released into Caesar Creek. The Gorge offers shallow streams for stream quality monitoring studies; a one mile loop trail; a wetland complex; a sheltered picnic area; fishing platforms and restrooms. Wheelchair accessibility is limited due to the terrain in sections of this site. The Gorge is located off Tailwater Road, which intersects Clarksville Road less than ¼ mile south of the Visitor Center. Transportation is necessary from the Visitor Center to the Gorge.

Note for buses: Tailwater Road can be fairly winding and steep at times, particularly near the bottom of the hill, so buses should use caution when driving to and from the Gorge.

Flat Fork Ridge Recreation Area

Flat Fork Ridge offers hiking trails; a lake and dam overlook; two sheltered picnic areas; a playground; volleyball net; fishing platforms and restrooms. Flat Fork Ridge is located slightly more than ½ mile south of the Visitor Center on Clarksville Road. Transportation is necessary from the Visitor Center to Flat Fork Ridge.

Picnic Facilities, Playgrounds and Restrooms

There are two sets of picnic shelters located at the Visitor Center, two adjacent sets at Flat Fork Ridge and one at the Gorge. There are playgrounds near the Flat Fork Ridge and Visitor Center shelters. Restrooms are located at the Visitor Center, Flat Fork Ridge and at the Gorge.

Map of Corps Operations Area



Directions to Caesar Creek Lake Visitor Center

A map of Caesar Creek Lake can be found on page 6.

From Dayton, Ohio: (drive time – approximately 30 minutes to 1 hour)

1. Take I-75 **south** to State Route 73 (exit 38)
2. Turn left onto State Route 73 – follow State Route 73 approximately 1 mile past U.S. 42 (in Waynesville)
3. Turn **right** onto Clarksville Road – follow to Visitor Center on **left**.

From Lebanon, Ohio: (drive time – approximately 30 minutes)

1. Take U.S. 42 **north** to State Route 73
2. Turn **right** onto State Route 73
3. Turn **right** onto Clarksville Road (approximately 1 mile) – follow to Visitor Center on **left**.

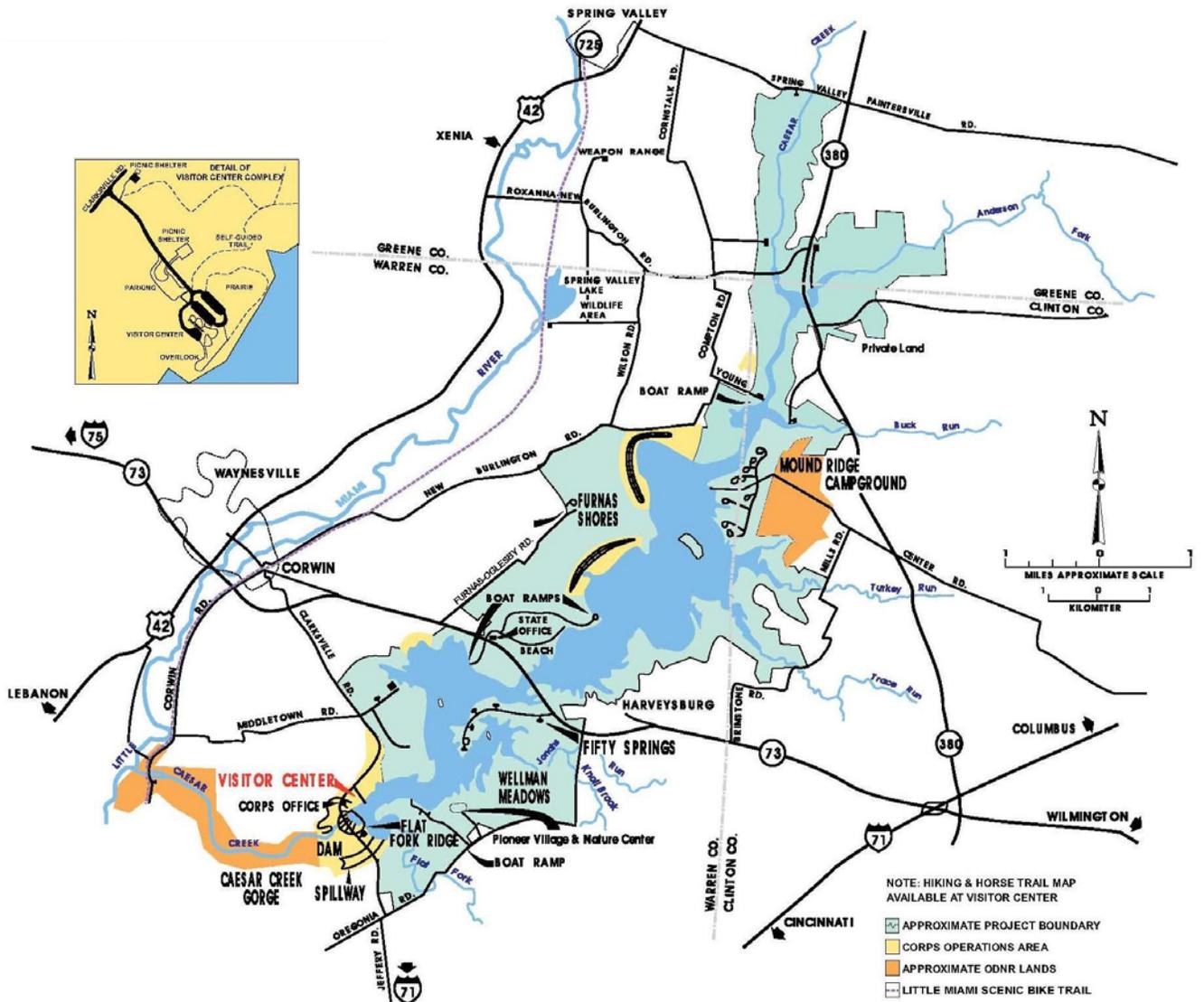
From Columbus, Ohio: (drive time – approximately 1½ hours)

1. Take I-71 **south** to State Route 73 (exit 45)
2. Turn **right** on State Route 73 – follow for approximately 7½ miles to Clarksville Road
3. Turn **left** onto Clarksville Road – follow to Visitor Center on **left**.

From Cincinnati, Ohio: (drive time – approximately 1 hour)

1. Take I-71 **north** to Wilmington Pike (exit 36)
2. Turn right (going east) onto Wilmington Road
3. Take a **left** onto Olive Branch Road – just after the overpass
4. Turn **right** onto Jeffery Road – follow to stop sign – approximately 3¼ miles (Jeffery Road becomes Lincoln Road)
5. Turn **right** then take an **immediate left** onto Clarksville Road – follow to Visitor Center on **right**.

Map of Caesar Creek Lake



Teacher's Checklist

The following checklist may help to organize your trip to Caesar Creek Lake.

1. _____ Have you contacted the Visitor Center rangers to make a reservation? (see "Planning a Visit to Caesar Creek Lake", page 1)
2. _____ Have you reviewed all of the pre-trip activities with your group?
3. _____ Have you decided which on-site activities you will use at Caesar Creek Lake? For example, which shelter your group will eat lunch at, whether or not you will need the classroom or theater or if you are going to need any of the materials at the Visitor Center, such as a rock box. Will you conduct the activities or have you arranged for assistance from the Visitor Center rangers?
4. _____ Have you looked at the map and the list of facilities and planned your route and schedule?
5. _____ Have you arranged for at least one adult for every ten children?

Making Your Visit a Safe One

These tips will help you make your trip more enjoyable and safer:

1. Please plan for adequate adult supervision. We recommend:
 - a. Preschoolers: 1 adult for every 8 students
 - b. Elementary: 1 adult for every 12 students
 - c. Junior/High: 1 adult for every 15 students
2. Have emergency forms available for every group member. If possible, include known allergies or medical conditions that could affect a child's participation. Alert the rangers to any serious conditions.
3. Please prepare your group for their field trip. This packet will give you some background material about the topics you have chosen.
4. Let your group know what is expected of them:
 - a. Use indoor voices inside and out
 - b. Listen when a ranger or other adult is sharing information with you
 - c. Walk at all times, especially in the buildings, on the trails and at the Control Tower
 - d. Leave sticks on the ground and put rocks back where you found them (except for fossils you may keep)
 - e. If your group goes on a nature hike, everyone should stay behind the ranger while on the trail

5. In order to ensure a productive learning environment, the rangers request that you assume the responsibility for disciplining the children. Please feel free to pull any especially disruptive child from an activity to give him or her a “time out” period.
6. The rangers also request that you supervise the group during the lunch period at the picnic shelter. There is a playground nearby where the children can have a supervised recess if desired. Please be aware of uneven terrain and the proximity of the lake.
7. Please make sure that the children bring a sack lunch and beverage. Also, inform the children that they will be eating outdoors at the picnic shelter. Please put trash in the provided trash bags and deposit those in the dumpster, which is located directly across the parking lot from the shelter.

