ABSTRACT

NATURAL RESOURCES INTERNSHIP WITH THE U.S. ARMY CORPS OF ENGINEERS
AT CAESAR CREEK LAKE

by Rebecca Ann Palmer

The purpose of this report is to describe my internship experience with the U.S. Army Corps of Engineers working as a Natural Resource Specialist Park Ranger at Caesar Creek Lake in Waynesville, Ohio from June 2009 to April 2013. Caesar Creek Lake is a flood control reservoir constructed by the Corps of Engineers in the 1970s. The Lake is also a source of drinking water and a resource for both humans and wildlife. Along with my fellow park rangers and manager, I was responsible for the day-to-day operations and maintenance of the Caesar Creek Lake project natural and recreational resources. In my report I discuss the history of the U.S. Army Corps of Engineers and the Caesar Creek Lake area. I detail and reflect upon some of my experiences as a park ranger, and I relate my experiences back to my education at Miami University.
NATURAL RESOURCES INTERNSHIP WITH THE U.S. ARMY CORPS OF ENGINEERS
AT CAESAR CREEK LAKE

An Internship

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LIST OF ACRONYMS

FCIP – Federal Career Intern Program
FOCC – Friends of Caesar Creek
IES – Institute for the Environment and Sustainability
M.En. – Master of Environmental Sciences
NRCS – Natural Resource Conservation Service
ODNR – Ohio Department of Natural Resources
ODOT – Ohio Department of Transportation
OEPA – Ohio Environmental Protection Agency
USACE – United States Army Corps of Engineers
USDA – United States Department of Agriculture
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I appreciate the support and encouragement I have received from the Corps of Engineers Miami River Area staff. I am grateful for the professional contributions my fellow Corps employees have made to the Corps, and I hope that we continue to work together to improve the organization and ourselves.

I am grateful to my father, Louis Elefante, for his continued love and support throughout my college career, and to my mother, Ann Elefante, who was taken from this Earth too soon, but who has always been a source of love and inspiration. I am grateful to my husband, Matthew Palmer, whose steadfast love and encouragement have given me the strength to grow and finish my degree.
INTRODUCTION

To fulfill the final requirements towards a Master of Environmental Sciences (M.En.) degree through the Institute for the Environment and Sustainability (IES), I interned with the U.S. Army Corps of Engineers (USACE). From June until December of 2009 I worked as a civilian employee for the Corps of Engineers at Caesar Creek Lake in Waynesville, Ohio as a full-time, temporary Natural Resource Specialist Park Ranger. As one of six temporary park rangers in the summer of 2009, I worked under the guidance of three permanent park rangers: Jim O’Boyle, Kim Baker and Matthew Palmer. In January of 2010, Jim O’Boyle was promoted to the Natural Resources Project Manager at William H. Harsha Lake. Consequently, a permanent position opened up at Caesar Creek Lake, and I was selected to fill the full-time ranger position in March of 2010 and have been working for the Corps since then. I was hired through a 5/7/9 Federal Career Intern Program (FCIP) under which I complete training requirements over a three year period to reach a journeyman-status GS-9 Natural Resource Specialist Park Ranger (see Appendix A).

Throughout my internship and resultant career with the Corps I have been given the opportunity to apply many of the techniques and knowledge attained as a student in both my undergraduate and graduate degree programs at Miami University. Because of my education at Miami University and love of learning, I think I have brought meaningful skills and experiences to my internship with the Corps of Engineers. I will share some of the on-the-job experiences after I have given some background information about the Corps and the Caesar Creek Lake Region.

BACKGROUND

*The U.S. Army Corps of Engineers*

The U.S. Army Corps of Engineers traces its history back to the American Revolution when in June of 1775 Congress provisioned a Chief Engineer position within the Continental Army. General George Washington’s first Chief Engineer Colonel Richard Gridley aided in the Battle at Breed’s Hill with his knowledge of battery and fortification construction. A distinct Corps of
Engineers, consisting of engineer troops within the Continental Army, was not created by Congress until 1779. Under General George Washington’s command, Corps soldiers made many contributions to the Revolutionary War efforts including: overseeing the construction of fortifications, drawing detailed maps for commanders and reconnoitering enemy positions and battlefields (U.S. Army Corps of Engineers, Office of History).

The U.S. Army Corps of Engineers as we know it today was established by Thomas Jefferson in 1802, along with the U.S. Military Academy at West Point – the Nation’s first engineering school. West Point graduates were the main source of engineer officers for the Corps and fulfilled roles in the War of 1812 similar to those that the Corps soldiers had in the Revolutionary War. During the early 19th century, Corps members known as Topographical Engineers or “topogs” were sent out across the New World as explorers, surveyors and cartographers. Soon, topogs were involved in the development of canals, roads and railroads (U.S. Army Corps of Engineers, Office of History).

The modern-day mission of the U.S. Army Corps of Engineers is to “provide vital public engineering services in peace and war to strengthen our Nation’s security, energize the economy, and reduce risks from disaster.” Under the overarching mission are a variety of refined Corps missions, which include regulatory functions, facilities design and construction, environmental infrastructure, ecosystem restoration and environmental stewardship, installation support, watershed planning, disaster response, hydropower, water supply, recreation, flood and storm damage reduction and navigation (U.S. Army Corps of Engineers, Office of History).

The Corps of Engineers is perhaps most well-known for its operation of locks and dams across the United States. Within the contiguous United States exist seven Corps divisions divided into districts, which are further subdivided into project areas. Ohio is part of the Great Lakes and Ohio River Division, and Southwest Ohio is located within the Louisville District. I began my career with the Corps in the Miami River Area at Caesar Creek Lake, which is a flood control lake project.
The Caesar Creek Lake Project

The Caesar Creek Lake project was authorized by Congress as part of the Flood Control Act of 1938. Construction on the 165 foot tall, 2,750 foot long earth and rock dam began in October of 1971, and the lake was impounded over six years later in January of 1978. The 2,830-acre lake furnishes flood protection to the Little Miami River and reduces flood stages at all points downstream along the Ohio River, as a unit in a comprehensive plan for the Ohio River Basin. Since its conception, the lake has prevented over $150 million in flood damages (USACE). The lake also operates for the storage of water, water supply and water quality control, recreation and fish and wildlife activities.
Land for the Caesar Creek project was obtained under the Joint Department of Interior-Department of Army Acquisition Policy, as administered from 1962 to 1971. The policy specified acquisition in fee with 5 feet of freeboard above the flood pool or 300 feet horizontally above the full pool elevation, which ever resulted in procurement of more land. This policy was designed to prevent property damage from wave action to the shoreline. In general, fee land was taken at elevation 888 mean feet above sea level, and attempts were made to follow property lines or other boundaries rather than the contour line of the reservoir.

The Corps of Engineers holds title to 10,548 acres of land and water that makes up the Caesar Creek project. In addition, the Corps has 1,326 acres of flowage easement lands. Of the fee lands, 9,471 acres are leased to the State of Ohio, Department of Natural Resources (ODNR). This leased area is administratively divided between the Division of Parks and Recreation and the Division of Wildlife. The Division of Parks and Recreation is responsible for 4,585 acres of
land, and the Division of Wildlife is responsible for 2,060 acres of land, and both have jurisdiction on the 2,830 acres of water. The Corps coordinates and monitors State activities in the entire leased area. This land is used for public recreation, fishing, hunting and wildlife and forest management purposes. The State maintains campgrounds, a day lodge, beaches, boat ramps, horseback riding, mountain biking and hiking trails, fishing and hunting areas, wildlife viewing area, picnic areas and Pioneer Village historic site.

Figure 3. Map of Caesar Creek Lake. Areas in yellow are exclusively owned by the Corps; green and blue areas are owned by the Corps and leased to ODNR and orange areas are owned exclusively by ODNR (USACE).
The area not leased to the State is directly managed by the Corps. These 1,073 acres of project operation lands include flood control structures consisting of the dam, spillway, tailwater area and four dikes. The operations area also includes maintenance buildings, trails, picnic sites, fishing platforms, restrooms and constructed wetlands and prairies. Located in the project operations area is the Miami River Area Office and Regional Visitor Center. The visitor center is a class “A” visitor center of which there are only seven in the nation.

