US Army Corps
of Engineers
Nashville District

Natural Resources Management
Park Ranger Training Program

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USACE- Nashville District
Natural Resources Management
Ranger Training Program

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LETTER FROM THE OPERATIONS DIVISION CHIEF

First off, let me say: "Welcome to the Nashville District!" The journey you are about to embark on with the Natural Resource Management (NRM) Ranger Training Program will be both enriching and rewarding. You are entering into a program that is rich with proud tradition and has been established over the last 40 plus years by some of the most highly regarded Rangers in the U. S. Army Corps of Engineers (USACE). This training manual has come to fruition through the efforts of multiple offices and dedicated personnel throughout the District. Therefore, you are receiving instruction and wisdom that is representative of the District as a whole.

The career field that you are entering into is one of the best job opportunities that USACE has to offer. The day-to-day work environment for our NRM staff is truly where the "Boots Hit the Dirt." You will be tasked with protecting our Natural Resources, ensuring longevity of our Flood Risk Management infrastructure, promoting recreational opportunities, and the extremely important mission of educating the public to promote water safety and ultimately reduce fatalities at our projects. YOU are now the "Face of the Corps." When you put on your green (NRM) uniform you are not only representing the USACE, you are representing all those career professionals that laid the foundation before you.

If you have any questions, or concerns, about this program during your time with the Nashville District, please remember that you always have an open line of communication to my office. You are now a part of the Nashville District and the Operations family and we strive to be the best public servants possible, humbly delivering the mission at the local, regional, and national levels. Good luck and I look forward to seeing you when our boots meet in the dirt or during your rotation in the District Office.

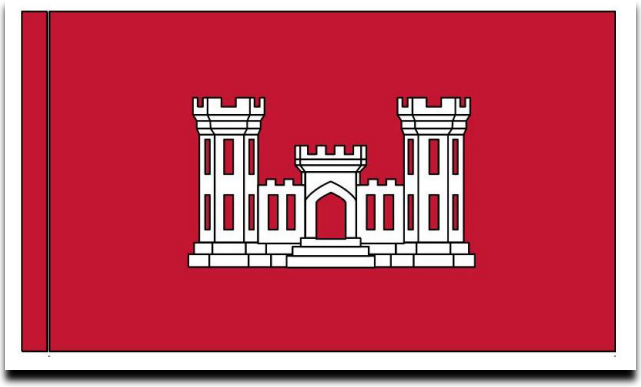
Enjoy the journey and stay safe.

Timothy C. Fudge
Chief, Operations Division
U.S. Army Corps of Engineers
Nashville District

LETTER FROM THE OPERATIONS SECTION CHIEF

We're excited to welcome you to the team! We think you'll be a great asset to the agency. The Natural Resources Management (NRM) Ranger Training Program was designed to give new employees everything they will need to perform at their best. As you will see, we have prepared a training manual to guide you through the first two years of work as a Park Ranger Trainee, within the Nashville District (LRN). Many of the policies, regulations, and operating procedures are outlined for trainees; however, you will be expected to rely on your initiative to ensure that you will be prepared to assume the full responsibilities of a Journeyman Ranger at the end of the training program.

Our district motto is, “We protect people from water, water from people, and make water useful.” What does that mean for those within the confines of the NRM Ranger Training Program? Together, we facilitate programs and policies necessary to manage where people go, what they can do safely for themselves and others, what they can’t do, and determine appropriate actions necessary to protect and maintain natural and man-made features within LRN.



During this program, there will be a heavy focus on Recreation and Environmental Stewardship mission areas. Having said that, Visitor Use Management and Public Safety are the foundations of our program. Through the completion of the thirty NRM training modules, you will gain the knowledge and expertise required to provide high-quality and safe public outdoor recreation experiences to our visiting public.

As you know, I currently serve as the Chief, Operations Section for LRN. However, I started my career with USACE as you are now- a Nashville District park ranger trainee. Since that time, I have served in many different roles that include LRN District Ranger, Resource Manager at two LRN projects- J. Percy Priest and Cordell Hull (temporary assignments), LRN Biologist, LRD Project Manager (temporary assignment), Conservation Biologist at J. Percy Priest and Cheatham, Real Estate Specialist (temporary assignment), and a Journeyman level Park Ranger at Old Hickory. During my time completing the LRN NRM Ranger Training Program, I served in positions at Old Hickory and J. Percy Priest, respectively. Teams I have served on include; LRD Park Ranger CoP Advisory Board, HQ Park Ranger CoP, MOLE, OCAT instructor, just to name a few.

If you have any questions about the program, I have an open-door policy. Please feel free to email, call, or stop by my office, and I’ll be more than happy to help. Again, I am looking forward to working with you and seeing you achieve great things within the NRM community!

Trey Church
Chief, Operations Section

I. ORIENTATION

The Nashville District is a leader in the fields of land management, recreation, and natural resources management within the Corps of Engineers. The Nashville District's natural resources management program has for years been a model for other districts, divisions, and the Office of the Chief of Engineers in the field of natural resources management

Training in the Nashville District has been maintained at a high standard through the coordinated efforts of Resource Managers and the Natural Resources Management Branch. Standards were established for the hiring of Park Rangers and qualifications were upgraded to require education and/or experience in natural resources management. Since 1962, individuals with college degrees in the natural sciences (forestry, agriculture, biology, wildlife management, and fisheries) or parks and recreation management have been selected to fill professional ranger positions.