Subject Areas

**The U.S. Army
Corps of
Engineers**

1. The U.S. Army Corps of Engineers

Introduction

The purpose of this subject area is to introduce your students to the U.S. Army Corps of Engineers and their role as a water management agency.

The first section of activities is included to introduce your students to the roles of the Corps. Activities that take advantage of the Visitor Center facilities at Caesar Creek Lake are next and finally, activities for after your visit have been included to reinforce the concepts learned about the Corps.

A Brief History

The roots of the U.S. Army Corps of Engineers date back to the American Revolution. The Continental Congress established a military engineering department to construct batteries and fortifications to help win the war with Great Britain. After the war, President George Washington directed the formation of a new, more official Engineering Corps of Artillerists and Engineers. This Corps provided military personnel to direct the construction and maintenance of planned coastal fortifications. At Washington's urging, a training school for military engineers was also established. This engineering school was established at West Point headquarters and was the forerunner of the U.S. Military Academy. The Corps of Engineers received the overall assignment for surveying and exploring the West. The officers in charge of the operations were educated at West Point. Commissioned as topographical engineers, their mission was to obtain the scientific data necessary for opening the frontier to settlement. They became scientist-explorers, skilled in both the natural sciences and in the practical techniques of surveying and mapping. The Army Corps of Engineers has completed projects few private contractors or local resources could accomplish. Projects completed by the Corps include the Panama Canal and the vast Pentagon building.

Today, the U.S. Army Corps of Engineers is the federal government's largest water resources development and management agency. The variety and challenge of water projects under its civil works program also serve to maintain a broad range of engineering skills critical to the Corps capabilities and performance during the nation's emergencies. The Corps water resource program began in 1824 when Congress first allocated money for improving river navigation. Since then, the Corps has been involved in improving ports and river navigation, reducing flood damage and controlling beach erosion. Along with these missions, the Corps generates hydropower, supplies water to

cities, industry, and agriculture, regulates development in wetland areas and operates extensive recreation and natural resource management programs. It is important to remember that only a few of the people who work for the Corps are in the Army. All of the people who work at Caesar Creek Lake are civilians.

Important Concepts

The activities in this section will help the student understand the following concepts. Important vocabulary words are in **bold** print.

The **U.S. Army Corps of Engineers** built and operates the Caesar Creek Lake dam.

An **engineer** is someone who uses mathematical and scientific principles in the design, construction and operation of structures, equipment and systems.

The Corps is part of the **U.S. federal government**. The leader of this and other branches of the U.S. government is the President of the United States.

Some people who work for the Corps are in the Army; some are not. Most of the people who work for the Corps are civilians. Caesar Creek Lake is operated by civilian employees of the Corps.

The Army Corps of Engineers was founded in 1775 when Colonel Gridley was appointed by George Washington as Chief Engineer of the Continental Army during the Revolutionary War.

After the war the new nation needed roads, bridges and forts. As the nation's only organized engineers, the Corps was assigned the challenge and began its dual role in defense and civil works.

Later the Corps was given the task of making the Mississippi River navigable, and thus the role as a **water management agency**.

As a water management agency, the Corps has several missions. They are: producing **hydropower**, improving **navigation** by providing locks, maintaining inland waterways and harbors, managing **natural resources** in such way to provide **environmental protection** and enhancement, managing **recreation** sites, providing **flood control** and supplying water for irrigation, industry and municipalities.

At Caesar Creek Lake the U.S. Army Corps of Engineers manages natural resources, manages recreation sites and provides flood control and supply water for the city of Wilmington.

Before Your Visit

The following activity is intended to introduce your students to the Corps' role as a water resource management agency and to give them a chance to discover and understand the responsibilities or missions of the U.S. Army Corps of Engineers.

Mission: Decode:

Distribute the Mission: Decode activity to each student in your classroom (page 13). Ask your students to decode the messages using the key code to learn about the U.S. Army Corps of Engineers.



Mission: Decode

Your mission is to decode the messages below.

Here is how the code works. The numbers 1 through 26 stand for letters A through Z, respectively. Therefore, 1=A, 2=B, 3=C, etc... Fill in the correct letters and decode the message.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

1. The U.S. Army Corps of Engineers is part of the 21,14,9,20,5,4
19,20,1,20,5,19 federal government. The 12,5,1,4,5,18 of the Corps and
of our 3,15,21,14,20,18,25 is the 16,18,5,19,9,4,5,14,20 of the United
States.
2. The U.S. Army Corps of Engineers and other parts of the United States
government are 6,21,14,4,5,4 by the 20,1,24,5,19 that people pay.
3. Three main jobs of the U.S. Army Corps of Engineers are building and
maintaining 4,1,13,19, navigation 12,15,3,11,19, and 10,5,20,20,9,5,19.
4. 6,12,15,15,4 control and 9,18,18,9,7,1,20,9,15,14 are two reasons that
some dams are built.
5. The U.S. Army Corps of Engineers 4,5,19,9,7,14,5,4 and operates
3,1,5,19,1,18 Creek Lake.
6. The main missions of the U.S. Army Corps of Engineers at Caesar Creek
Lake are 6,12,15,15,4 control, managing natural
18,5,19,15,21,18,3,5,19 and providing recreational opportunities.
7. Caesar Creek Lake includes a 4,1,13, a control tower, a
16,15,23,5,18,8,15,21,19,5 and a visitor center.
8. Many people use U.S. Army Corps of Engineers areas for recreation.
Many people 6,9,19,8, swim, 3,1,13,16 and boat in these areas.
9. The U.S. Army Corps of Engineers is also responsible for
13,1,14,1,7,9,14,7 natural resources. One important
18,5,19,15,21,18,3,5 at Caesar Creek Lake is the Osprey.



Mission: Decode

Your mission is to decode the messages below.

Answers:

1. United States, leader, country, President
2. funded, taxes
3. dams, locks, jetties
4. flood, irrigation
5. designed, Caesar
6. flood, resources
7. dam, spillway
8. fish, camp
9. managing, resource

During Your Visit

Your students can learn more about the Corps of Engineers during their visit to Caesar Creek Lake. Here are some suggestions to accomplish that goal.

Ask the Visitor Center Rangers:

The rangers at the Caesar Creek Lake Visitor Center will be happy to tell your group about the roles of the U.S. Army Corps of Engineers.

Caesar Creek Lake Visitor Center:

Exhibits in the Corps Gallery at the Visitor Center will introduce your students to the role of the U.S. Army Corps of Engineers. Bring copies of the Visitor Center Scavenger Hunt (see pages 16-23) for your students' visit to the Visitor Center.

U.S. Army Corps of Engineers Films:

Films about the U.S. Army Corps of Engineers are shown in the theater at the Visitor Center. Please request a film showing when you reserve time for your visit.



US Army Corps
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Visitor Center Scavenger Hunt 1

Directions: The Caesar Creek Lake Visitor Center is divided into four main exhibit areas: the Main Lobby; the Corps Gallery; the Natural Resources Gallery and the History Gallery. Answers to the following questions can be found by exploring each of these areas. After locating the answers to these questions, report them to your group leader.

Main Lobby

1. What is the scientific name of Ohio's state fossil? _____

2. Name two of the closest relatives to the Trilobite you could find living today? _____ & _____
3. When were the first pieces of shale removed from the giant Trilobite on display? _____
4. What living animals are related to the ancient Cephalopods?
_____, _____ & _____
5. The crinoids have a unique _____ shape on the end of each stem segment.
6. What was the name of the time period in which these fossils were alive?

Corps Gallery

1. How long is the Caesar Creek dam? _____
2. Who used the diving boots that are on display? _____
3. How many states does the Ohio River Division cover? _____
4. If today's dam had been built before the 1937 floods, how much less would the water have risen in Cincinnati? _____
What about Louisville? _____
5. Caesar Creek Lake is a multi-purpose project. We actively manage for water supply, water quality, recreation, wildlife enhancement and _____.
6. Name three steps in the flow of water from the lake: 1) All water is released through the gates and into the _____.
2) From there the water moves into the _____.