![Figure 4. Aerial view of the Caesar Creek Lake Visitor Center (USACE).](image)

Currently, the Corps of Engineers staff on site includes Operations Manager Steve Lee, who oversees the five lake projects in the Miami River Area, and his Administrative Assistant Becky Byrge. Joe Bertolini is the Caesar Creek Lake Natural Resource Project Manager, and he manages the maintenance and park ranger staff. The three permanent full-time rangers are Kimberly Baker, Russell Curtis and myself. For six months during the busy recreation season, 2-4 temporary park rangers are hired in a typical year. The four permanent full-time maintenance
staff members are Leonard Bakker, Ja Franek, Dennis Norman and JD Wearly. One-two six-month temporary laborers are hired in April.

This staff of ten to sixteen individuals, depending on the time of year, is tasked with meeting the missions of the U.S. Army Corps of Engineers. The primary missions at Caesar Creek include flood control, natural resource management and recreation resource management. The Corps altered the landscape for flood control, and the Caesar Creek staff has been entrusted with caring for the dam, waters and surrounding land. Despite the enormity of the dam, the Corps’ footprint on the land is very small relative to the land’s historical inhabitants.

_Caesar Creek Regional History_

At least 10,000 years before the implementation of the Caesar Creek Lake project, Paleo and Archaic Indians were living in the region; however, little evidence remains from their culture. Approximately seven to eight thousand years later, the area attracted a group of people known as the Mound Builders. Their cultural remnants give the majority of archaeological evidence found primarily in mounds left by the distinctly different Indian Groups: the Adenas, Hopewell, and to a lesser extent, the Fort Ancient (U.S. Army Corps of Engineers, Office of History).

Later, the Miami River Valley was home to American Indian Tribes such as the Miami, Shawnee, Wyandot and Delaware. These peoples were pushed west into the Ohio River Valley by the Iroquois. The first reported European entry into the area was by the French explorer, La Salle, whose exploration took him south from Lake Erie to the Ohio River during the latter part of the 17th century. French fur traders entered the area in 1692 but discontinued their work in the Ohio Valley because of the great distance to the Great Lakes and the presence of the fierce Iroquois tribes. However, British traders from the east were undaunted and developed an intensive fur trade in the area by the 1740s. This diversion of trade to the British concerned French officials who viewed the rising British influence among the western Indians with apprehension (U.S. Army Corps of Engineers, Office of History).
Because of its geographical location and network of navigable waterways, the Ohio Valley was considered the key to control of interior America. The struggle to gain dominance involved the exploitation of the native Indian population, each side trying to gain the good will of the Indians and to turn them against the opposing forces. The conflict between the two European nations flared into warfare by 1754 (U.S. Army Corps of Engineers, Office of History).

Eventually, the French withdrew from the Ohio Valley and the British were left with the rich land and its resources; they were also left with the continuing animosity between the Indians and the settlers. In 1803 the state of Ohio was established, and during the first half of the 19th century, the number of settlements increased along the entire length of the Little Miami River. The river and other streams provided waterpower for many mills needed by the early settlers for grinding their grain. Clifton Mill and Grinnels Mill in Greene County and Waynesville, respectfully, and Fosters Mill in Warren County are among those mills constructed during this period that still exist today (U.S. Army Corps of Engineers, Office of History).

Waterway transportation was supplemented by stagecoach lines, the first of which opened in 1827, running from Cincinnati to Sandusky. Another traversed what is now John Bryan State Park. Taverns for overnight stay and food were located along the coach lines. The Golden Lamb in Lebanon is the oldest tavern still in operation (U.S. Army Corps of Engineers, Office of History).

The first permanent settler on Caesar Creek was reputedly a Negro slave name Caesar who was captured and adopted by the Shawnee Indians in 1776. Caesar was travelling down the Ohio River with his master and mistress when they were attacked by the Shawnee. The white couple was killed and Caesar became a prisoner of the Shawnee. He was taken to Old Chillicothe, a major Shawnee village on the Little Miami River where he was adopted into their culture. According to the legend, the area was named after Caesar, because he used the area surrounding Caesar Creek for hunting and fishing, claiming it as his own property (USACE).
Natural Resource Management at Caesar Creek Lake

The geology of the Caesar Creek Lake Region includes both geologically young and old materials. On the surface lie sediments deposited by streams, wind and glaciers during relatively recent ice age periods. Beneath the cover of sediment lies the much older bedrock, which is mainly exposed along steep valleys and stream beds. Caesar Creek Lake is located near the crest of the Cincinnati Arch, which means that a majority of the bedrock is Ordovician in age and consists mostly of fossiliferous shale with numerous thin limestone layers. Exposed bedrock in the emergency spillway is a popular attraction for professional and amateur paleontologists from around the world, and visitors are permitted to collect fossils smaller than the palm of their hand out of the spillway. The unique geology of the spillway serves as a great interpretive tool for public programming and educational tool for local schools.
Figure 6. The Emergency Spillway exposes Ordovician-age fossils (a) Emergency Spillway (b) A young fossil collector finds a cephalopod fossil (USACE).

The vegetation at Caesar Creek Lake is a result of the geologic history of the area as well as human activity. A majority of the climax forest lands, including oak-hickory, beech-maple and northern flood plain forest, have been transformed into subclimax forest by human habitation. The Corps objectives concerning vegetation and forest management are to apply wise resource management principles that provide for habitat diversity and demonstrate good stewardship in the management of these resources. The management of woodlands is focused on the establishment and maintenance of the natural diversity of native plant species. Management of forest resources focuses on the establishment and maintenance of riparian zones and connection of fragmented upland woodlots. Efforts have been made by the Corps to restore wetland and prairie habitat, but this is a small component of the forested land that makes up a vast majority of the project (see Appendix B).

Corps management for habitat diversity brings a variety of animal species. Fauna in the Caesar Creek Lake Region includes about 52 species of mammals, 250 potential avian residents, 28 reptiles, 28 amphibians and about 100 species of fish (USACE). The federally-endangered Indian Bat (Myotis sodalis) has been reported on the project; however, no caves suitable for nesting or roosting are known to occur in the project area. Bald Eagles, once a federally-endangered species, now nest and overwinter in the project area. The Corps manages nest box
programs other avian residents, including Wood Ducks, Eastern Bluebirds and Prothonotary Warblers.

ODNR, Division of Wildlife primarily manages the land they lease for wild game. Management includes sharecropping with local farmers for grain crops beneficial to wildlife (i.e. corn, wheat, soybeans, sunflowers and oats). Approximately 10% of the crop is left un-harvested in the field for wildlife. The Division of Wildlife also stocks the lake with muskellunge and saugeye for fishermen. Other abundant fish include crappie, bluegill, large- and small-mouthed bass and non-native grass carp.

Recreational Resource Management at Caesar Creek Lake

The objective of the Corps park management program is to provide quality outdoor recreation opportunities on Corps lands and waters, to provide a safe and healthy environment for project visitors and to protect the natural resources to insure their continued availability. The Corps maintains trails, picnic sites, fishing platforms, playgrounds, shelter houses, restrooms and a Visitor Center for the public. The Corps also offers interpretive programming for the public and educational opportunities for local schools.

ODNR, Division of Parks and Recreation maintains a wider variety of amenities over a much larger land area. They manage campgrounds, primitive camping areas, group camping areas, a day lodge, beaches, five boat ramps, horseback riding, mountain biking, hiking and cross-country ski trails, shelter houses, Nature Center and Pioneer Village historic site.

CAESAR CREEK LAKE INTERNSHIP

I began my internship cleaning up goose droppings. There are, I am certain, better ways to set the tone for a job than scrubbing goose droppings off a sidewalk, but not this job. Quite honestly, to be an effective park ranger you have to be able and willing to get dirty. Certain aspects of the job were far from glamorous, and I started low on the federal hierarchy as a GS-4.
Quality Assurance Inspections

Shortly after I was hired, it must have become evident that I am a fairly meticulous and competent person, because I became the cleaning contract quality assurance inspector. The cleaning contractor responsibilities include cleaning the Visitor Center inside and out as well as Flat Fork and Gorge Recreation Areas. Inside the Visitor Center are offices, restrooms, theater, three rooms with displays for the public to learn about the U.S. Army Corps of Engineers, dams, wetlands and the cultural and natural history of Caesar Creek Lake and a newly added learning center/classroom. I am responsible for making sure the contractors dust displays, empty trash cans and scrub toilets in accordance with the contract specifications. In addition to ensuring that contractual obligations are fulfilled, I have learned how to write up contract deficiencies and address contractor questions and problems. While doing contract quality assurance inspections is not one of my favorite responsibilities, it has been a learning opportunity for me. Working with the contract has given me a preliminary understanding of government contracts, which was later expanded upon in an Operations and Maintenance Contracts Corps training course. I also have gained confidence in my ability to confront people with an issue that requires resolution. Unfortunately, our cleaning contractors do not implement a rigorous quality control program, which means that I am frequently recording where improvement is needed. It has been and continues to be a constant struggle to ensure that the contractors are performing to the contract specifications.