A formal training program was needed for Park Rangers. To establish a program in the beginning would have been difficult due to the ever-changing, complex programs and increasing workload over the years. In September 1969, Mr. C. C. Crossman, Chief, Reservoir Management Branch, felt that the program had reached a stage where a formal training program was needed. Mr. Crossman appointed a training program director and a training committee to study the training needs and to develop a training program for rangers.

Some years later, a training manual was completed to guide the trainee through the first year of work as a Park Ranger in the Nashville District. Much of the work was outlined for the trainee; however, the trainee was still expected to rely on his or her own initiative to ensure that he or she would be prepared to assume the full responsibilities of a Ranger at the end of the first year. In January 1987, a committee was formed to revise and update the ranger training manual. This manual is the result of the efforts of that committee and subsequent revisions.

During your first two years of work, your resource manager and team leaders will direct your work and provide assistance when necessary. You will spend time in formal classroom study and research as well as participate in practical exercises under the direction of the team leader and/or experienced park rangers. More responsibilities will be given to you as your training program progresses.

Your training will not end with the completion of this manual. Like managers, rangers are often sent to schools, special courses, training seminars, etc., to further their knowledge of natural resources management and related activities.

Your input to the training program is essential. As your training progresses you should address your weaknesses and strive for improvement. Maintain good communications with your Resource Manager/Team Leader and keep him or her informed of your needs and problems. For example, if you have a strong wildlife management background, you may need to spend less time on wildlife management and possibly more on other areas of the manual such as interpretation or visitor assistance.

This manual is for your benefit. Remember, the knowledge you gain will be in direct proportion to the effort you expend.

1. The Symbols of the Corps

The Turreted Castle

In designing a heraldic device, whether a badge or coat of arms, the requirements are the commemoration of something noteworthy, simplicity of design, and practicability. These are all apparent in the design of the turreted castle insignia.

The earliest important work of the Corps was concerned with the construction of the castle-like fortifications along the Atlantic Coast. Many of them were even named "castles"—such as Castle Williams and Castle Clinton in New York Harbor; also, there were the works on Castle Island, in Boston Harbor; and Castle Pinckney, in South Carolina. The selection of a castle as the symbol of the Corps was, therefore, most appropriate, and the actual castle design fully meets the requirements of simplicity and practicality.

Generals Delafield and Totten first recommended the use of the turreted castle insignia by the Corps of Engineers. At the time, General Delafield was a colonel and Superintendent of the U.S. Military Academy at West Point, and General Totten was Chief of Engineers. The cadets at West Point were the first to wear the insignia, probably during the summer or early fall of 1839. The Academy was under the management of the Chief of Engineers from the date of its establishment in 1802 until after the Civil War in 1866.

The Seal of the Corps

The official Seal of the Corps is sometimes referred to as the Coat of Arms. It was adopted shortly after the Civil War to commemorate the consolidation of the Corps of Topographical Engineers with the regular Corps of Engineers established in 1802. The Topographical Corps had been an off-shoot of the older corps since its establishment in the 1830's, and the consolidation of the two corps took place in the midst of the Civil War.

The significance of the design as commemorating the achievements of both the Corps of Engineers and the Corps of Topographical Engineers is plain to be seen. The larger shield is divided into three horizontal sections, of which the top usually is represented in solid blue color, while the bottom is divided into vertical (red and white) stripes. The center section shows

the interesting original shields of the two historic corps: the dextral shield being a reproduction of the basic device of the Engineers oldest insignia, the Essayons Button; the sinistral shield showing the Corps of Topographical Engineers red, white, and blue shield between the letter's "T" and "E" (Topographical Engineers). The eagle and motto ESSAYONS dominate the overall design as they originally did in the decorative sections of the Macomb maps of 1806 and 1807. Essayons means "Let us Try."

General Andrew A. Humphreys, who had been a distinguished member of the Corps of Topographical Engineers before the Civil War, is given credit for first adopting, or at least ordering, the use of the present Corps of Engineers Seal. This was not long after he was appointed Chief of Engineers in 1866. The Seal was not adopted officially until General John M. Wilson, Chief of Engineers, promulgated his order of April 6, 1897.

2. The Nashville District

History

The U. S. Army Corps of Engineers has played an active role in the history of this region. An Army Engineer, Lt. Thomas Hutchings, was the first person to accurately map the Cumberland and Tennessee River Basins in 1769. His reports and maps played an important part in the decision of many people to move to this frontier. Settlement of this area was rapid, and the cantankerous Cumberland and treacherous Tennessee Rivers were the major routes of trade for the new inhabitants.

In early times, travel on the rivers was dangerous and resulted in the loss of many lives and a tremendous amount of goods. Public demands that something be done reached a climax during President Andrew Jackson's term. As a result, in 1832 Congress appropriated $30,000 for surveying and implementing improvements on the Cumberland River. Captain Henry M. Shreve, Superintendent of Western River Improvement, United States Engineer Department, was directed to carry out this mission. He recommended four specific areas that would vastly improve the navigation of the Cumberland River. These improvements included cutting the timber along the shoreline, clearing the existing snags, blasting the rocks obstructing the channel, and constructing wing dams at shoals. Captain Shreve recommended William McKnight as "Superintendent of Improvement of the Cumberland River." McKnight was given command of the task and began actual construction in the spring of 1833.