3) After the stilling basin the water moves into the _____
_____ called _____.

Natural Resource Gallery

1. The hawk is a predator and will eat what for its prey? _____
2. Fool's gold or _____ can be found within the Cincinnati Arch.
3. Name three fish common to Caesar Creek Lake: _____,
_____ & _____
4. The raccoon is a predator and will prey on _____.
5. _____ is a fossil that looks like a cow's horn.
6. Don't touch me! I have a nasty bite. What am I? _____

History Gallery

1. Who was the Shawnee Chief of the Miami and Shawnee tribes of Southwestern Ohio during the latter half of the 18th Century?

2. Who was the first settler of Caesar Creek? _____
3. _____ provided mobility for hunting, fishing, recreation, migration and exchange of goods with other tribes.
4. What was the name of the first steam snagboat? _____
5. What was the name of the Quaker family who settled over 1000 acres on Caesar Creek in 1807? _____
6. What were the early roads called that opened Caesar Creek to settlement and commerce? _____

Congratulations!

You have completed the Visitor Center Scavenger Hunt. If you have any questions about what you've learned, please ask a Park Ranger for assistance.

Visitor Center Scavenger Hunt 1 Answer Key

Main Lobby

1. What is the scientific name of Ohio's state fossil? **Isotellus maximus**
2. Name two of the closest relatives to the Trilobite you could find living today? **insects, spiders, centipedes & other arthropods**
3. When were the first pieces of shale removed from the giant Trilobite on display? **May 2, 1987 @ 11:00am**
4. What living animals are related to the ancient Cephalopods? **squid, octopus & cuttlefish**
5. The crinoids have a unique **star** shape on the end of each stem segment.
6. What was the name of the time period in which these fossils were alive? **Ordovician**

Corps Gallery

1. How long is the Caesar Creek dam? **2,750 feet long**
2. Who used the diving boots that are on display? **hard hat divers**
3. How many states does the Ohio River Division cover? **14**
4. If today's dam had been built before the 1937 floods, how much less would the water have risen in Cincinnati? **10.5 feet** What about Louisville? **4.5 feet**
5. Caesar Creek Lake is a multi-purpose project. We actively manage for water supply, water quality, recreation, wildlife enhancement and **flood control**.
6. Name three steps in the flow of water from the lake: 1) All water is released through the gates and into the **concrete conduit or drain pipe**. 2) From there the water moves into the **stilling basin**. 3) After the stilling basin the water moves into the **natural stream** called **Caesar Creek**.

Natural Resource Gallery

1. The hawk is a predator and will eat what for its prey? **squirrel**
2. Fool's gold or **pyrite** can be found within the Cincinnati Arch.
3. Name three fish common to Caesar Creek Lake: **catfish, bluegill & bass**
4. The raccoon is a predator and will prey on **crayfish**.
5. **Horn coral** is a fossil that looks like a cow's horn.
6. Don't touch me! I have a nasty bite. What am I? **snapping turtle**

History Gallery

1. Who was the Shawnee Chief of the Miami and Shawnee tribes of Southwestern Ohio during the latter half of the 18th Century? **Tecumseh**
2. Who was the first settler of Caesar Creek? **Caesar or Cizar**
3. **Canoes** provided mobility for hunting, fishing, recreation, migration and exchange of goods with other tribes.
4. What was the name of the first steam snagboat? **Heliopolis**
5. What was the name of the Quaker family who settled over 1000 acres on Caesar Creek in 1807? **the Lukens family**
6. What were the early roads called that opened Caesar Creek to settlement and commerce? **traces**



US Army Corps
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Visitor Center Scavenger Hunt 2

Directions: The Caesar Creek Lake Visitor Center is divided into four main exhibit areas: the Main Lobby; the Corps Gallery; the Natural Resources Gallery and the History Gallery. Answers to the following questions can be found by exploring each of these areas. After locating the answers to these questions, report them to your group leader.

Main Lobby

1. Trilobites developed into how many different types of species? _____
2. Trilobite means _____
3. Fossiles of sea lilies or _____ can be found in the display case in the main lobby.
4. The Ohio state fossil is _____.
5. Bryozoan colonies were mossy looking because of their _____.
6. Tabulate coral are formed by tiny animals called _____.

Corps Gallery

1. How many locks and dams were developed and are operated by the Great Lakes and Ohio River Division of the U.S. Army Corps of Engineers? ____
2. The maximum height of Caesar Creek dam is _____ feet.
3. The _____ breaks the force of water so as not to damage natural areas downstream.
4. Caesar Creek lake holds _____ gallons of water.
5. _____ and _____ are used today to make sure dams are safe and well maintained compared to the 40 pound diving boots that were historically used.
6. “_____” or locks ensure that barges move smoothly.

Natural Resource Gallery

1. I am a swift water predator, and I can deposit 2,000 to 20,000 eggs at a time. _____
2. _____ and other _____ agencies look to the Corps for assistance with environmental protection and restoration projects.
3. _____, formed from sediments setting far from shore in tropical oceans, is found in Ohio today because Ohio was once covered by a _____.
4. Rocks carried by glaciers from other regions are called _____.
5. _____ search for clues, mostly in rocks, about the history of our earth.
6. The region was once covered by _____, which retreated and left large rivers and gorges.

History Gallery

1. Moccasins were commonly made from _____, _____ or _____.
2. The Treaty of _____ forced American Indians to give up their Ohio land for settlement.
3. We know Caesar was an _____ who lived among the Shawnee and for whom Caesar Creek Lake is named.
4. _____ built the first bank vault in _____, Ohio.
5. Who built the first saw mill in the area? _____
6. These two American Indian groups claimed Caesar Creek valley by the 17th century. _____ and _____ Indians

Congratulations!

You have completed the Visitor Center Scavenger Hunt. If you have any questions about what you've learned, please ask a Park Ranger for assistance.

Visitor Center Scavenger Hunt 2 Answer Key

Main Lobby

1. Trilobites developed into how many different types of species? **More than 10,000**
2. Trilobite means **three lobed**.
3. Fossiles of sea lilies or **crinoids** can be found in the display case in the main lobby.
4. The Ohio state fossil is **Isotelus maximus**.
5. Bryozoan colonies were mossy looking because of their **feathery appendages**.
6. Tabulate coral are formed by tiny animals called **coral polyps**.

Corps Gallery

1. How many locks and dams were developed and are operated by the Great Lakes and Ohio River Division of the U.S. Army Corps of Engineers? **80**
2. The maximum height of Caesar Creek dam is **165** feet.
3. The **stilling basin** breaks the force of water so as not to damage natural areas downstream.
4. Caesar Creek lake holds **three trillion** gallons of water.
5. **Remote cameras** and **other sensing devices** are used today to make sure dams are safe and well maintained compared to the 40 pound diving boots that were historically used.
6. "**Stair steps**" or locks ensure that barges move smoothly.

Natural Resource Gallery

1. I am a swift water predator, and I can deposit 2,000 to 20,000 eggs at a time. **smallmouth bass**
2. **Congress** and other **federal** agencies look to the Corps for assistance with environmental protection and restoration projects.
3. **Limestone**, formed from sediments setting far from shore in tropical oceans, is found in Ohio today because Ohio was once covered by a **sea/water/ocean**.
4. Rocks carried by glaciers from other regions are called **glacial drift**.
5. **Geologists** search for clues, mostly in rocks, about the history of our earth.
6. The region was once covered by **glaciers**, which retreated and left large rivers and gorges.

History Gallery

1. Moccasins were commonly made from **deer, elk** or **buffalo hide**.
2. The Treaty of **Greeneville** forced American Indians to give up their Ohio land for settlement.
3. We know Caesar was an **African American** who lived among the Shawnee and for whom Caesar Creek Lake is named.
4. **John Heighway** built the first bank vault in **Cincinnati**, Ohio.
5. Who built the first saw mill in the area? **Levi Lukens**
6. These two American Indian groups claimed Caesar Creek valley by the 17th century. **Miami** and **Shawnee** Indians

After Your Visit

The following activities are to be completed after your visit to Caesar Creek Lake. They are intended to reinforce vocabulary and concepts learned before and during your visit.

Visit Other Corps Lakes in the Miami River Area:

C.J. Brown Dam and Reservoir, William H. Harsha Lake, West Fork Lake and Brookville Lake are four other U.S. Army Corps of Engineers lakes in the Miami River Area. Of course you are always welcome back at Caesar Creek Lake; we hope to see you again!