Prairie Management

When given the opportunity to get outside and learn something new I took it. During my first summer, the area manager Steve Lee and park ranger Jim O’Boyle took me out into the prairies and taught me how to identify a variety of native plants. Prior to our outings I could not distinguish between prairie plants as distinct in appearance as wild bergamot and prairie dock. While I am by no means an expert now, I at least can identify a dozen or so common native Ohio prairie plants, which is useful when making prairie management decisions. In the process I also learned to identify a few invasive prairie plants as well, including teasel, clover and Canadian
thistle. I spent many days throughout that first summer removing these invasive species from the prairies and many days in the fall collecting prairie seed for later sowing.

![Image of thistle with hand cutting it](image1.jpg)

Another prairie management technique I have learned on the job is prescribed burning. I had the opportunity to attend the ODNR, Division of Forestry Interagency Wildfire Training Course and am now qualified to assist with prescribed prairie burns. Prescribed burning kills woody vegetation and aggressive invasive plants that outcompete prairie plants for light and water resources. Burning pauses the prairie successional phase, which provides another distinct habitat type at Caesar Creek Lake.

![Image of prescribed burning](image2.jpg)

![Image of controlled burns on native prairie grasses](image3.jpg)

Figure 7. Collecting Golden Alexander and Buttonbush seed.

Figure 8. Conducting controlled burns on native prairie grasses.
Forest Management

In addition to controlling invasive plants in prairies, I have spent a significant amount of time controlling invasive species in Caesar Creek Lake’s woodlands. Using loppers, a poll saw and herbicide, I have cut and sprayed invasive plants such as honeysuckle, autumn olive, garlic mustard and multiflora rose in our woods, along our trails and on the downstream abutments of the dam. When possible it appears that pulling these invaders by hand is a better long-term solution, but many of the honeysuckle and autumn olive bushes are too large to pull. Controlling these prolific plants takes continuous effort year after year and leaves me feeling a little hopeless about there being any real long-term effects of all our efforts.

I have collaborated with the U.S. Department of Agriculture (USDA) to monitor for invasive insects on the project. I have monitored for gypsy moths and emerald ash borers, using USDA-issued traps that contain a pheromone lure. My roles in the process were setting up and taking down the traps, replacing the pheromone lures halfway through the study and sending in any suspected insects. We never did trap either of these invasive insects over the three summers. After the second summer assisting with the gypsy moth program, the study was discontinued due to the lack of evidence that gypsy moths were in the area (and possibly lack of funding). The emerald ash borer wasn’t found in the traps, but evidence of their presence has been found in the project area. We have removed several stressed ash trees near the Visitor Center that demonstrated some of the emerald ash borer infestation warning signs.

Nesting Habitat Management

I have also assisted with the coordination and implementation of several nesting box programs that create cavity nesting habitat for several bird species. We put up Eagle Scout-created nesting boxes designed for Eastern Bluebirds, Wood Ducks and Prothonotary Warblers. Many other bird species use the boxes including Tufted Titmice, Carolina Chickadees, House Wren, Tree Swallows, Great-crested Flycatchers and Screech Owls. A majority of the bluebird box program is accomplished through volunteer monitoring. Each volunteer has his or her own trail of boxes that he or she walks every week during the breeding season. My role has been to assist with
volunteer concerns as they arise, grease bluebird poles, replace boxes and control House Sparrows. Wood ducks boxes are checked in the winter when the ponds they are on are sufficiently frozen. We walk out onto the ice-covered ponds, attempt to count the egg fragments in order to estimate fledgling rates and replace the cedar chips. I can be a lengthy process, particularly when we have to hike out to the boxes with all our gear. There are about 40 boxes to check on the project, and many of them are scattered in areas that are not directly adjacent to roads and parking lots. So this usually makes for some cold winter hiking and bushwhacking through honeysuckle.

![Figure 9. (a) Matthew Palmer installing a Prothonotary Warbler nest box and (b) counting Wood Duck egg fragments with a curious onlooker.](image)

Project Boundary Monitoring

Monitoring the boundary of the park is also done in the winter. Between three rangers the entire 40 miles of park boundary are monitored every year, typically during the months of November and December after the leaves have fallen off the trees. It’s easier to bushwhack through the woods after honeysuckle has dropped its leaves, especially in the heavily disturbed forest edges where honeysuckle is abundant. Without the leaves on the trees we can use a handheld GPS unit to find the monument markers. The GPS unit makes walking the boundary quicker and easier. After the boundary has been walked, the following year is spent addressing issues such as trespasses, encroachments and missing monument markers.
Figure 10. Boundary maintenance. (a) Ranger Matthew Palmer installing a Carsonite post to mark a boundary monument, (b) Rangers Matthew and Rebecca Palmer installing posts along an agricultural trespass and (c) Ranger Matthew surveying along the boundary line.
GIS Technology Application

Not all natural resource work is done in the field. I have worked on several natural resource projects utilizing GIS tools. I used ESRI’s ArcGIS for a level one natural resource inventory of Caesar Creek Lake (see Appendix B). The inventory involved the mapping and qualification of wetlands, vegetation types, soils and endangered and threatened species on the project. I gathered, manipulated and presented all of the GIS data for these inventories. After completing the inventory for Caesar Creek Lake, I completed inventories for the other lakes in the Miami River Area, including Brookville Lake, West Fork Lake, William H. Harsha Lake and C.J. Brown Dam and Reservoir. Upon completion of the area’s inventories, I was encouraged to offer my help to other lake projects in the District, completing inventories for Patoka Lake in Indiana and Barren River and Cave Run Lakes in Kentucky. My knowledge of GIS tools made me a valuable temporary ranger and directly contributed to getting hired on full time. Other GIS projects have included making maps of Prothonotary Warbler nest box locations, the Caesar Creek Lake/Spring Valley Audubon Christmas Bird Count circle and Ohio Breeding Bird Atlas quadrants. In 2011 I became a member of a District-wide GIS/GPS working group called a Community of Practice. Through the Community of Practice (CoP) I hosted and taught an intro to GIS class for the Louisville District. I was teaching fellow park rangers and my supervisors some of the basic GIS techniques they could apply on the job. It was a challenge I took on with great enthusiasm.
Figure 11. Caesar Creek Lake Level 1 Natural Resource Inventory - Land Capability Class
Park Ranger Community of Practice

Last year, I applied and was selected to be on the National- and Division-wide Park Ranger Communities of Practice. The Park Ranger CoP focuses on the development of the Park Ranger profession within the U.S. Army Corps of Engineers. We are responsible for planning conferences, webinars and other aids to professional development. I orchestrated a sustainability webinar that addressed minimizing resources such as electricity in our campgrounds and facilities. As environmental concerns heighten and budgets tighten, the Corps is looking for ways to decrease its energy consumption and costs.

Wetland Habitat Restoration Partnership

Partnering with other agencies has increased in importance in the current fiscal climate. Not only do we partner with the USDA to monitor for invasive insects, but we have partnered with the Ohio Department of Transportation (ODOT), Natural Resources Conservation Service (NRCS), Warren County Soil and Water and the Ohio Division of Wildlife to restore a seven-acre wetland at Caesar Creek Lake. ODOT brought in its heavy equipment operators and tools necessary to construct a dam and water control structure. I assisted the crew by tamping down the soil as they relocated it to the dam. With the help of volunteers and Corps staff, I transplanted wetland plants and seed to the newly restored wetland. I also collected prairie seed and sowed it around the exposed soil surrounding the wetland. The prompt establishment of desirable native plants is essential before invasive plants take root. I’ve taken the time to monitor the water control structure and dam during and after rains.
Ohio Environmental Protection Agency Water Quality Partnership

I facilitated a partnership with the Ohio Environmental Protection Agency (OEPA) to assist with a two-year-long lake profile study of Caesar Creek Lake and its tributaries. My role was that of boat operator for the OEPA water quality staff. I also collected the Corps weekly lake profile temperatures and dissolved oxygen levels while out on the boat. The OEPA staff took a myriad of data at three distinct sites around the lake. Site A was near the dam in the deepest part of the lake (100+ feet); site B was near the water intake structure for the nearby City of Wilmington and Site C was where Caesar Creek enters Caesar Creek Lake. Data collected included lake profile temperatures and dissolved oxygen, inorganic and organic solids, zooplankton and phytoplankton. I enjoyed spending the day out on the lake assisting and learning from the OEPA staff.
Figure 13. Rangers Matthew and Rebecca Palmer taking the OEPA staff out on the lake.