The work produced a great improvement but had to be suspended in 1839. The financial squeeze of the crash of 1837 had caused a nationwide depression. Very little work was done from 1839 until the close of the Civil War. By this time the improvements made by McKnight had deteriorated, making navigation of the Cumberland River very hazardous once again. This condition was true for most of the rivers of the United States and in 1866 Congress sought to improve this situation.

The River and Harbor Act of 1866 provided large sums of money to resurvey and report what was needed to improve the nation's waterways. This Act was the first time the Corps of Engineers, or any federal agency, had to compare the cost of improvements with the benefits provided. As a result of this report, $30,000, to be administered through the Office of the Improvement of the Cumberland River, was appropriated to improve navigation on the river.

In 1888 the Office of the Improvement of the Cumberland River became the Nashville Engineer District in accordance with *General Order 93*. The district, under the direction of Division Engineer Cyrus Comstock, was then part of the Southwest Division. During the next 45 years, the Corps of Engineers experienced many internal reorganizations. Although the Nashville District boundaries were kept the same, the district changed divisions quite frequently and at different times was under the Southwest, Gulf, Central, and Upper Mississippi Divisions.

From 1900 until about 1924. the Nashville District was actively engaged in the building of the low-head navigation locks and dams lettered "A" through "F" below Nashville and numbered 1 - 8 above Nashville, and 21 just below Burnside, Kentucky. In 1928, Congress enacted legislation that required all districts to prepare a comprehensive report on the development of their respective waterways.

This report, commonly called the 308 Report as prepared by the Nashville District, covered the entire Cumberland River watershed and envisioned the construction of high-head, multipurpose projects throughout the basin. This report was completed in 1931 and accepted by Congress and published in 1933. After this report was finished, the district reverted to a rather inactive status due to the depression and was organized along simple lines with an Administrative Division and an Engineering Division.

Wilson Powerplant, Florence Alabama, ca. 1926.
Constructed by the Corps of Engineers.

In November 1933, the Ohio River Division was formed and included the Nashville, Huntington, Louisville, Pittsburgh, and Cincinnati Districts. The Cincinnati District was abolished in 1947, and its functions were absorbed by the other districts. The single-purpose mission of the Nashville District to provide a navigation system for the Cumberland River remained.

In 1933 President Roosevelt signed the Tennessee Valley Authority (TVA) Act. The Chattanooga District was abolished, and the Nashville District absorbed most of its personnel, including the Chattanooga District Engineer, General Robert R. Neyland, who assumed command of the expanded Nashville District. He directed the transfer of responsibilities to TVA until 1936 when he retired to devote his full time to his hobby of coaching the University of Tennessee football team. He had simultaneously been District Engineer and coach since 1926. In this transfer, the functions of the Chattanooga District were passed to TVA, except for the operation and maintenance of navigational features, which the Corps of Engineers retained. TVA immediately initiated a large and expanding construction program in the Tennessee River Basin, and the Nashville District established a Lock Design Division in 1936 to design the navigation system.

General Robert R. Neyland

The next major change came after the 1937 flood, which had a devastating effect on the entire Ohio River Watershed. An extensive organization dealing with hydrology and hydraulics was established to expand the knowledge of rainfall, runoff and flood routing, and to check and validate the information developed in the 308 Report concerning the power capabilities of the various projects recommended in that report.

Throughout this period, Operations and Engineering were under the same chief, but in 1939 the district was reorganized. An Engineering Division containing a Drafting and Surveying Section, a Design and Inspection Section, and a Hydrologics Section was established. The Operations Division directed navigation operations on both the Cumberland and Tennessee Rivers through the Navigation Channels, Commercial Statistics, Permits,

Reports and Special Studies, and Land Acquisition Branches. This type of organization, with minor changes, remained in effect until about 1941 when the Operations Division was further reorganized to include branches covering Procurement and Supplies, Contracts and Inspections, Safety, Land Acquisition, Navigation, Plant, Radio, Transportation, Photography, and Construction.

In 1944, the titles of the various divisions were changed to branches, and the district at that time contained a Military Construction Branch, a Procurement Branch, an Engineering Branch, an Administrative Branch, and an Operations Branch.

In 1945, a further reorganization established the Services Branches within the district; these were Fiscal, Civilian Personnel Office, Legal, Safety, and Control Branches. The main operating branches were redesignated operating divisions with the titles of Engineering, Construction, and Operation and Maintenance Divisions. At this time, Permits and Commercial Statistics, which had been under the Engineering Division for a few years, were transferred back to the Operations Division.

During the period 1933-1935, the Cumberland and Tennessee Rivers were supervised as independent streams although both were operating under the Chief of the Operations Division. The supervisor in charge of each river had the responsibility for all fleet operations, navigation structures, channels, major lock repair, and lock operations. During the 1945 reorganization an internal change within the Operations Division consolidated lock operations under one chief (Lock Operations Branch) and maintenance functions under a separate chief (Maintenance Branch) with full responsibility over both rivers.