Name the Missions of the Corps:

This activity will reinforce understanding of the missions or responsibilities of the U.S. Army Corps of Engineers (see page 25).



Name the Missions of the Corps!

Match the words in the list of missions of the Corps with their definitions.

The list of missions:

1. Navigation
2. Hydropower
3. Flood Control
4. Irrigation Water Storage
5. Resource Management
6. Water Based Recreation Management

Definitions to match them to:

- A. ____ A clean renewable source of electricity
- B. ____ Improving and maintaining waterways for the passage of ships
- C. ____ Managing resources for the safe enjoyment of waterways
- D. ____ Using, protecting and enhancing environmental resources
- E. ____ Controlling the river's flow to prevent flooding
- F. ____ Impounding water used to grow crops in dry areas



Name the Missions of the Corps!

Answers:

- A. 2 – Hydropower
- B. 1 – Navigation
- C. 6 – Water Based Recreation Management
- D. 5 – Resource Management
- E. 3 – Flood Control
- F. 4 – Irrigation Water Storage

Flood Control

2. Flood Control

Introduction

The purpose of this subject area is to familiarize students with flood control at Caesar Creek Lake.

The first section includes an activity that may be used to introduce flood control concepts in the classroom. Next, is a list of on-site activities. Finally, activities are included for after your visit to help reinforce what has been learned about flood control.

A Brief History

Congress authorized the building of Caesar Creek Lake under the Flood Control Act of 1938. The Louisville District of the U.S. Army Corps of Engineers designed, built and operates the Caesar Creek Lake dam. Construction of the dam began in October of 1971, and the dam became operational in January of 1978. Caesar Creek Lake operates for flood reduction, recreation, water supply, fish and wildlife conservation and to augment natural low flow water quality. The lake serves as one unit within the comprehensive plan for the Ohio River Basin to reduce flood stages downstream of the dam.

During the fall and winter months, the lake level is lowered to prepare for the storage of heavy spring rainfall. If heavy rains occur, surface water runoff is stored in the lake until the swollen streams and rivers below the dam have receded. Once they can handle the discharge of the stored water without damage to lives or property, the extra water is released.

Caesar Creek Lake has prevented over \$203.5 million in flood damages, has provided over \$563.5 million in visitor recreation expenditures and was built for \$62.9 million. The lake also provides a source of water supply for surrounding communities. A full range of opportunities available include camping, fishing, hunting, boating, hiking, picnicking and swimming.

Important Concepts

The activity in this section will help the student understand the following concepts. Important vocabulary words are in **bold** print.

Congress authorized the building of Caesar Creek Lake under the **Flood Control Act of 1938**.

Caesar Creek Lake **dam** is a structure built to hold back water so that it can be regulated for **flood control**.

The concrete building in the lake near the dam is called the **control tower**. It contains equipment necessary for regulating the water released through the **conduit pipe** and into the **stilling basin**, which is where water is slowed and diverted by huge baffle blocks to prevent **erosion** along the shoreline on the downstream side of the dam. Another way in which the Corps prevents erosion is by laying down **riprap** (large rocks).

The **spillway** is an emergency overflow channel for the lake. In extreme flooding conditions the water from the lake would travel through the spillway to prevent water from going over the dam.

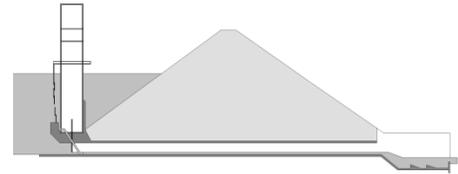
Before Your Visit

The following activity about flood control is designed to be used before you bring your students to Caesar Creek Lake.

Label the Dam and Outlet Works

Students should be given a copy of the activity Label the Dam and Outlet Works (page 31). They may then label the dam and outlet works with the letter corresponding to the appropriate term provided on the activity sheet. Review the definitions of the various components of the dam and outlet works with your students (page 30). Students may also color in the activity sheet.

Label the Dam and Outlet Works



Review the following definitions of the components of the dam and outlet works. Then label the diagram with the letter that corresponds to the appropriate term.

A. Dam – A barrier to obstruct the flow of water, especially one built across a stream. The Caesar Creek Lake Dam is an earth and rock structure built to hold back water so that it could be regulated for flood control.

B. Water intake gates – The openings in the dam that take in water from the lake. They can be adjusted to increase or decrease the flow of water.

C. Stilling basin – The concrete portion of the dam located downstream of the conduit that slows down the flow of the fast-moving water to minimize downstream erosion.

D. Bypass gate – A 2-foot wide by 3-foot high opening in the outlet works that is used for releasing minor flows.

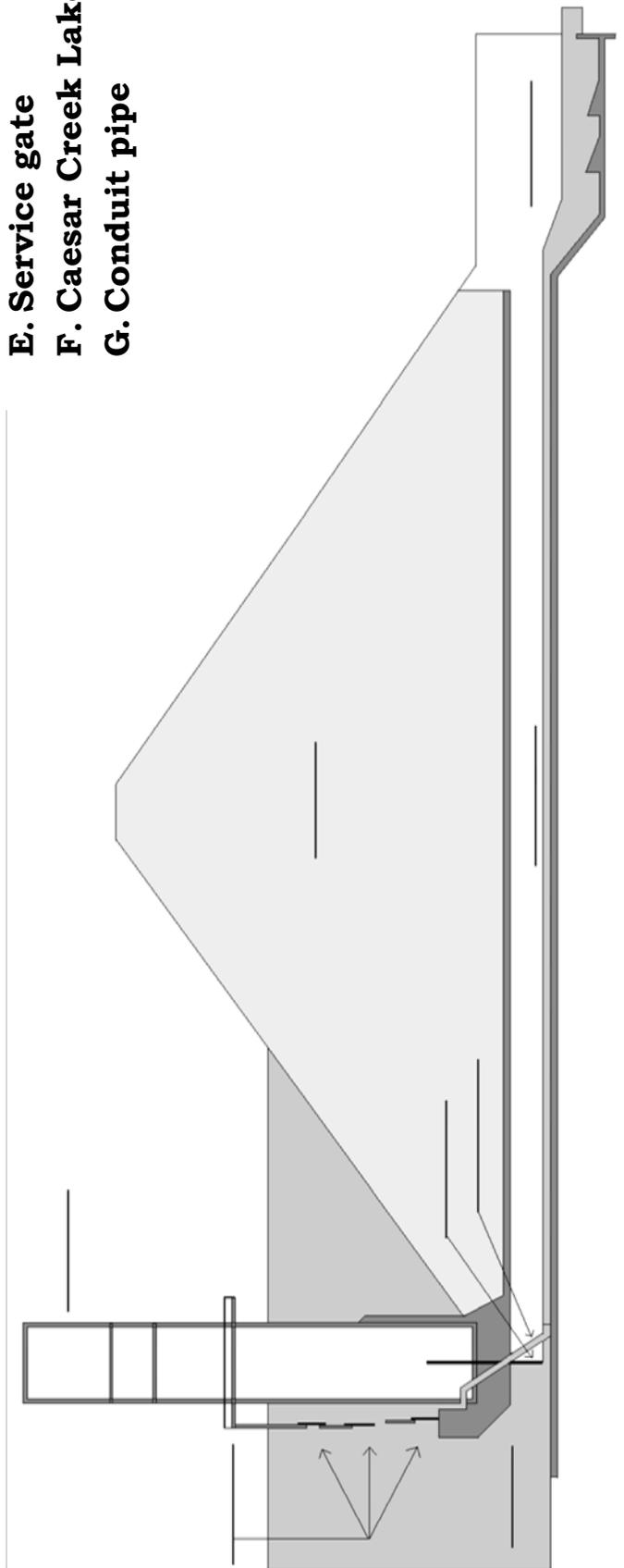
E. Service gate – A 4-foot wide by 12-foot high opening in the outlet works that is used for releasing major flows.

F. Lake – A large inland body of water. Caesar Creek Lake operates for flood reduction, recreation, water supply, fish and wildlife conservation and to augment natural low flow water quality.