_Boat Patrols_

I never envisioned myself as a boat operator, but as it turned out the Corps sent me to its boat operator’s course. The Corps has recently increased its emphasis on water safety and has made it its goal to reduce drowning accidents to zero at Corps of Engineers lakes. The mission befits the organization, since Corps projects are focused around water resources such as rivers and reservoirs. Generally once a week between Memorial Day and Labor Day, I’m on the lake promoting water safety. While on boat patrol I’m either alerting boaters to the rules on the water or rewarding boaters for playing it safe. I carry water safety giveaways, which include Frisbees, floating key chains and coloring books. I hand these out to kids wearing their life jackets and adults following the rules. The Corps rangers usually play good cop on the water and leave the
role of bad cop to ODNR, Division of Watercraft who has a weekly presence on the lake during the summer months.

Visitor Assistance

Boat patrols are one part of my overarching responsibility to visitor assistance. Visitor assistance means protecting visitors from themselves, from each other and protecting the visitor from the project’s resources or vice versa. I do all of this with federal citation authority but no law enforcement capabilities. However, I have never written a citation, and I average one warning citation per year. As an occupation made up of biologists, environmental scientists and resource managers, we are neither equipped nor expected to enforce any regulations other than the Corps’ Title 36 regulations, which include requirements such as parking in designated areas, keeping your dog on a leash and refraining from cutting down trees on government property. We contract out law enforcement in our operations area to Warren County law enforcement, and since we lease much of the project out to the State of Ohio, the State Park rangers enforce their regulations on State-leased land. Even though we are not out looking for infractions, to protect ourselves as uniformed rangers, we are trained in unarmed self-defense, verbal judo, first aid, CPR and use of pepper spray. I have only ever had to use my verbal judo training albeit in very low-risk situations. If I ever have to use my pepper spray it will most likely be on a dog, as we are trained to avoid situations that could escalate to requiring pepper spray use.

Visitor Center Operation

Working at a Visitor Center within a project that gets about 1 million visitors per year, it is only natural that I’m in contact with the public on a daily basis. If I’m not working directly with visitors at our Center or recreation areas, I’m answering phone calls. In the peak of summer we may get as many as 400-500 visitors per day through the doors of the Visitor Center. We are constantly answering questions, handing out brochures, handling complaints, taking shelter and program reservations, etc… In order to make the visitor’s experience positive I am continuously tidying up the Visitor Center, researching questions and creating new displays. We even make book cart sales for our cooperating organization Friends of Caesar Creek.
Friends of Caesar Creek Cooperating Association

Friends of Caesar Creek (FOCC) is a 501(c)(3) not-for-profit volunteer organization dedicated to educating the public about the natural resources at Caesar Creek Lake. They support the education, scientific and historical activities of the project by offering workshops and programs and operating a regional interest book cart with educational materials at the Caesar Creek Lake Visitor Center (Friends of Caesar Creek bylaws). FOCC supports interpretive programs such as Trilling Toads and Tiny Treefrogs, Spring Birding Clinic, Junior Rangers, Owl Moon and the Caesar Creek Lake/Spring Valley Audubon Christmas Bird Count. FOCC has also supported the development of a topographical trail map, playground, fitness trail, welcome video and several displays.

Coordinating Volunteer Work

We rely on volunteers to accomplish our missions. I frequently task Warren County community service workers with picking up trash at the project. I also work with Eagle Scouts on their Eagle Scout projects. Projects range from constructing nest boxes to trail bridges and stairs. I have a crew of Bluebird nest box monitors that conduct weekly checks of their Bluebird trails. If trails need mowed, boxes need replaced or poles need greased, I am out fixing trails. Volunteers assist us with programs, Visitor Center operations, trail work, natural resource work and much more. Volunteers require extra work, but their efforts can prove to be rewarding for both the agency and the volunteer.

Public Programs

As I alluded to previously, programming is a significant part of my job. In the fall and spring-time, school groups are filing through our Center on a daily basis. Our most popular program includes a tour of the Visitor Center, hike, pond study, Ordovician fossil talk and fossil hunting in our emergency spillway. School groups range from kindergarten to college-aged but most groups consist of second or third-graders. In the summer weekday programs slow down, but we still offer daycare programs. We also offer stream quality monitoring programs and control
tower tours. In addition to our weekday programming, we offer public programs on the weekends throughout the year. We are a seven day a week operation. Weekend programs include the BioBlitz; Little Miami Watershed Festival; Webelos Geologist, Naturalist and Forester badges; Ohio Bird Banding Association Banding Demonstration and Take a Warrior Fishing, among many others.

To get the word out to the public about our programs I send out press releases, make fliers, event calendars and displays. I also rewrote and redesigned a Teacher’s Packet, which highlights our school programs and includes activity worksheets for the students (see Appendix 3). Topics include flood control, natural resource management, Ordovician fossils, pond life and water safety. I found myself really enjoying the work I did on this time-consuming project.

Figure 14. Example of an activity in the revised Teacher’s Packet.
I have also incorporated the educational and research components of bird banding into my job. I offer public banding demonstrations throughout the year and collaborate with volunteer and master bird bander Robert Thobaben every winter on a feeder habitat study. For the last three fall Northern Saw-whet Owl migration seasons, I banded regularly in the evening hours not only to monitor owl migration at Caesar Creek Lake but give the public a look at these elusive owls. It has been fascinating to see owls I have banded being recaptured in places like Maine and Minnesota. I have learned a lot through my banding efforts and I know visitors both young and old enjoy participating.

Figure 15. Northern Saw-whet Owl (a) extracting, (b) banding and (c) educating.
Bird-related Programs

I have also used public programs as an outlet for my love of birds. Bird-related programs include the Mid-winter Bald Eagle Survey, Spring Birding Clinic, International Migratory Bird Day, Owl Moon, the BioBlitz and the Audubon Christmas Bird Count (CBC). This past year the Caesar Creek Lake/Spring Valley CBC included 70 volunteers, including a group of about 10 children. The 2012 CBC was a huge success and I hope it continues to grow as birding transcends all age-groups. It is nice that to some extent I can create programs based upon my interests and skills.

Water Safety Outreach

As I have mentioned, water safety is very important in my organization, so naturally I also conduct water safety programs. A lot of our water safety programming is off-site. We attend events like the Cincinnati Boat Show, Ohio State Fair, Dayton Water Fest, Waynesville 4th of July Parade, Paddlefest at Coney Island and the Kid’s Safety Fair at Great American Ballpark. We have two mascots: Buddy the Beaver and Bobber the Water Safety Dog, both of which I have been tasked with animating. Our mascots often make an appearance at public water-related events and participate in sports like Mascot Broomball at Fountain Square, the Flying Pig Marathon, the Nascar truck series and Mascot Wiffleball at Great American Ballpark. I have personally met the Gapper, Rosie Red and Mr. Redlegs, to name a few famous mascots. The Gapper is a real piece of work, but I guess it comes with the territory when you are a professional mascot. Water safety programs can be a lot of fun, unless of course I’m stuck being the mascot on a 90 degree day.
SYNTHESES AND CONCLUSIONS

My job duties span a wide array of disciplines including biology, environmental science, education, communications, public relations and natural and recreation resource management. This list doesn’t even scratch the surface of all of the various day-to-day tasks that I do at Caesar Creek Lake. It can be difficult to briefly describe my profession when friends and family ask, but it is even more difficult to dispel the myths of what I do in the mind of the public. To some I’m a park cop, to others a naturalist. Wearing a uniform conjures up many first impressions and to some extent they are all true. It can certainly be fun and rewarding to wear so many different hats, but it can also be challenging. I am expected to be a jack-of-all-trades and a master-of-most, in the eyes of the public and sometimes even my supervisors. Fortunately, the Corps offers both formal and informal training opportunities, and if I don’t have the answers I can look them up or ask more experienced coworkers.

The interdisciplinary nature of the IES program was a fitting prelude to my job as a park ranger. IES provided me with varied coursework and problem solving projects that prepared me for these challenges. In Environmental Measurements we spent time identifying macroinvertebrates and fish in local streams. We also practiced using surveying levels and evaluating bird banding
data. In my GIS courses we learned how to use ArcGIS and GPS units. Working as a teaching assistant for Ornithology and Introductory Biology classes gave me some of the platform skills I need when speaking to the public.