The Nashville District entered a new era as a multipurpose district with the start of construction of the Dale Hollow Project in 1942; the retirement of the low-head, single-purpose dams could be foreseen. In 1946, a Recreation Section was organized under the Engineering Division. The title of this branch was changed to Reservoir Utilization in 1947, Reservoir Management in 1948, Recreation-Resource Management in 1971, and Natural Resources Management in 1984. During the latter part of 1947, a Power Operations Section, also under the supervision of the Engineering Division, was established to operate the Dale Hollow Project. In 1949, the supervision of the Reservoir Management Branch was transferred from the Engineering Division to the Real Estate Division, and the Dale Hollow Power Operations Branch was transferred to the Construction Division. In 1951 these two branches were again transferred to the Operations Division.

Prior to 1950 the Operations Division operated an elaborate complex of shops, yards, and warehouses. This facility contained complete auto repair, auto body, machine, and carpenter shops, as well as warehousing materials and supplies for the field installations. Field projects had no authority to acquire any item of equipment or supplies. Initially this facility was located at Lock A, Cumberland River, then moved to Lock 1, and later moved to Nashville at the facility known as the West Nashville Depot. Rising costs and availability of supplies in local areas prompted the closing of this facility.

A tow enters the chamber at Cheatham Lock.

In 1954, the functions of the Reservoir Planning Section, which had been a part of the Reservoir Management Branch were transferred from the Operations Division and placed under the supervisory control of the Plans and Reports Branch, Engineering Division.

Since the construction of Dale Hollow Dam in 1943, nine additional multipurpose projects have been completed. In addition to these large multipurpose projects, many local flood control projects also have been built.

The enactment of the law creating the Tennessee-Tombigbee Waterway created another opportunity to meet the needs of the people within the Nashville District. The size of this project was enormous; more earth was moved to connect and develop these two river systems than was moved in the construction of the Panama Canal. The Nashville District shared development of this project with the Mobile District. This major link in our system of inland waterways was opened in 1985 and provides a shorter route from ports on the Cumberland and Tennessee Rivers to the Gulf of Mexico.

The Nashville District was also responsible for the acquisition and development of the Big South Fork National River and Recreation Area, authorized by Congress by Public Law 93- 251 on 7 March 1974. This area consists of approximately 120,000 acres, including “The Gorge”, at the headwaters of the Big South Fork of the Cumberland River. The purposes of this project include “conserving and interpreting an area containing unique cultural, historic, geologic, fish and wildlife, archaeological, scenic, and recreational values, and preserving as a natural, free flowing stream the Big South Fork of the Cumberland River, and major portions of its Clear Fork and New River streams.”

This directive initiated a new era for the Nashville District and an opportunity to expand the benefits the Corps of Engineers has provided for the region and the United States of America. The Big South Fork Area was turned over to the National Park Service for operation.

In the mid-2000s, the Nashville District began two major rehabilitation projects at Wolf Creek Dam and Center Hill Dam. Seepage issues had plagued both structures since impoundment and in 2005 both were classified as "high-risk" by USACE and an independent panel of dam safety experts. Both projects lowered their lake levels during the construction period, which included grouting and installation of a barrier cut-off wall along the face of the dam. Wolf Creek's rehab project was completed in 2013, while Center Hill was not completed until 2020, due in large part to the additional construction of a roller compacted concrete berm at the auxiliary dam approximately ¼ mile upstream from the main dam.

Currently, there are other major projects ongoing within the Nashville District. In 2014, a contract was awarded at Center Hill Powerplant to completely refurbish all three turbines for the first time since they became fully operational in 1951. Center Hill is the first scheduled turbine-generator rehabilitation project spanning the 9 plants that house 28 generators along the Cumberland River Basin. The hydroelectric units at Center Hill, like many across the District, had far exceeded their original design life. The project was completed in 2021 and plans are in place to refurbish all of the turbines within LRN. In 2022, contracts were awarded at Wolf Creek Dam and Center Hill Dam to completely replace the spillway gates.

Reference

-*Engineers on the Twin Rivers*, Leland R. Johnson, U.S. Army Corps of Engineers, Nashville District, 1978.

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https://www.lrn.usace.army.mil/Media/News-Stories/Article/2244995/berm-construction-completes-last-repair-phase-for-dam-rehabilitation/

https://www.lrn.usace.army.mil/Media/News-Stories/Article/2932328/turbine-generators-replaced-at-center-hill-hydropower-plant/

3. Statistical Information

The Corps of Engineers is a worldwide organization, operated by the Department of the Army through the Office of the Chief of Engineers. In its military role, the Corps plans, designs, and supervises the construction of modern facilities which are necessary to ensure the combat readiness of our Army and Air Force.

The civil works function of the Corps is divided into divisions, which in most cases consist of major watershed areas, the exceptions being overseas units and divisions in the western United States which may include two or more major watersheds. Each division is subdivided into districts, which usually are major geographic or watershed areas within the division. The Great Lakes and Ohio River Division (LRD) is divided into seven districts: Louisville, Pittsburgh, Huntington, Nashville, Detroit, Buffalo, and Chicago.

The Nashville District includes the watersheds of both the Tennessee and Cumberland Rivers, which encompass over 59,000 square miles in parts of seven states. The Tennessee River and its tributaries are under the jurisdiction of the TVA except for navigation and regulatory (Department of the Army Permit Program) matters, which remain the responsibility of the Corps. Projects on the Cumberland River and its tributaries are operated and maintained by the Corps' Nashville District.