G. Conduit pipe – The large pipe that carries water from the Control Tower under the dam to the river downstream.

Label the Dam and Outlet Works

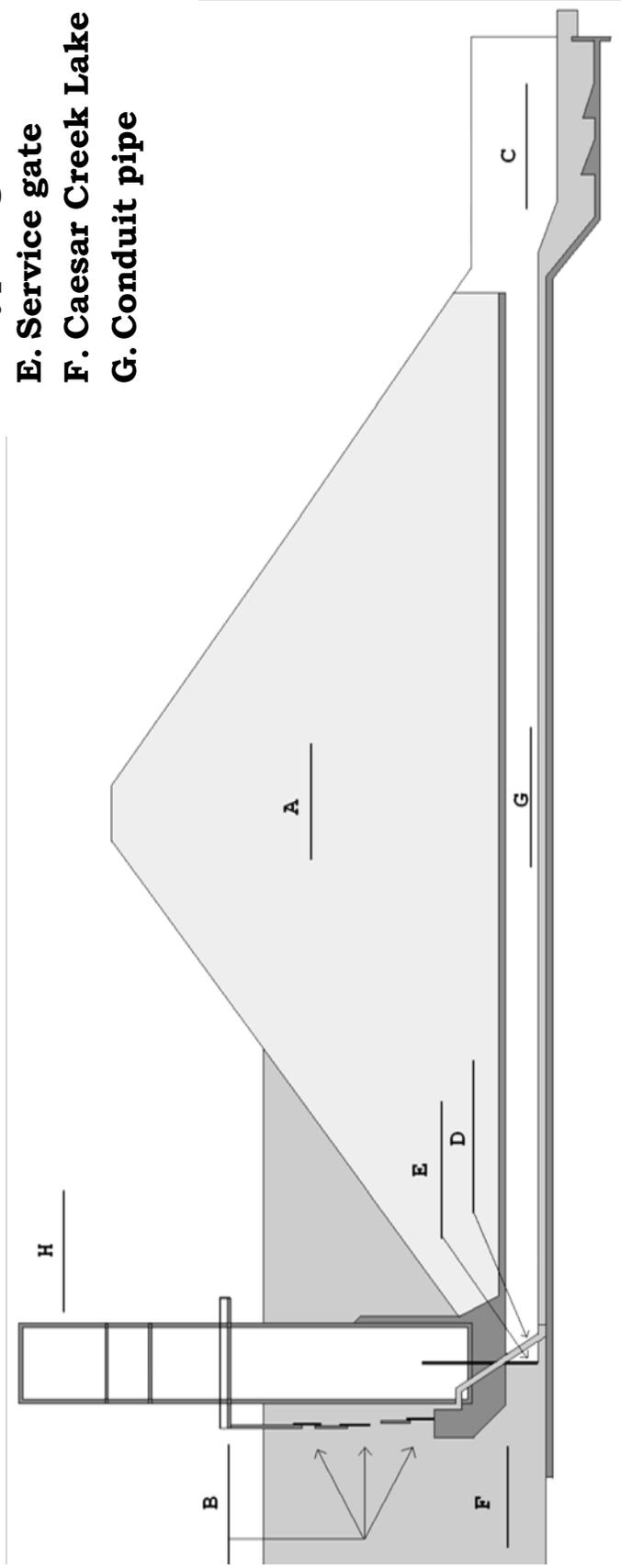
- A. Dam
- B. Water intake gates
- C. Stilling basin
- D. Bypass gate
- E. Service gate
- F. Caesar Creek Lake
- G. Conduit pipe



Label the Dam and Outlet Works

Answers:

- A. Dam
- B. Water intake gates
- C. Stilling basin
- D. Bypass gate
- E. Service gate
- F. Caesar Creek Lake
- G. Conduit pipe



During Your Visit

The following activities in this section are intended for use during your visit to Caesar Creek Lake. They will give your students a chance to learn about flood control.

Ask the Visitor Center Rangers:

The rangers at the Caesar Creek Lake Visitor Center will be happy to answer your group's questions about flood control.

Caesar Creek Lake Visitor Center:

Exhibits in the Corps Gallery at the Visitor Center will introduce your students to flood control. Bring copies of the Visitor Center Scavenger Hunt (see pages 16-23) for your students' visit to the Visitor Center. Students can see the dam and learn about its construction by visiting the dam overlook out the back doors of the Visitor Center.

Control Tower Tour:

Ask the Visitor Center rangers about setting up a guided tour of the Caesar Creek Lake control tower.

After Your Visit

In this section, you will find an activity to be completed after your visit to Caesar Creek Lake. This activity is intended to reinforce vocabulary and important concepts learned earlier.

Build a Dam:

With the right tools your students can make their own dam (see page 33). Supply them with materials and let them get creative.

Build a Dam

A dam is a structure built to hold back water so that it can be regulated for flood control. It slows down the flow of a river or stream. Can you build a dam out of Popsicle sticks and small rocks?

Materials Needed:

- long, shallow, clear Tupperware container
- sand
- small rocks (like aquarium gravel)
- popsicle sticks
- bucket full of water



Instructions:

1. Fill the Tupperware container with sand.
2. Dig the path of a river in the sand.
3. Choose a spot somewhere along the river to build your dam.
4. Use Popsicle sticks and small rocks to construct a dam that will let only a little bit of water come through, but not too much. Keep in mind that the deeper the water, the greater the water pressure. So the bottom of your dam will need to support more pressure than the top of your dam. If you built your dam in a triangular shape, then the bottom will be wider and will be able to support more pressure.
5. Test your dam by pouring water from a bucket down the river path.

Water Safety

3. Water Safety

Introduction

The purpose of this subject area is to introduce your students to the importance of water safety at U.S. Army Corps of Engineers lakes.

The first section of activities is included to introduce your students to water safety. Activities that take advantage of the Visitor Center facilities at Caesar Creek Lake are next and finally, activities for after your visit have been included to reinforce the concepts learned about water safety.

Important Concepts

The activities in this section will help students understand the following concepts. Important vocabulary words are in **bold** print.

Each year more than 3,000 people drown in the U.S. Since most drowning victims had no intention of being in the water, and since most people drown within 10-30 feet of safety, it is important that you and your family learn to swim. It is important to follow these simple crucial guidelines if you, your family or your friends are going to be near the water.

Learn these few simple techniques to help someone in trouble and keep yourself safe:

Reach: To help someone in the water reach first with a fishing pole, towel, boat oar, but don't get in the water yourself.

Throw: Scan your area for items such as an empty milk jug, cooler or ring buoys that can be thrown to someone in the water.

Row: It's not safe to go near a swimmer with the boat motor running. Use the oars to bring the boat close enough to reach or throw.

Don't go: Without expert training and experience in lifesaving techniques, you could put yourself in danger along with the person you are trying to help.

Always remember to wear your Coast Guard approved **life jacket**. Life jackets float, you don't. They should be in good condition and fit the wearer snugly. When picked up by the life jacket shoulders, the child's chin and ears should not slip through.

Before Your Visit

The following activity will introduce your students to the importance of being water safety conscious at Caesar Creek Lake and around other bodies of water where they may be recreating.

Water Safety Scramble:

This activity teaches the student about fun water-related activities at Caesar Creek Lake and how to be safe when enjoying these activities. Students are to unscramble the phrases to see what they can do to be safe in and on the water (see page 38).

Water Safety Scramble

Spending time in or on the water can be fun and relaxing. We want you to enjoy yourself when you come to Caesar Creek Lake. We also want you to have a *safe* visit. Here are some enjoyable things you can do at Caesar Creek Lake. Circle your favorites!

Go boating and stop by the Visitor Center boat dock

Go fishing at the Gorge

Swim at the beach

Watch the osprey dive for fish from the Flat Fork Ridge overlook

Go for a hike along the lakeshore

Here are some tips for staying safe in and around the water at Caesar Creek Lake. Unscramble the phrases to see how you can be safe when you enjoy the water.

1. enrev vide
2. erwa a lectejiakf
3. od otn hups ro mupj no hrsote
4. miws ni santdeidge seara loyn
5. enlra ot wmis
6. vener smiw loane
7. od nto rtenpde ot eb rnindwog



Water Safety Scramble Answers

Here are the phrases unscrambled:

1. enrev vide
never dive
2. erwa a lectejiakf
wear a lifejacket
3. od otn hups ro mupj no hrsote
do not push or jump on others
4. miws ni santdeidge seara loyn
swim in designated areas only
5. enlra ot wmis
learn to swim
6. vener smiw loane
never swim alone
7. od nto rtenpde ot eb rnindwog
do not pretend to be drowning



During Your Visit

The following activities in this section are intended for use during your visit to Caesar Creek Lake. They will give your students a chance to learn about water safety.