A big adjustment for me has been adapting to the unfocussed nature of the profession. In other words, interruptions while working are a part of the job, particularly while working at the Visitor Center during the peak visitation season. Working on a project at my computer or with a coworker also means I’m answering phone calls and getting up to help visitors at the front desk, sometimes two or more of those at the same time! As a person who tends to put a great deal of focus and care into my work, I still find the constant interruptions to be a challenge. Sometimes I have to mentally walk through what I have done over a given amount of time to remember what I was doing in the first place. It can be frustrating, but alas these interruptions are part of the job.

The most challenging part of being a park ranger has been working with the public. Visitors, as one might imagine, can be very easy to please or very difficult to please, and sometimes there is no pleasing anyone, or so it seems. Of course the difficult ones are the exception, rather than the rule. People generally like park rangers and seem to remember me. I’m at the disadvantage of usually not remembering a single one of them, except for the ones who make a lasting impression. For example, there are visitors who are so worked up about something that they enter the Visitor Center and want help or answers immediately. There are visitors that seem to think I’m their counselor and require my ear for upwards of a half an hour. There are even visitors who think the Visitor Center is a great place to pick up women. There is never a dull moment when the public is involved. The public relations aspect of the job has challenged me to think on my feet. While it might have behooved me to take a communications or public relations class while at Miami University, the Corps has offered me several applicable training opportunities including Ranger Safety Training and Visitor Assistance.

Equally as difficult at times is working with my fellow rangers and supervisors. It is comparable to working on the IES public service project all over again. There are times when people skate by and do the bare minimum and there are times when people work towards bettering themselves and the mission of the group. Working on projects with varying levels of commitment can make
working as a team a challenge. While the rewards are few for hard work and integrity in the short term, I hope in the long term it pays off.

I eventually see myself possibly advancing to the role of park manager at a Corps project, which would bring upon a whole new set of tasks and challenges. I would be responsible for creating budgets, monitoring contracts, data tracking and entry and the list goes on. The fun field work would mostly be a thing of the past, but I would hope that I can still visit it and break the chains of my computer. The park manager position is not as glorified of a position as the park ranger even though it’s better paid.

There are days when the challenges of the job such as dealing with people are not as fulfilling as the mental challenges I enjoyed in the academic setting. The physicality of the job can also be exhausting when it’s not exhilarating. After obtaining my masters, I may consider applying to teach at a community college, or maybe I will use the friends I have made through the numerous partnerships to pursue a more focused career with an organization like the EPA. No matter the career path I choose, I know I will be equipped with the foundation that IES and my internship has provided.

My time with the Corps has been a learning experience. Being a ranger has taken me out of my comfort zone as a scientist and pushed me into the realms of public relations and communications. I read a book recently called Don’t be Such a Scientist: Talking Substance in an Age of Style. The author, Randy Olson, shares what he has learned about communicating science to the general public. As scientists we shouldn’t be so cerebral, so literal-minded and so unlikeable, and we shouldn’t be such poor storytellers. I educate the general public about science and nature through programs and day-to-day interactions, and I know that I have demonstrated some if not all of those characteristics. Working as a park ranger and pursuing my masters with IES have both stretched my tendency to think and act like such as scientist.
REFERENCES


TRAINING AGREEMENT FOR
NATURAL RESOURCES MANAGEMENT TRAINEES

1. Execution of the following agreement is required as a condition of employment upon entrance into the position Natural Resource Management Specialist, GS-0401-05/7/9, in the Engineer and Scientist career field. Selection for this position is contingent upon the selectee’s timely execution of the agreement.

2. Management acknowledges the obligation to exercise judgment and integrity in providing required training and directing placement for interns.

3. The undersigned selectee understands:

   a. The requirements of the intern training plan for the Engineer and Scientist career field which are set forth in the Civilian Personnel Regulation (CPR) as outlined below, and recognizes the obligation to accept temporary training or developmental assignments as permanent changes of duty station (PCS) as directed by the Command Career Program Manager or DA Functional Chief for this career field.

   b. Specifically, the following information is applicable:

      Location of Training Site: CELRL-OP-MR-C (Caesar Creek Lake)
      Entrance of Duty (EOD) Date_________________________
      During of Initial Training: Two Years from EOD.
      Location of Permanent Duty Location (PDL) Assignment: Caesar Creek Lake

   c. During tenure in the career intern program, promotions are dependent upon satisfactory performance and completion of required training; as follows:

      ENTRY GRADE GS-05
      MINIMUM TIME TO GRADE GS-07 is 12 months
      MINIMUM TIME TO GRADE GS-09 is 12 months

   d. The target grade level is GS-09. Promotion beyond the target grade is contingent upon the provision of CPR 950-a. Career Management – Basic Policies and Requirements; and individual employee performance demonstrated potential; and availability.

   e. The undersigned selectee understands that appropriate pay adjustments will be provided in the inservice placement of current Federal employees within the entry level grade for which selected and initial Permanent Change of Station (PCS) benefits will be provided under controlling regulations.

5. The undersigned selectee understands that authorized travel and transportation expenses incident to temporary or PCS, after EOD, will be borne by the Federal Government.
RANGER TRAINING PROGRAM
AGREEMENT TO FOLLOW RANGER TRAINING PROGRAM PLAN
IN PROGRESSING THROUGH RANGER TRAINEE PROGRAM

I _________________ understand that I am enrolled in the Louisville District Natural Resource Management Training Program. I further understand that the attached training plan will be used as a guide during the time that I am enrolled in the Natural Resource Management Training Program. I hereby certify that I will do all that is within my power to complete the on the job training and scheduled formal training with in the program.

____________________________________  ____________________
EMPLOYEE                                  DATE

____________________________________  ____________________
SUPERVISOR                                  DATE
## NATURAL RESOURCES MANAGEMENT TRAINEE
### ON-THE-JOB CHECKLIST

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<td><strong>Natural Resources Management</strong></td>
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<td>Review Engineer Regulation (ER) and Engineer Pamphlet (EP)</td>
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<td>1130-2-540 Project Operations</td>
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<td>Environmental Stewardship</td>
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<td>Operations and Maintenance Policies</td>
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<td>Become Familiar w/ Section 10 &amp; 404 permit procedures enough to refer &amp; interpret to the public</td>
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<td>Conduct planning and forest and wildlife management activities</td>
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<td>Participate in Water Quality Testing Procedures</td>
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<td>Review Erosion Control Techniques and Demonstrate Ability to Determine Erosion Control Needs</td>
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<td>Participate in Boundary Line Maintenance Activities and/or</td>
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<td>Assist in Administration of Contract</td>
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<td>Conduct Encroachment Survey</td>
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<td>Review Cultural Resources Program and Historic Properties Management Plan</td>
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<td>Take the local Pest Control Course</td>
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<td>Demonstrate Ability to Interpret Maps, Aerial Photos, &amp; Survey Plats</td>
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<td>Demonstrate Basic understanding of survey equipment</td>
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<td>Review GIS and OPIE Project Applications</td>
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<td>Demonstrate ability operate GPS equip and collect field data</td>
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<td>Demonstrate ability to incorporate data and create project maps</td>
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<td>Meet and know the ODNR Divs. of Wildlife staff at Spring Valley and District 5</td>
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<td>Meet and know the Divs. of Natural Areas &amp; Preserves staff</td>
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<td><strong>Recreation</strong></td>
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<td>Read ER and EP 1130-2-550</td>
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<td>Review Project Sign Management Plan</td>
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<td>Participate in Administration of User Fee Program</td>
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<td>Prepare Monthly Visitation Reports</td>
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<td>Read and Maintain Traffic Counters. Enter VERS data</td>
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<td>Review Project Operations and Maintenance Business Information Link (OMBIL) Data</td>
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<td>Participate in Outgrant/Compliance Inspections</td>
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<td>Review project Real Property Report</td>
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<td>Plan and conduct Customer Surveys</td>
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<td>Demonstrate Proficiency in Motorboat Operation</td>
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<td>Demonstrate Proficiency in Radio Operations</td>
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<td>Prepare and Present Interpretative Programs and/or Conduct Tours</td>
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<td>Prepare and Present Programs to Civic Clubs</td>
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<td>Participate in Public, Employee, Contractor Safety Programs</td>
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<td>Participate and Conduct Recreation Area Safety Inspection</td>
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<td>Participate in Playground Safety Inspections</td>
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<td>Demonstrate Proficiency in Using Digital Cameras</td>
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<td>Review and Participate in Recreation Facilities Design, Construction and Maint.</td>
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<td>Meet and know the ODNR Divs. of Park staff at Caesar Creek Lake</td>
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<td>Prepare News Releases</td>
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**NATURAL RESOURCES MANAGEMENT TRAINEE**  
**ON-THE-JOB CHECKLIST**