Presently there are ten multipurpose projects, which contain 27,063 square miles of drainage, in operation in the Nashville District. The actual projects include: 216,600 acres of water, 251,717 acres of fee and easement land, and 4,621 miles of shoreline. Brief descriptions of the ten multipurpose projects follow:

Barkley Lock and Dam and Lake Barkley

The dam is located at Mile 30.6 of the Cumberland River. The dam structure is concrete-gravity and earth fill construction. It is 157 feet high, 10,180 feet long, and has 12 Tainter crest gates measuring 55 feet by 50 feet with a total discharge capacity of 570,000 cubic feet per second (c.f.s.). The lock is located on the left bank and measures 110 feet by 800 feet with a lift of 57 feet at normal pool elevation.

Power production at Barkley Power Plant consists of four units, each with a capacity of 32,500 kilowatts. This represents an average annual energy production of 582,200,000 kilowatt-hours. The lake at normal pool elevation of 359 feet above mean sea level covers 57,920 acres. At full flood storage (Elevation. 375) it covers 93,430 acres and has a total volume of 2,082,000 acre-feet of water. The lake, extending 118 miles to Cheatham Dam, has a total of 1,004 miles of shoreline and drains an area of 7,808 square miles.

Lake Barkley was authorized by Congress in 1954 for flood control, power production, and navigation. Construction was initiated in June 1957 and completed for full beneficial use in July 1966.

Cheatham Lock and Dam and Cheatham Lake

Cheatham Dam is located 148.7 miles above the confluence of the Ohio and Cumberland Rivers. The concrete-gravity dam structure is 75 feet high, 1,400 feet long, and has 7 Tainter crest gates measuring 60 feet by 27 feet. The lock is located on the right bank and measures 110 feet by 800 feet with a lift of 27 feet at normal pool elevation.

There are three hydropower units with a total capacity of 36,000 kilowatts. The estimated average annual energy production of the Cheatham Power Plant is 160,000,000 kilowatt-hours.

The lake at normal pool elevation of 385 feet above mean sea level covers 7,450 acres and has a total volume of 104,000 acre-feet. The lake extends 67.5 miles to Old Hickory Dam, and it has a total of 320 miles of shoreline and a drainage area of 5,262 square miles.

The project was originally authorized by Congress in 1946 for navigation purposes and in 1952 additional authorization for power production was added. Construction began in April 1950 and was completed for full beneficial use in 1960.

Old Hickory Lock and Dam and Old Hickory Lake

Old Hickory Dam is located 216.2 miles above the mouth of the Cumberland River. The structure is concrete-gravity and earth fill construction, 98 feet high, and 3,750 feet long. Six 45-foot by 41- foot Tainter crest gates provide a total discharge capacity of 236,000 c.f.s. The lock is located on the left bank and measures 84 feet x 400 feet with a lift of 60 feet at normal pool elevation.

Power production consists of four units, each with a capacity of 25,000 kilowatts. The average annual energy production is 420,000,000 kilowatt-hours.

At normal pool elevation, 445 feet above mean sea level, the lake has a surface area of 22,500 acres; at maximum pool level, Elevation 450, the lake covers 27,450 acres and has a total volume of 545,000 acre-feet. The lake extends 97.3 miles to Cordell Hull Dam, has 440 miles of shoreline, and drains an area of 2,776 square miles.

Old Hickory Lock and Dam was authorized by Congress in 1946 for power production and navigation. Construction was initiated in January 1952, the lake was impounded in 1954, and work was completed for full beneficial use in December 1957.

Cordell Hull Lock and Dam and Cordell Hull Lake

Cordell Hull Dam is located at Cumberland River Mile 313.5. The dam structure is concrete-gravity and earth fill construction, 93 feet high, and 1,306 feet long. It has five tainter crest gates measuring 45 feet by 41 feet with a total discharge capacity of 175,000 c.f.s. The lock is located on the left bank and measures 84 feet by 400 feet with a lift of 59 feet at normal pool elevation.

Power production consists of three units, each with a capacity of 33,333 kilowatts, producing an average annual energy output of 350,000,000 kilowatt- hours.

At normal pool elevation, 504 feet above mean sea level, the lake covers 11,960 acres; at maximum pool level, Elevation 508, it has a surface area of 13,920 acres. The lake extends 71 miles upstream, has 381 miles of shoreline, and drains an area of 1,372 square miles.

The project was authorized by Congress in 1946 for navigation and power production. Construction began in May 1963 and was completed for full beneficial use in November 1973.

J. Percy Priest Dam and Lake

This project is located on the Stones River 6.8 miles above the confluence with the Cumberland at Mile 206. The dam structure is concrete-gravity and earth fill construction, 147 feet high, and 2,716 feet long. The dam has 4 Tainter crest gates measuring 45 feet x 41 feet with a total discharge capacity of 263,000 c.f.s.

Power production consists of one unit of 28,000-kilowatt capacity producing an average annual energy output of 70,000,000 kilowatt-hours.