Caesar Creek Lake Visitor Center:

There are a variety of water safety activities and games that students can participate in at the Visitor Center. Ask the Visitor Center rangers before you visit to see what water safety opportunities are available. Students will learn ways to be safe in and near the water, what to do if someone needs help in the water and why they should be safe around the water.

Water Safety Films:

Films about water safety are shown in the theater at the Visitor Center. Please request a film showing when you reserve time for your visit.

After Your Visit

The following activity is to be completed after your visit to Caesar Creek Lake. It is intended to reinforce vocabulary and concepts learned before and during your visit.

Saving Sam:

One of the recreational opportunities at Caesar Creek Lake is swimming. This activity will have students think about how to be safe while swimming and what can be done in an emergency involving a drowning person (see page 41). If your students are not familiar with first aid techniques emphasize knowing where a phone is to call for help, know what number to call (such as 911) and finding a ranger if an accident occurs. Also, students should never jump in the water themselves to save someone drowning. It could mean two or more people drown instead of one.

Saving Sam

How will you save Sam?

Write a story telling what you will use to save Sam and what you will do when you get him out of the water. Be sure to include in your story what things you have done to be sure you have a safe swim.



Life in the Pond

4. Life in the Pond

Introduction

The purpose of this subject area is to familiarize students with life in the pond at Caesar Creek Lake.

The first section includes an activity that may be used to introduce pond life concepts in the classroom. Next, is a list of on-site activities. Finally, activities are included for after your visit to help reinforce what has been learned about pond life.

Important Concepts

The activity in this section will help the student understand the following concepts. Important vocabulary words are in **bold** print.

Every living thing needs energy in order to live. Animals get energy from the food they eat. Animals that eat plants or other animals are called **consumers**.

Animals that only eat other animals are known as **carnivores**, animals that eat both animals and plants are called **omnivores** and animals that eat only plants are called **herbivores**.

Plants use sunlight, water and nutrients to get energy in a process called **photosynthesis**. Since plants produce their own food, plants are considered **producers**.

A **food chain** illustrates how each living thing gets food and how nutrients and energy are passed from creature to creature.

The **interdependence** of populations within a food chain helps to maintain the balance of plant and animal populations within a community.

A **habitat** is a place where a plant or animal can get the food, water, shelter and space it needs to live.

Keeping water clean and clear of contaminants ensures good **water quality** for the creatures that live in a pond water habitat.

Before Your Visit

The following activity, called Pond Food Chain Game, is intended to introduce your students how pesticides can travel through a food chain.

Pond Food Chain Game



Procedure:

1. Divide the group into three teams. In a class of 26 students, there would be 2 “herons”, 6 “fish” and 18 “tadpoles”. OPTIONAL: Have tadpoles, fish and herons labeled so they can be identified easily. For example, a green cloth flag (tied around the arm) for tadpoles, yellow cloth flag for fish and blue cloth flag for herons.
2. Distribute a small paper bag or other small container to each “tadpole”. The container is to represent the “stomach” of the animal.
3. With the students eyes closed, or otherwise not watching where the food is place, spread white and colored straws (or whatever material used) around in a large open space. Outside in a playing field (if it is not windy) or on a gymnasium floor will work; a classroom will also work if chairs and tables or desks can be moved.
4. Give the students the following instructions: the tadpoles are the first to go looking for food; the herons and fish are to sit quietly on the sidelines watching their prey. At a given signal, the tadpoles are allowed to enter the area to collect as many food tokens (algae) as they can, placing the food tokens in their stomachs (the bag). The tadpoles have to move quickly to gather food. At the end of 30 seconds, the tadpoles are to stop collecting food tokens.
5. Next, allow the fish to hunt the tadpoles. The herons are still on the sidelines quietly watching the activity. The amount of time available to the fish to hunt tadpoles should take into account the size of the area in which you are working. In the classroom, 15 seconds may be enough time; on a large playing field, 60 seconds may be better. Each fish should have time to catch one or more tadpoles. Any tadpole tagged or caught by a fish must give its bag of food to the fish and then sit on the sidelines.
6. Next, allow from 15 to 60 seconds for the herons to hunt the fish. The same rules follow. Any fish still alive may hunt for tadpoles. If a heron catches a fish, the heron gets the food bag and the fish goes to the sidelines. At the end of the designated time period, ask all students to come together in a circle, bringing whatever food bags they have with them.
7. Ask students that have been “consumed” to identify what animal they are and what animal ate them. If they are wearing labels, this will be obvious. Next, ask any animals still alive to empty their food bags out

onto the floor where they can count the number of food pieces they have in their food sacks. List any tadpoles and the total number of white and multicolored food pieces each has. List the number of fish left and the number of white and multicolored pieces each has. Finally, list the herons and the number of white and multicolored food pieces each has.

8. Inform the students that there is something called a pesticide that has contaminated the pond habitat. This pesticide accumulates in food chains and can stay in the environment a long time. In this activity, all multicolored food pieces represent the pesticide. All tadpoles that were not eaten by fish may now be considered dead if they have any multicolored food pieces in their food supply. Any fish for which half or more of their food supply was multicolored pieces would also be considered dead from chemical side effects. The one heron with the highest number of multicolored food pieces will not die. However, it has accumulated so much of the pesticide in its body that the egg shells produced by it and its mate during the next season will be so thin that the eggs will not hatch successfully. The other herons are not visibly affected at this time.
9. Talk with the students about what they just experienced in the activity. Ask for their observations about how the food chain seems to work and how the pesticide can enter the food chain with a variety of results.

During Your Visit

The following activities in this section are intended for use during your visit to Caesar Creek Lake. They will give your students a chance to learn about pond life.

Caesar Creek Lake Visitor Center:

There is a variety of pond life and educational exhibits that students can learn from at the Visitor Center.

Pond Study:

Ask the Visitor Center Rangers about setting up a guided pond study. Students will get the opportunity to learn about animals that live in the pond and how each animal is dependent on other animals in the food chain. Students will also get to handle pond creatures.

Kid's Fishing Pond:

If you have a small group, have each student bring their rod and reel to go fishing on the Visitor Center pond. Fishing restricted to children under the age of 16.

After Your Visit

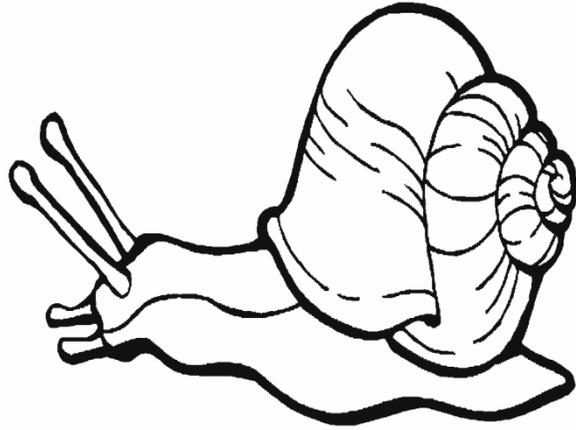
The following activities are to be completed after your visit to Caesar Creek Lake. They are intended to reinforce vocabulary and concepts learned before and during your visit.

Make a Pond Critter Mobile:

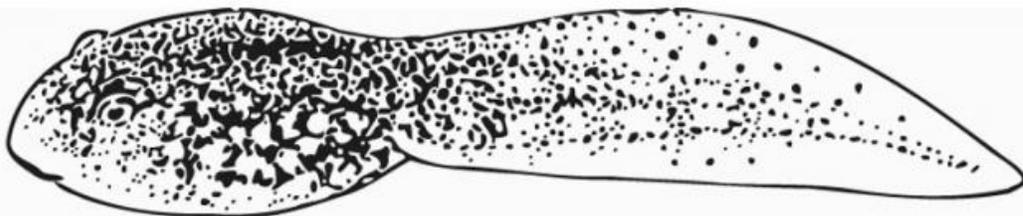
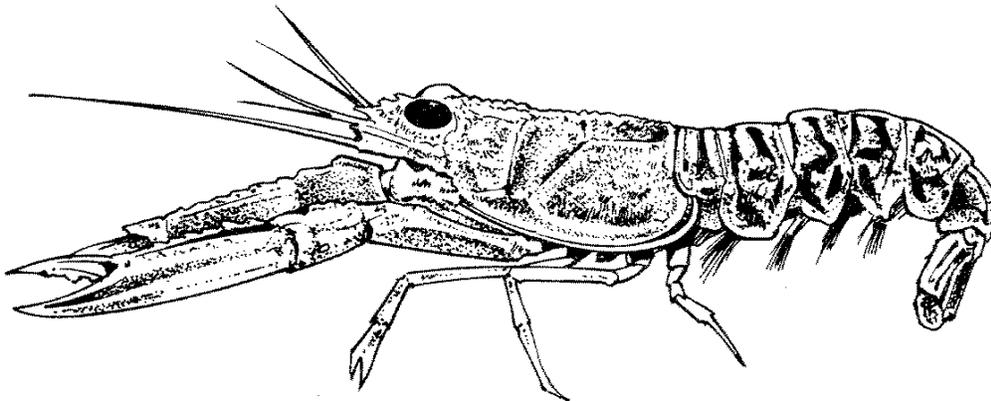
Use drawings of pond animals, cardboard to reinforce them and some sticks and string to make a hanging pond critter mobile (see page 47). This will be a good reminder of your visit to Caesar Creek Lake. Magazines could be a source of pictures.