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<td><strong>Visitor Center Operations</strong></td>
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<td>Review EP 1130-2-434 Interpretive Services and Outreach Program</td>
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<td>Read EP 1130-2-433 Volunteer Brochure</td>
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<td>Participate and Review Project Volunteer Program</td>
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<td>* Host the volunteer appreciation dinner</td>
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<td>Review Caesar Creek Lake Visitor Center Interpretive Plan.</td>
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<td>Perform Interpretive and Educational programs appropriate to the project Interp. Plan.</td>
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<td>*Create a completely new weekend program start to finish</td>
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<td>Read and apply the principles and information to Interpretive &amp; Educational Outreach Programs</td>
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<td>Freeman Tilden: &quot;Interpreting Our Heritage&quot;</td>
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<td>William J. Lewis: &quot;Interpreting for Park Visitors&quot;</td>
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<td>Joseph Cornell: &quot;Sharing Nature with Children&quot;</td>
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<td>&quot;Fossils of the Cincinnati Arch&quot;</td>
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<td>Sam Ham: &quot;Environmental Interpretation&quot;</td>
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<td>Shrake: &quot;Excursions at Caesar Creek Lake&quot;</td>
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<td>&quot;The History of the Army Corps of Engineers&quot;</td>
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<td>*design an interpretive front air lock display from conception &amp; design to contracting &amp; completion</td>
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<td>Learn and use the building Opening/Closing procedures.</td>
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<td>*Take on the responsibility &amp; manage, become chair person for least one special program (GUD, Water-Fest, Jr. Rangers, or BioBlitz)</td>
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### Visitor Assistance

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<td>Demonstrate Understanding of Visitor Assistance Program</td>
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<td>Complete “Safe Self” Annual Training</td>
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<td>Complete OC Spray training &amp; required refresher trainings</td>
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<td></td>
</tr>
<tr>
<td>Prepare Citation Reports</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Prepare Schedules for Rangers in Patrol Work Situations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review Project Search &amp; Rescue Procedures</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Attend Federal Magistrate Court and Observe Courtroom Procedures</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Review Project Security Plans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Issue Warning Citations and Violation Notices *Once USACE VA course is completed</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Flood Damage Reduction / Maintenance

<table>
<thead>
<tr>
<th>Duties</th>
<th>Date Scheduled</th>
<th>Date Complete</th>
<th>Ranger</th>
<th>Supervisor</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participate in Operations (Planning and Procedures) for a two week minimum period</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrate understanding of Flood Damage Mission and role of project</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read Project Dam Safety Plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read Project O&amp;M Manual</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Review Flood Control Gate Operators Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study &amp; receive Gate Operators Certification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observe / Conduct Gate Operations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrate Understanding of Project Flood Pool Elevations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participate in the collection Rain Gauge Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participate in the collection of Dissolved Oxygen and Lake Temperature Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participate in processing Daily Lake Bulletin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review Project Safety Plans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participate in MR Project Safety Inspections</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review of Hazardous Materials on Project</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# NATURAL RESOURCES MANAGEMENT TRAINEE ON-THE-JOB CHECKLIST

(Flood Damage Reduction / Maintenance cont.)

<table>
<thead>
<tr>
<th>Prepare News Releases</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedures for operating equipment &amp; licensing</td>
<td></td>
</tr>
<tr>
<td>Overview of facilities on Project</td>
<td></td>
</tr>
</tbody>
</table>

## CONTRACTS

<table>
<thead>
<tr>
<th>Participate in Administration for a minimum two week period</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare Scopes of Work and/or RFQ's for contracts</td>
<td></td>
</tr>
<tr>
<td>Conduct QA Inspections</td>
<td></td>
</tr>
<tr>
<td>Assist with establishment and management of the project LECA</td>
<td></td>
</tr>
<tr>
<td>Duties</td>
<td>Date Scheduled</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Administration</td>
<td></td>
</tr>
<tr>
<td>Prepare Written Responses to Request for Information</td>
<td></td>
</tr>
<tr>
<td>Get CEFMS Card &amp; learn the process for Receiving, processing travel vouchers, etc.</td>
<td></td>
</tr>
<tr>
<td>Prepare Responses to Memorandums</td>
<td></td>
</tr>
<tr>
<td>Prepare Incident Reports</td>
<td></td>
</tr>
<tr>
<td>Review Lower-graded Park Ranger Work for Approval</td>
<td></td>
</tr>
<tr>
<td>Participate in Budget Preparation for VC Operations and/or local projects</td>
<td></td>
</tr>
<tr>
<td>Review Time Keeping Procedures</td>
<td></td>
</tr>
<tr>
<td>Review Travel Procedures</td>
<td></td>
</tr>
<tr>
<td>Participate in Administrative Operations with the Office Administrator</td>
<td></td>
</tr>
<tr>
<td>Basic understanding of Project Files and</td>
<td></td>
</tr>
<tr>
<td>Demonstrate telephone etiquette</td>
<td></td>
</tr>
<tr>
<td>OTHER PROJECT SPECIFIC</td>
<td></td>
</tr>
<tr>
<td>Conduct Homeland Security Reporting Procedures</td>
<td></td>
</tr>
<tr>
<td>Review ENGLink &amp; Personal Data</td>
<td></td>
</tr>
<tr>
<td>Review Environmental Operating Principles – Commanders Policy Memorandum # 12</td>
<td></td>
</tr>
<tr>
<td>Review PMBP</td>
<td></td>
</tr>
<tr>
<td>Read ER 25-1-8 – Communities of Practice in the USACE</td>
<td></td>
</tr>
<tr>
<td>Review CCK Authorizations</td>
<td></td>
</tr>
<tr>
<td>Review Title 36 CFR</td>
<td></td>
</tr>
<tr>
<td>Review CCK SOPs</td>
<td></td>
</tr>
<tr>
<td>Review the Project OMP</td>
<td></td>
</tr>
</tbody>
</table>
The following should be signed and forwarded to the OP CPAC Representative when all training assignment have been completed:

_______________________________  __________________________
Natural Resource Management Intern  Date

_______________________________  __________________________
Immediate Supervisor  Date

_______________________________  __________________________
Operations Manager  Date

_______________________________  __________________________
OP CPAC Representative  Date
**Required Courses** The trainee is required to attend & satisfactorily complete the below specified courses.

<table>
<thead>
<tr>
<th>Course</th>
<th>Scheduled</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visitor Assistance Program for Natural Resource Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O&amp;M Contracting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpretive Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action Officer Development Course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OSHA Inspection of Facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dam Safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attend a local or National NAI conference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Army Civilian Education System Leadership Program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foundations Course (Distributed Learning) (If Required by CPAC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attend APPL conference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Aid and CPR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Safety and Motorboat Operators License</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defensive Driving</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Suggested courses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Wet or Project Wild facilitator course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attend NPS Interpretive Panel and Wayside exhibit course</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Elective Training** (After completion of required training, emphasis should continue on elective courses through Individual Development Plans). Trainee should complete or schedule at least two of these courses during the 24-month training period.

<table>
<thead>
<tr>
<th>Course</th>
<th>Scheduled</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Involvement and Communications Skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photography (on Project)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective Letter Writing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective Briefing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Awareness/Conflict Resolution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural Resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LRD Ranger Meeting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LRL Ranger Meetings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MRA Meetings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Miscellaneous Required Training

<table>
<thead>
<tr>
<th>Course</th>
<th>Scheduled</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preventing Sexual Harassment in the Workplace</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EEO its Place in the Federal Government</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Ethics Training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security Training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government Travel Card Training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective Work Delegation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Cross-Training: **OPTIONAL** - Based on budget, mission requirements, and availability
(Training must be approved in Advance by Operations Manager and Operations Division Chief)

**OPTIONAL**: Two Weeks; one week at two projects

<table>
<thead>
<tr>
<th>Project One</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>Dates</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Two</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>Dates</td>
<td></td>
</tr>
</tbody>
</table>

Comments Concerning Cross-Training:

**OPTIONAL**: District Office Training Assignment

Required: Minimum two weeks – to be arranged by Operations Manager

<table>
<thead>
<tr>
<th>Scheduled</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Dates of Training</td>
<td></td>
</tr>
</tbody>
</table>

Other Training Assignments
APPENDIX B: LEVEL ONE INVENTORY
Introduction

The following summary report addresses the findings of a level one natural resource inventory at Caesar Creek Lake. Level one natural resource inventory data are used in determining natural resource management needs. The level one inventory is a general classification and quantification of resources present on the project site. The inventory is based on four basic resource sets including vegetation cover types, soil capability, wetlands, and special status species. Standards in collecting these datasets have been implemented to maintain consistency and provide data that can be shared on the national level. This data will provide information to guide natural resource planning, development, restoration and environmental reviews.