At normal pool elevation, 490 feet above mean sea level (about 1 May through 15 October), J. Percy Priest Lake covers 14,200 acres. At Elevation 483, (about 1 December through 1 April) the surface area decreases to 11,630 acres. At maximum pool level, Elevation 504.5, the lake has a total storage capacity of 22,720 acres and a volume of 652,000 acre-feet. The lake impounds 31.9 miles of the Stones River, 10 miles of the East Fork and 6.5 miles of the West Fork, for a total shoreline distance of 213 miles and a drainage area of 892 square miles.

Percy Priest was authorized by Congress in July 1958 for flood control, power production, and recreation. Construction was initiated in June 1963 and completed for full beneficial use in February 1970.

Center Hill Dam and Lake

Center Hill Dam is located on the Caney Fork River, the largest tributary of the Cumberland, 26.6 miles above the mouth at Cumberland River Mile 309. The dam structure is concrete-gravity and earth fill construction, 250 feet high, and 2,160 feet long. Eight Tainter crest gates provide a total discharge capacity of 454,000 c.f.s..

Center Hill Lake was authorized for construction by Congress in June 1938 for flood control and hydropower production. Construction was initiated in March 1942 but suspended from March 1943 to January 1946 because of the war. The lake was impounded in 1948, and the project was completed for full beneficial use in 1953.

Dale Hollow Dam and Lake

The dam is located on the Obey River 7.3 miles above its confluence with the Cumberland River at Mile 380.9. The concrete gravity and earth fill structure is 200 feet high and 1,717 feet long. Six tainter gates measuring 12 feet by 60 feet provide a total discharge capacity of 166,000 c.f.s.

Power production consists of three units each having a capacity of 18,000 kilowatts. Average annual energy production is 127,000,000 kilowatt-hours.

At normal pool elevation, 651 feet above mean sea level, the lake covers 27,700 acres. At maximum elevation, 663 feet above mean sea level, it has a surface area of 30,990 acres and a total storage capacity of 1,706,000 acre-feet. The lake extends 61 miles upstream and has a total shoreline length of 620 miles at Elevation. 663. It drains an area of 935 square miles.

Dale Hollow Lake was authorized for construction by Congress in June 1938 for flood control and power production. Construction was initiated in March 1942 and the lake was impounded in May 1943. With the installation of the third generating unit in November 1953 the project was complete for full beneficial use. Dale Hollow was the first multipurpose water resources project in the Nashville District.

Wolf Creek Dam and Lake Cumberland

The dam is located on the Cumberland River at Mile 460.9. The concrete-gravity and earth fill structure are 258 feet high and 5,736 feet long. It has 10 radial crest gates measuring 50 feet by 37 feet with a total discharge capacity of 553,000 c.f.s.

Power production consists of six units, each having a capacity of 45,000 kilowatts, for a total average annual energy output of 800,000,000 kilowatt-hours.

At normal pool elevation, 723 feet above mean sea level, Lake Cumberland covers 50,250 acres. At the maximum lake level, Elevation 760 feet, it covers 63,530 acres and has a total storage capacity of 6,089,000 acre-feet. The lake extends 101 miles upstream and has a total shoreline length of 1,255 miles at Elevation 760. The drainage area encompasses 5,789 square miles.

The project was authorized by Congress in 1938 for flood control and hydropower production. Construction was initiated in August 1941, suspended for three years during World War II, and completed in 1952 for full beneficial use. At normal pool elevation, 723 feet above mean sea level, Lake Cumberland covers 50,250 acres.

Laurel Dam and Lake

The dam is located on the Laurel River at 2.3 miles above its confluence with the Cumberland River at Mile 550. Constructed of rock fill with an impervious core, the dam is 282 feet high and 1,420 feet long. An uncontrolled spillway side- channel is present on the left bank.

Power production consists of one generating unit of 61,000-kilowatt capacity.

The full power pool elevation is 1,018.5 feet above mean sea level. The surface area at elevation 1,018.5 is 6,060 acres with a volume of 435,000 acre-feet. The lake extends 19.2 miles upstream and has a total shoreline length of 206 miles. It drains an area of 282 square miles. The lake lies within the Daniel Boone National Forest.

Laurel Lake was authorized by Congress in July 1960 for power production and recreation. Construction was initiated in December 1964 and completed October 1973.

Martins Fork Dam and Lake

Martins Fork Dam is located at Mile 15.6 on Martins Fork, a tributary of the Clover Fork. The Clover Fork joins with the Poor Fork at Baxter, Kentucky to form the Cumberland River. The concrete gravity type structure is 97 feet high and 526 feet long. The dam has no capability to produce hydroelectric power. The outlet structures consist of 3 sluice gates measuring 4 feet by 4 feet. Located at different elevations, they are used to regulate the pool elevation and release water for water quality purposes. The dam has a 200-foot-wide uncontrolled spillway.

At normal summer pool elevation, 1,310 feet above mean sea level, Martins Fork Lake covers 340 acres. At maximum pool level, Elevation 1341, the lake has a surface area of 578 acres. It has 10 miles of shoreline and drains an area of 55.7 square miles.

The Martins Fork Project was authorized by Public Law 89-298, the Flood Control Act of October 1965, for the purposes of flood control, recreation, and water quality. Construction of the project began in December 1973; impoundment took place in December, 1978 and the project was completed for full beneficial use in January, 1979.