Draw a Food Chain:

Have your students draw their own food chain. Label the producers and consumers.



Pond Critter Mobile



Ordovician Fossils

5. Ordovician Fossils

Introduction

The purpose of this subject area is to familiarize students with Ordovician fossils at Caesar Creek Lake. In the process of building the dam at Caesar Creek Lake, the Corps of Engineers created a spillway. The spillway is an area just southeast of the dam that has been blasted away to a level 12 feet lower than the top of the dam. The spillway acts as an overflow, so that during a high water event the lake water will divert into the spillway rather than flow over the top of the dam.

The layer of limestone rock and shale exposed by blasting away the spillway hillside is about 450 million years old. At the time when this rock layer was exposed, Southwest Ohio rested at the bottom of a shallow sea. Evidence of the ocean-dwelling creatures that lived in the Ordovician Sea can be found in the form of fossils at the Spillway. The fossils were formed over a long period of time in which sediment blanketed the dead bodies of sea creatures on the ocean floor. Eventually, the increasing amount of pressure fossilized their bodies into the limestone rock seen exposed today.

After reviewing the important concepts, you will find that the first section includes activities that may be used to introduce Ordovician fossil concepts in the classroom. Next, is a list of on-site activities. Finally, activities are included for after your visit to help reinforce what has been learned about Ordovician fossils.

Important Concepts

The activities in this section will help students understand the following concepts. Important vocabulary words are in **bold** print.

Fossils are the preserved remains, imprints or traces of plants, animals or other organisms from the past. In order for an organism to be fossilized, it generally must have had hard parts, i.e. bones or shells, because soft tissue normally decays.

A **mold** is created when the original shell or bony material has been dissolved away, leaving an impression of the outside or inside of the organism. If the vacant space, once occupied by the fossil, is filled in by sediments or crystals, then the resulting fossil structure is called a **cast**.

Trace fossils include any indirect (non-body fossil) evidence of the former existence of life. Examples of trace fossils are tracks, trails, burrows and coprolites (fossil feces).

A **paleontologist** is a scientist who studies fossils.

The science of **geology** is the study of the Earth and its processes. Geologists break the past changes in the Earth into periods using a **geologic time line**. The **Ordovician Period**, one of the time periods on this time line, occurred approximately 450 million years ago.

Life in Southwest Ohio was very different during the Ordovician Period. A shallow saltwater sea called the **Ordovician Sea** covered the land. Creatures that lived in the Ordovician Sea during this geologic time period included brachiopods, cephalopods, bryozoans, gastropods, crinoids, horn coral and trilobites.

Brachiopods look a lot like sea shells that you find on the beach. Some of these animals lived attached to the bottom of the sea by a small “foot”. Others drifted free or even burrowed into the mud.

The **cephalopod** is in the octopus family and looks similar to our modern-day squid. The cephalopod has a hard cone-shaped shell over its body, so that only its head and eight legs stick out. This creature propelled itself through the water by circulating water in and out of its hollow shell.

The **bryozoan**, also called moss-animals, was the apartment builder of the ocean floor. Even though moss-animals look like twigs or corals, they were really several tiny animals that built houses around themselves.

Gastropods looked like modern-day aquatic snails. These snails carried their homes on their backs and moved along the sea floor with a broad muscular foot.

The **crinoid**, also called “sea lily”, had a stem that held it to the sea floor like a plant. The stems look like stacks of doughnuts with a five-point star in the center.

Horn coral look like a rhinoceros horn or a dinosaur tooth; however, it was an animal. Most horn coral lived attached to the sea floor.

The **trilobite** looked much like a roly-poly bug and could roll up into a ball much like one. The trilobites were related to modern-day insects, spiders,

lobsters and crabs. They crawled along the sea floor and would shed their hard outer exoskeleton.

Before Your Visit

The following activities are designed to introduce your students to Ordovician fossils before they visit Caesar Creek Lake.

Official State Fossils:

Fossils are an important link to the past. We think they deserve some recognition! Here's a way for your students to give fossils special recognition. Start by asking if anyone knows what their state bird, tree or flower is. Explain that many states have other mascots too, such as a state insect or mammal.

And some states even have state fossils! Ohio's state fossil is *Isotelus maximus* trilobite. Have your students research their state fossil to find out all they can about it. You could also have them make models and posters or write poems and songs about the fossil.

Impressions in Clay:

Fossils are any evidence of ancient life preserved (usually) in stone. Many fossils are impressions of ancient life, rather than any preserved part of the actual organism. Impressions of hard parts are more common than soft parts, but impressions of soft parts such as skin and scales have been preserved as fossils in rock. Fossil tracks are also impressions. To illustrate how impressions form, and how hard or easy it is for organisms to leave impressions, students will make impressions of different objects in clay (see pages 52 – 54). In nature, muddy or clayey sediments are the best sediments for leaving impressions, so using clay in the classroom is a good model for nature.

Impressions in Clay

Time: 15-30 minutes in class (or can be done as part of an outside classroom activity)

Materials:

- Objects to make impressions. You can substitute objects, but there should be a mix of hard and soft objects. Small, low-relief to flat objects work the best
- Cotton ball
- Coin
- Blade of grass
- Leaf
- Shell or other hard natural object like a paper clip or nail
- Modeling clay or Playdo to make impressions
- Paper and pencil to take notes
- Activity worksheet

Exercise:

In addition to the objects suggested, you can have the students collect different types of plant material for making impressions, or other natural objects (shells, teeth, bones) where available. The important thing is that each student or group of students starts with 5 different objects, some of which are hard, and some of which are soft.

Working in groups or individually, have students mold their clay into a pancake shape.

Have students place one of the objects on their desk (or if outside on their hand). Write the name of the object on the worksheet. Is this a hard or soft object? Write hard or soft in the appropriate column on the worksheet.

Press the clay pancake over the object (either on the desk or in your hand if outside). Peel back the clay and separate the object from the clay.

What is the quality of the impression (none, poor, good, excellent)? Write an “x” under the column that best describes the quality of the impression.

Repeat the procedure for five different items, or have each person in a group test a different object and fill out one chart. Compare the quality of impressions from the different objects. Answer the questions on the worksheet.

You should be able to see that not all objects have the same potential to leave an impression and not all details of an object are preserved. How good was the impression? Can you tell what the object was from the impression? Which objects leave the best impressions?

Stephen F. Greb
Kentucky Geological Survey

Impression Worksheet

Name _____

In the table, write the name of the object you are using. In the next column classify it as a soft or hard object. After you make an impression, put an x under the column for the quality of that object's impression (none, poor, good, or excellent).

Impressions Quality

Object name or description	Soft or hard	None	Poor	Good	Excellent
1. _____	_____	_____	_____	_____	_____
2. _____	_____	_____	_____	_____	_____
3. _____	_____	_____	_____	_____	_____
4. _____	_____	_____	_____	_____	_____
5. _____	_____	_____	_____	_____	_____

Based on the data you collected, answer the following questions.

1). Which objects (name or description) made the best impressions?

2). Which objects (name or description) made the worst impressions?

3). Imagine a dead animal or plant that was buried in the mud. What parts of that animal or plant might make good impressions?

During Your Visit

The following activities in this section are intended for use during your visit to Caesar Creek Lake. They will give your students a chance to learn about Ordovician Fossils.