Methods

Level One Natural Resource Standards

Vegetation cover types were assessed and classified according to the National Vegetation Classification System (NVCS) to the subclass level. Soils were classified based on the suitability of the land for use without permanent damage according to the Land (Soil) Capability Classes, as defined by the Natural Resources Conservation Service (NRCS). Classifications of wetlands were completed using the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) classification standard to the subclass level. Special status species comprise the fourth and final component of the level one inventory. Because the inventory for special status species is still in process, it is not discussed in this document.

Vegetation Classification Methods

Vegetation classification for the Caesar Creek Lake Project was accomplished by using ESRI ArcGIS 9.3 and three GIS data layers: a fee title shapefile created from segment maps and the National Land Cover Database (NLCD) 2001 land cover and tree canopy raster data (available online at http://www.mrlc.gov/). Area in acres of the NLCD 2001 data layers was calculated and acreage was summed in tabular form for each vegetation subclass.

Wetland Classification Methods

Wetland classification for the Caesar Creek Lake Project was accomplished using ESRI ArcGIS 9.3, a fee title shapefile created from segment maps and an USFWS National Wetland Inventory shapefile (available at http://www.fws.gov/wetlands/). Area in acres of the NWI polygons was calculated and acreage was summed in tabular form for each wetland subclass.
Land (Soil) Capabilities Classification Methods

Land (soil) capabilities classification for the Caesar Creek Lake Project was accomplished by using ESRI ArcGIS 9.3, a fee title shapefile created from segment maps, SSURGO soils data (available at [http://soildatamart.nrcs.usda.gov/](http://soildatamart.nrcs.usda.gov/)) and the soil data viewer tool for ArcGIS 9.3 (available at [http://soildataviewer.nrcs.usda.gov/](http://soildataviewer.nrcs.usda.gov/)). The soil data viewer tool was used to map the appropriate nonirrigated capability class for each soil type. Area in acres was calculated and acreage was summed in tabular form for each nonirrigated capability class.

Results

Vegetation

The most common vegetation type is closed tree canopy deciduous forest at 3,875 acres. The second most common vegetation type is open tree canopy deciduous forest at 876 acres, followed by closed tree canopy evergreen-deciduous (mixed) forest at 744 acres (Table 1). A vegetation map can be referenced on the following page in Figure 1.

Table 1. Vegetation Classification

<table>
<thead>
<tr>
<th>Land Cover</th>
<th>Sum (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Water</td>
<td>2820.853</td>
</tr>
<tr>
<td>Developed, Open Space</td>
<td>386.300</td>
</tr>
<tr>
<td>Developed, Low Intensity</td>
<td>27.577</td>
</tr>
<tr>
<td>Developed, Medium Intensity</td>
<td>19.126</td>
</tr>
<tr>
<td>Developed, High Intensity</td>
<td>14.233</td>
</tr>
<tr>
<td>Barren Land (Rock/Sand/Clay)</td>
<td>79.395</td>
</tr>
<tr>
<td>Open Tree Canopy Deciduous</td>
<td>875.791</td>
</tr>
<tr>
<td>Closed Tree Canopy Deciduous</td>
<td>3875.230</td>
</tr>
<tr>
<td>Open Tree Canopy Evergreen</td>
<td>23.129</td>
</tr>
<tr>
<td>Closed Tree Canopy Evergreen</td>
<td>204.381</td>
</tr>
<tr>
<td>Open Tree Canopy Mixed</td>
<td>73.390</td>
</tr>
<tr>
<td>Closed Tree Canopy Mixed</td>
<td>743.688</td>
</tr>
<tr>
<td>Shrub/Scrub</td>
<td>110.975</td>
</tr>
<tr>
<td>Grassland/Herbaceous</td>
<td>108.751</td>
</tr>
<tr>
<td>Pasture/Hay</td>
<td>607.583</td>
</tr>
<tr>
<td>Cultivated Crops</td>
<td>623.373</td>
</tr>
<tr>
<td>Woody Wetlands</td>
<td>9.785</td>
</tr>
<tr>
<td>Emergent Herbaceous Wetlands</td>
<td>26.465</td>
</tr>
<tr>
<td><strong>Total Acres</strong></td>
<td><strong>10630.02548</strong></td>
</tr>
</tbody>
</table>
Caesar Creek Lake Vegetation Classification

Land Cover
- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Barren Land (Rock/Sand/Clay)
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

Figure 1.
Wetlands

The most common classification of wetlands is the main portion of Caesar Creek Lake, which is classified as L1UBHh at 5,348 acres. The second most common wetland classification is the lower perennial riverine system at 1,703 acres, followed by PFO5Fh at 49 acres (Table 2). A wetland map can be referenced on the following page in Figure 2.