4. Organization and Functions of the Nashville District

Engineer Regulation 10-1-2 establishes uniform organization and functions for division and district offices of the Corps of Engineers. District Regulation 10-1-3 establishes authorized organizational elements and functional assignments within the Nashville District. You should become familiar with the organization of the district and the functions of each major office within the district office.

5. The Natural Resources Management Program

The Nashville District's Natural Resources Management (NRM) program encompasses the management of all resources, excluding power plants, locks, and dam structures (except for Martins Fork Dam) at the multipurpose projects along the Cumberland River and its tributaries. This includes not only the operation and maintenance of utilities, grounds, shops, storage facilities, and recreation facilities, but also includes land, forest, and wildlife conservation, pollution control, pest control, fire suppression, and outgrants management.

The lakes that are presently managed comprise a total area of 411,560 acres of land and water with a total of 4,835 miles of shoreline. There are 155 Corps maintained recreation areas and access points, and a total of 61 commercial marinas. NRM personnel are the principal point of contact between the Corps and the public using the projects. With the sustained increase in recreation use over the years, public pressure has created challenges related to sanitation, vandalism, trespasses, despoilment, off-road vehicles, public relations, recreation use surveys, recreation use data, and the administration of the recreation use fee program.

NRM personnel also inspect local flood protection projects and complete inspection reports. Permit or outgrant requests for work or structures proposed within project limits are reviewed and inspected to ensure that all use of public property is in accordance with approved policy. NRM personnel are also tasked with surveillance of watershed areas to ensure compliance with Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act.

In addition to the administration and coordination of the programs stated, all budget requests and justifications, plans and specifications for site developments, personnel matters, requisitions, application for outgrants, reports of trespass, public visitation reports, and correspondence with the public and other agencies must be analyzed for conformance to policy and coordinated with other district elements with recommendations for action.

With the continued emphasis on professional management of natural resources and recreation facilities, several programs have been implemented to protect the beauty of the natural resources while providing quality recreation opportunities for present and future generations. Among these programs are shoreline management, natural and historical interpretation, forest, fish and wildlife enhancement, environmental awareness, and volunteer services.

6. The Operations Division

This section deals with the basic functions of the Operations Division and the specific missions of each of the individual branches. You should review this section before you begin your two- week district office orientation session.

The Operations Division serves a technical staff office responsible for supervision and direction of operation and maintenance of multi-purpose civil works projects, environmental compliance, the Department of the Army (DA) Regulatory program for permitting work in waters of the United States, emergency management associated with natural and national disasters, and mobilization readiness of the District.

Office of the Division Chief

Serves as a technical advisor to the District Commander and a member of the District Corporate Board. Ensures consistent and through implementation of policy, procedures, and programs, as directed by higher authority. Manages programs to ensure budget execution for Operations and Maintenance (O&M) General, Flood Control, and Coastal Emergencies (FC&CE), and Aquatic Plant Control, Maintains liaison with regional professional and trade organizations, industry, users, and regional agencies. Manages, monitors, and reports on manpower requirements, allocations and utilization for Operations Division, and recommends adjustments in allocations. Conducts division studies and internal reviews for productivity and quality improvements. Directs, coordinates, and manages the following organizational elements:

-Management Support Branch

-Technical Support Branch
    -Maintenance Section
    -Operations Section

- Hydropower Support Branch
    -Hydropower Section
    -Electronic Services Section
    -Remote Operations Section

-Operations Project Managers

Management Support Branch

Manages the business functions of Operations Division by providing support and guidance to field projects and District Office branches for personnel management, budget execution, contract administration support, Engineering/ Construction support, environmental compliance, safety management, union matters, adverse personnel actions, certain congressional contacts, information management, controversial problems or matters of far-reaching impact.

Maintenance Section (formerly Navigation)

Provides standardized policy, technical support, coordination, and program compliance review for the management, operation, preventive and major maintenance of all navigation locks, mooring facilities, and aids to navigation.

Coordinates development of schedules and budget information for maintenance of navigation structures and manages repair work for such structures. Develops budget information, schedules, and performs channel maintenance activities on almost 1,200 miles of commercially navigable waterways. Coordinates with TVA on all aspects of the Tennessee River Waterway System. Maintains emergency response capability that is both land and water mobile. Provides technical information to Operations Project Managers for budget line items, reviews the navigation features of the annual FY+2 budget submission and recommends priorities. Manages the District underwater division program.

Operations Section (formerly Natural Resources Management)

The Natural Resources Management Mission is to manage and conserve those natural resources, consistent with ecosystem management principles, while providing quality public outdoor recreation experiences to serve the needs of present and future generations. In all aspects of natural and cultural resources management, the Corps promotes awareness of environmental values and adheres to sound environmental stewardship, protection, compliance, and restoration practices. Provides standardized policy, technical support, coordination, and program compliance review for:

-Conservation and protection of lands, waters, forests, wildlife, and cultural resources. Determines availability of project lands and waters for disposal, leases, licenses, or other outgrants.

-Park Management, including operations, maintenance, and renovation of recreation areas, roads, trails, grounds, water, and wastewater treatment systems, and related project facilities.

-The Shoreline Management Program

-The Visitor Assistance and Law Enforcement Programs. Serves as liaison with the U.S. Attorney's Office, U.S. Magistrate, and Office of Counsel. Reviews/approves special public-use restrictions and law enforcement agreements.