Ask the Visitor Center Rangers:

Schedule a fossil talk with the rangers for your group of 20 or more students.

Caesar Creek Lake Visitor Center:

Bring your students to the Visitor Center to see and touch real Ordovician fossils on display.

Fossil Scavenger Hunt:

While you are at the Visitor Center, try this scavenger hunt out to learn more about the fossils at Caesar Creek Lake (see page 57).

Check Out a Rock Box:

Group leaders may check out a “Rock Box” from the Visitor Center information desk. The box contains examples of each of the seven fossils and artistic depictions of what the animals looked like when they were alive. The box is available to any self-guided group; however, it must be returned at the end of each visit.

Collect Fossils at the Emergency Spillway:

Students can collect their own fossils to take home with them at the Spillway, or students could even take pencil/crayon rubbings of the fossils.

Fossils may be observed in the Spillway at any time, but the collection of natural formations is prohibited without the permission from the Corps of Engineers. If you would like to collect fossils, you must first check in at the Visitor Center.

We ask that you please observe the following rules at the Spillway:

1. Fossils may not be collected for commercial use.
2. No tools may be used in collecting.
3. You may keep fossils that fit in the palm of your hand.

For your safety...

1. We ask that you park completely off the road in one of the designated parking areas.
2. Climbing on the walls of the spillway is very dangerous. For this reason, climbing is strictly prohibited. We ask that you remain on the spillway floor.

Fossil Scavenger Hunt

Caesar Creek fossils are the hard remains of animals that lived at the bottom of a shallow saltwater sea, called the Ordovician Sea, over 450 million years ago. Like our bones these fossils were the shells of ancient ocean dwellers. During your visit to Caesar Creek Lake, see if you can collect three of the seven fossils listed below. Draw your favorite fossil below.

Fill in the missing blanks to form a table that describes each of the fossils.

Name	Shape	Identifying Markings
Brachiopod		
	Round disks, like a stack of doughnuts	
		Swirls to a point like an ice cream cone
	Looks like a Roly-Poly bug or beetle	
Cephalopod		Has rings like a Crinoid but smoother
	Looks like twigs or small bones	
Horn coral		Lines to the center of round end

After Your Visit

The following activity is to be completed after your visit to Caesar Creek Lake. It is intended to reinforce vocabulary and concepts learned before and during your visit.

Draw the Ordovician Sea:

Have your students draw or paint a picture of what they think the Ordovician Sea looked like. Ask your students to think about the fossils that they learned about and found at Caesar Creek Lake. Allow students to explain their picture to a partner or the rest of the class.

Natural Resource Management

6. Natural Resource Management

Introduction

The purpose of this subject area is to familiarize students with natural resources at Caesar Creek Lake.

The first section includes an activity that may be used to introduce natural resource concepts in the classroom. Next, is a list of on-site activities. Finally, activities are included for after your visit to reinforce concepts learned.

Important Concepts

The activities in this section will help students understand the following concepts. Important vocabulary words are in **bold** print.

A **natural resource** is something found in **nature** that can be useful to people in some way. Humans have the power to change, use, take care of or destroy natural resources. People are also dependent on natural resources, so it is to our benefit to manage natural resources wisely.

A natural resource can be living or non-living. A couple of non-living natural resources found at Caesar Creek Lake are water and air. Some of the living resources found at Caesar Creek Lake are: muskie, osprey, Canada geese, deer and wild turkey.

Natural resources are interdependent; they are connected together and interact to form what we call the natural **environment**. When one natural resource is changed it affects all the others.

When we manage natural resources we must think about how a change we make to one resource might affect other resources. We change a river to reduce flooding. This change affects other natural resources that depend on the river. Fish, wildlife and plants have adapted to the natural seasonal fluctuations of the river. Building a dam disrupts this natural pattern, and steps must be taken to artificially duplicate nature or some way make up for the harm done. This is called natural resource management.

Before Your Visit

Natural Resource Identification:

This game will help students identify what resources are useful to us (page 61). Some natural resources are taken for granted because they are so familiar.

Natural Resource Identification

Natural resources are things in nature and may be useful to us in some way.

Below, you will see photos of some of the natural resources that the Corps of Engineers takes care of at Caesar Creek Lake. Under each photo, write how each of the living or non-living natural resources may be useful to people.

Next, draw lines between any of these natural resources which are connected somehow to one another. For example, geese need water so draw a line from the geese to the water. What other connections are there?



During Your Visit

Your students can learn more about natural resources during their visit to Caesar Creek Lake. Here are some suggestions to accomplish that goal.

Caesar Creek Lake Visitor Center:

Stop by the Visitor Center to learn about natural resource management work at Caesar Creek Lake. Call ahead of time to schedule a ranger-led nature hike.

Take a Hike:

Take your students on a hike on any of a number of trail systems in the park. Call ahead of time to ask about the best trail for your group's needs. Trail maps are available at the Visitor Center.

Animal Checklist:

A copy of this checklist can be given to each of your students. It will help them identify the natural resources at Caesar Creek Lake (see page 63).

Animal Checklist

Animals are important natural resources. The animals listed below are often seen at or near Caesar Creek Lake. Put a check by each of the animals you see during your visit and write a description of what it looks like.

<input type="checkbox"/> turkey vulture	_____
<input type="checkbox"/> osprey	_____
<input type="checkbox"/> gull	_____
<input type="checkbox"/> Canada goose	_____
<input type="checkbox"/> great blue heron	_____
<input type="checkbox"/> deer	_____
<input type="checkbox"/> coyote	_____
<input type="checkbox"/> fox	_____
<input type="checkbox"/> beaver	_____
<input type="checkbox"/> squirrel	_____
<input type="checkbox"/> frog	_____
<input type="checkbox"/> snake	_____
<input type="checkbox"/> spider	_____
<input type="checkbox"/> butterfly	_____
<input type="checkbox"/> turtle	_____
<input type="checkbox"/> fish	_____
<input type="checkbox"/> other	_____
<input type="checkbox"/> other	_____

After Your Visit

The following activities are to be completed after your visit to Caesar Creek Lake. They are intended to reinforce vocabulary and concepts learned before and during your visit.

Fill in the Blanks Naturally:

Pass out copies of the worksheet to students and have them fill in the blanks to review natural resource concepts (see page 65).

Fill in the Blanks Naturally

If you worked as a park ranger or natural resource manager you would have to know about protecting and managing natural resources. To give you an idea of some of the things you will have to know about, fill in the blanks below.

1. Natural resources are things found in nature that may be useful to us in some way. List four examples of natural resources found at or near Caesar Creek Lake including:
 - a. Two living _____
 - b. Two non-living _____

2. Give an example of how two of the above are connected and interdependent.

3. List two ways that people have changed natural resources at or near Caesar Creek Lake.

4. How have these changes affected other natural resources?

5. Trade-offs are decisions we make to trade the benefits of some things to gain increased benefits from others. With this mind:

List one trade-off made at the dam. _____

For example: We trade a wild river for a lake so that we can supply water to the city of Wilmington.

6. List one way the Corps of Engineers manages a resource.

7. List two ways you can help take care of natural resources.

8. List a job related to natural resources at a dam.

Fill in the Blanks Naturally

If you worked as a park ranger or natural resource manager you would have to know about protecting and managing natural resources. To give you an idea of some of the things you will have to know about, fill in the blanks below.

1. Natural resources are things found in nature that may be useful to us in some way. List four examples of natural resources found at or near Caesar Creek Lake including:
 - a. Two living fish trees
 - b. Two non-living air water
2. Give an example of how two of the above are connected and interdependent. **Fish need cool water; trees need water. Trees that grow next to water help cool the water for the fish that live in it.**
3. List two ways that people have changed natural resources at or near Caesar Creek Lake. **We have changed the river into a lake. We have changed the landscape to create a beach for swimmers.**
4. How have these changes affected other natural resources? **Flooding has been reduced, and the lake provides additional food sources for birds.**
5. Trade-offs are decisions we make to trade the benefits of some things to gain increased benefits from others. With this in mind:
List one trade-off made at the dam. **We trade the homes of people who once lived around Caesar Creek for flood control of homes downstream.**
For example: We trade a wild river for a lake so that we can supply water to the city of Wilmington.
6. List one way the Corps of Engineers manages a resource. **The Corps builds dams so that the water resource can be used to meet a variety of society's needs.**
7. List two ways you can help take care of natural resources. **Don't litter and recycle**
8. List a job related to natural resources at a dam. **Park ranger**