Table 2. Wetland Classification

<table>
<thead>
<tr>
<th>Code</th>
<th>System</th>
<th>Subsystem</th>
<th>Class</th>
<th>Subclass/Modifier</th>
<th>Total Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1UBFh</td>
<td>Lacustrine</td>
<td>Limnetic</td>
<td>Unconsolidated Bottom</td>
<td>Semi-permanently flooded - Diked/Impounded</td>
<td>8.0985</td>
</tr>
<tr>
<td>L1UBHh</td>
<td>Lacustrine</td>
<td>Limnetic</td>
<td>Unconsolidated Bottom</td>
<td>Permanently flooded - Diked/Impounded</td>
<td>5,348.2979</td>
</tr>
<tr>
<td>L2UBFh</td>
<td>Lacustrine</td>
<td>Littoral</td>
<td>Unconsolidated Bottom</td>
<td>Semi-permanently flooded - Diked/Impounded</td>
<td>28.9103</td>
</tr>
<tr>
<td>L2UBGh</td>
<td>Lacustrine</td>
<td>Littoral</td>
<td>Unconsolidated Bottom</td>
<td>Intermittently Exposed - Diked/Impounded</td>
<td>40.6062</td>
</tr>
<tr>
<td>PABF</td>
<td>Palustrine</td>
<td>Aquatic Bed</td>
<td></td>
<td>Semi-permanently flooded</td>
<td>0.2620</td>
</tr>
<tr>
<td>PABGh</td>
<td>Palustrine</td>
<td>Aquatic Bed</td>
<td></td>
<td>Intermittently Exposed - Diked/Impounded</td>
<td>0.3104</td>
</tr>
<tr>
<td>PEMA</td>
<td>Palustrine</td>
<td>Emergent</td>
<td>Temporarily flooded</td>
<td></td>
<td>7.0394</td>
</tr>
<tr>
<td>PEMC</td>
<td>Palustrine</td>
<td>Emergent</td>
<td></td>
<td>Seasonally flooded</td>
<td>0.1963</td>
</tr>
<tr>
<td>PFO1A</td>
<td>Palustrine</td>
<td>Forested</td>
<td>Broad-Leaved Deciduous</td>
<td>Temporarily flooded</td>
<td>0.4852</td>
</tr>
<tr>
<td>PFO5Fh</td>
<td>Palustrine</td>
<td>Forested</td>
<td>Dead - Semi-permanently</td>
<td>Diked/Impounded</td>
<td>49.1694</td>
</tr>
<tr>
<td>PFO5Gh</td>
<td>Palustrine</td>
<td>Forested</td>
<td>Dead - Intermittently</td>
<td>Exposed - Diked/Impounded</td>
<td>9.4661</td>
</tr>
<tr>
<td>PSS1C</td>
<td>Palustrine</td>
<td>Scrub Shrub</td>
<td>Broad-Leaved Deciduous</td>
<td>Seasonally Flooded</td>
<td>0.4059</td>
</tr>
<tr>
<td>PSS1F</td>
<td>Palustrine</td>
<td>Scrub Shrub</td>
<td>Broad-Leaved Deciduous</td>
<td>Semi-permanently Flooded</td>
<td>0.2679</td>
</tr>
<tr>
<td>PUBF</td>
<td>Palustrine</td>
<td>Unconsolidated Bottom</td>
<td></td>
<td>Semi-permanently flooded</td>
<td>0.3455</td>
</tr>
<tr>
<td>PUBG</td>
<td>Palustrine</td>
<td>Unconsolidated Bottom</td>
<td></td>
<td>Intermittently Exposed</td>
<td>0.9949</td>
</tr>
<tr>
<td>PUBGh</td>
<td>Palustrine</td>
<td>Unconsolidated Bottom</td>
<td></td>
<td>Intermittently Exposed - Diked/Impounded</td>
<td>14.5416</td>
</tr>
<tr>
<td>PUBGx</td>
<td>Palustrine</td>
<td>Unconsolidated Bottom</td>
<td></td>
<td>Intermittently Exposed - Excavated</td>
<td>7.0226</td>
</tr>
<tr>
<td>R2UBH</td>
<td>Riverine</td>
<td>Lower Perennial</td>
<td>Unconsolidated Bottom</td>
<td>Permanently Flooded</td>
<td>1703.3477</td>
</tr>
<tr>
<td>Map Code</td>
<td>System</td>
<td>Subsystem</td>
<td>Class</td>
<td>Subclass/Modifier</td>
<td>Total Acres</td>
</tr>
<tr>
<td>----------</td>
<td>---------------</td>
<td>-----------</td>
<td>------------------------</td>
<td>--------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td>Littoral</td>
<td>Unconsolidated Bottom</td>
<td>Semi-permanently flooded - Diked/Impounded</td>
<td></td>
<td>5348.2979</td>
</tr>
<tr>
<td></td>
<td>Littoral</td>
<td>Unconsolidated Bottom</td>
<td>Permanently flooded - Diked/Impounded</td>
<td></td>
<td>28.9103</td>
</tr>
<tr>
<td></td>
<td>Littoral</td>
<td>Unconsolidated Bottom</td>
<td>Semi-permanently flooded - Diked/Impounded</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Littoral</td>
<td>Unconsolidated Bottom</td>
<td>Intermittently Exposed-Diked/Impounded</td>
<td></td>
<td>40.6062</td>
</tr>
<tr>
<td></td>
<td>Palustrine</td>
<td>Aquatic Bed</td>
<td>Semi-permanently flooded</td>
<td></td>
<td>0.2620</td>
</tr>
<tr>
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<td>Emergent</td>
<td>Temporarily flooded</td>
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<tr>
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<td>Forested</td>
<td>Broad-Leaved Deciduous - Temporarily flooded</td>
<td></td>
<td>0.4862</td>
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<tr>
<td></td>
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<td>Forested</td>
<td>Dead - Semi-permanently flooded - Diked/Impounded</td>
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</tr>
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<td>Forested</td>
<td>Dead - Intermittently Exposed - Diked/Impounded</td>
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<td>3.4861</td>
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<tr>
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<td>Palustrine</td>
<td>Scrub Shrub</td>
<td>Broad-Leaved Deciduous - Temporarily flooded</td>
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<td>0.4059</td>
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<td>Palustrine</td>
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<td>0.2679</td>
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<td>Semi-permanently flooded</td>
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<td>0.3456</td>
</tr>
<tr>
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<td>Unconsolidated Bottom</td>
<td>Intermittently Exposed</td>
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<td>Intermittently Exposed - Diked/Impounded</td>
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<td></td>
<td>Palustrine</td>
<td>Unconsolidated Bottom</td>
<td>Intermittently Exposed - Excavated</td>
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<td></td>
<td>Riverine</td>
<td>Lower Perennial</td>
<td>Unconsolidated Bottom</td>
<td>Permanently Flooded</td>
<td>1703.3477</td>
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</table>

Caesar Creek Lake Wetland Classification
Soils

The most common land capability class is 2 at 4,459 acres. Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices. The second most common land capability class is class 7, which are soils with very severe limitations that make them unsuitable for cultivation. This is closely followed by class 3; these soils have severe limitations that reduce the choice of plants and/or require special conservation practices (Table 3). A land capabilities class map can be referenced on the following page in Figure 3.

Table 3. Soil – Land Capability Class

<table>
<thead>
<tr>
<th>Land Capability Class</th>
<th>Total Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>160.575</td>
</tr>
<tr>
<td>2</td>
<td>4458.875</td>
</tr>
<tr>
<td>3</td>
<td>1175.624</td>
</tr>
<tr>
<td>4</td>
<td>380.601</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>267.262</td>
</tr>
<tr>
<td>7</td>
<td>1531.491</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Not rated or not available</td>
<td>2666.432</td>
</tr>
<tr>
<td>TOTAL</td>
<td>10640.86</td>
</tr>
</tbody>
</table>
Caesar Creek Lake
Soil - Land Capability Class

Nonirrigated Capability Class

- 1 Few Limitations
- 2 Moderate Limitations
- 3 Severe Limitations
- 4 Very Severe Limitations
- 6 Generally Unsuitable for Cultivation
- 7 Unsuitable for Cultivation
- Not rated or not available

Figure 3.

<table>
<thead>
<tr>
<th>Land Capability Class</th>
<th>Total Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>160,575</td>
</tr>
<tr>
<td>2</td>
<td>445,875</td>
</tr>
<tr>
<td>3</td>
<td>117,562</td>
</tr>
<tr>
<td>4</td>
<td>80,601</td>
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<tr>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>267,282</td>
</tr>
<tr>
<td>7</td>
<td>153,149</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Not rated or not available</td>
<td>266,643.2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1,064,086</strong></td>
</tr>
</tbody>
</table>
Summary

GIS analysis has revealed about 5,795 acres of forested land, 1,230 acres of farmland and pasture, 447 acres of developed land, 110 acres of shrubland and 109 acres of grassland on the project. The analysis did not differentiate severely degraded from healthy, sustainable lands. Differentiating the quality of the vegetation cover could influence where we concentrate efforts such as invasive species removal, habitat restoration and other natural resource work.

Excluding lake and river environments, the total wetland acreage classified was 90 acres. There are undoubtedly other important wet soil environments that were not detected in the GIS analysis due to limitations associated with the NWI data.

Important soil findings include a substantial acreage of class 2 soils. This is the second highest rating in capabilities meaning that these soils have only moderate limitations that reduce the choice of plants or that require moderate conservation practices. The GIS soil layer should be reviewed prior to development or land use change.
APPENDIX C: TEACHER’S GUIDE TO CAESAR CREEK LAKE
Dear Group Leader,

This letter is to confirm the program you scheduled with the Corps of Engineers Rangers for:
_______________________, __________________________ at ________________am/pm.

Day of the Week          Date          Time

If you need to cancel, please contact a Park Ranger as soon as possible at (513)897-1050. We have planned programs/activities on the following topics you selected:
______________________________________________________________________________
______________________________________________________________________________
________________________

Bus transportation is highly recommended for many activities including: Control Tower tours, going to the picnic shelter for lunch and going to the fossil-collecting area. If your school/group is unable to provide bus transportation during the field trip, let us know so that we can plan the extra time needed for walking.
We hope that the following materials will be helpful in preparing your group for our visit. If you have any questions or concerns, please feel free to call us at the above number.
We look forward to seeing you and your group!

Sincerely,

Park Ranger
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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. The 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.
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.
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**
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. The **gastropod** 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.

The **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?

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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**

<table>
<thead>
<tr>
<th>Object name or description</th>
<th>Soft or hard</th>
<th>None</th>
<th>Poor</th>
<th>Good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.________________________</td>
<td>_____________</td>
<td>___</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>2.________________________</td>
<td>_____________</td>
<td>___</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>3.________________________</td>
<td>_____________</td>
<td>___</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>4.________________________</td>
<td>_____________</td>
<td>___</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>5.________________________</td>
<td>_____________</td>
<td>___</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
</tbody>
</table>

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 as 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.

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

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

_____ turkey vulture
_____ osprey
_____ gull
_____ Canada goose
_____ great blue heron
_____ deer
_____ coyote
_____ fox
_____ beaver
_____ squirrel
_____ frog
_____ snake
_____ spider
_____ butterfly
_____ turtle
_____ fish
_____ other
_____ 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 known 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 known 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

   fish  trees
   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