-The Recreation User Fee Program.

-The Interpretive Services and Outreach Program (ISOP).

-The Recreation Research Demonstration Program.

-The sign program.

-Manages the Natural Resources Management Career Development Program to provide qualified journeyman level employees commensurate with attrition. Assigns trainees to permanent duty stations upon completion of training.

-Provides technical support for long-range resource management plans, including Operations Management Plans, Master Plans, and Cultural Resources Management Plans. Analyses public use characteristics, environmental factors, and conflicting demands to determine long- range needs and resolve technical management problems.

-Provides technical support and database maintenance for the Headquarters, U.S. Army Corps of Engineers (HQUSACE) for natural resources automated reporting systems.

-Ensures consistency in public information services, including maps, brochures, exhibits, fact sheets, news releases, fishing reports, and trail guides.

-Manages the District Volunteer Services Program.

-Approves project annual work plans and five-year plans. Prepares engineering and design requests as necessary.

-Conducts inspections of recreation facilities for safety and compliance with regulations and policies.

-Provides technical support to Operations Project Mangers for recreation line items; reviews the natural resources management and recreation features of the annual budget, coordinates and reviews RecBest and ESBest entries and rankings, and recommends priorities.

-Plans, coordinates, and oversees Motorboat Operator Training and Certification for all District elements.

Hydropower Support Branch

This recently developed branch was previously under the Technical Support Branch. Hydropower Support Branch will consist of three sections: Hydropower Section, Electronic Services Section and Remote Operations Section. This branch will be led by a newly established GS-14 Supervisor/ Program Manager and will be responsible for local support, continued support to LRE and will also serve in a regional role as the LRD Hydropower Business Line Manager who is responsible for coordinating regional efforts and development of the overall regional budget.

Hydropower Section

Provides standardized policy, technical support, coordination, and program compliance review for:

-Management, operations preventative, and major maintenance of all electrical, mechanical, and structural features at all District flood control dams, navigation dams, hydropower plants, and high voltage switchyards for the purposes of flood control, power production and transmission, navigation channel elevation regulations, recreation, water quality, and other purposes.

-Emergency project operations, including reactions to major power system disturbances such as blackouts, brownouts, frequency disturbances, dam failure, earthquake, fire, and oil and hazardous substance incidents.

-The routine and emergency operation and maintenance during normal and flood conditions.

Electronic Services Station

The Electronic Services Station provides electrical test and maintenance services for all major power plant and switchyard equipment, both for Nashville and Detroit Districts.

Remote Operations Section

This section is responsible for the implementation of remotely operating the hydropower facilities. Previously each hydropower facility was operated onsite, or remotely at another nearby site.

Operations Manager (For multi-purpose projects)

Supervises, directs, and manages all aspects of operations, maintenance, and administration of assigned water resources development projects and associated resources, including natural, developed, historic, and archaeological resources. Represents the District Engineer as POC and public/customer interface on matters related to the project(s).

Prepares cost estimates and justifications for current and future year project budgets and manpower allocations. Reprograms for additional needs and reallocates to assigned project(s). Leads a project support team in execution of project mission, including budgeting, scheduling, purchasing, personnel administration, etc. Operates and maintains structures, lands, and waters for the purposes of recreation, flood control, hydropower, navigation, forestry, fisheries, and wildlife.

Manages field sites as an integrated while, avoiding or minimizing use conflicts. Administers rules and regulations governing public use of all facilities. Oversees inspections of assigned locks, dams, hydroelectric power plants, flood control and water supply structures, recreation areas, navigation aids, river and harbor structures, and other structures such as local flood protections projects, including those turned over to local interests associated with the project(s).

Determines need, extent, and schedules for repairs to facilities. Prepares field estimates of direct costs for maintenance work, including minor dredging, bank stabilization, and other similar work.

References

-District Organization Chart (Intranet)

-Nashville District Mission Statement and Functions

Training Requirement

-Complete District Office One-Week Rotational Assignment

7. Talking Our Language

One of the most frustrating things to a new park ranger can be the terminology and abbreviations often used by Corps personnel. For example, you have a question about a news release and ask your supervisor who to contact for more information. The answer will probably be "call PAO." If you are unfamiliar with Corps lingo, this leaves you still wondering who to call. PAO refers to the Public Affairs Office, which is responsible for the release of news items throughout the district.

Following is a list of the most common abbreviations used in our work in the Nashville District:

ABC-C - Army Benefit Center – Civilian

ACTEDS - Army Civilian Training Education and Development System

ASAP - As soon as possible

ATB- America the Beautiful Passes

AWOL - Absent without leave

BMP - Best Management Practices

BPA - Blanket Purchase Agreement

CATT - Coach, Assist and Train Teams

CEFMS - Corps of Engineers Financial Management System

CELRD - The Great Lakes and Ohio River Division (Cincinnati, Ohio)

CELRN - Lakes and River Division, Nashville District (Formerly CEORN, Ohio River Division, Nashville District)

CELRN-OPS-O - Lakes and River Division, Nashville District, Operations Division, Operations Section (formerly Natural Resource Management Branch)

CFR - Code of Federal Regulations

CIO/G6 – Chief Information Office (formerly ACEIT)

CISM - Critical Incident Stress Management

CO - Contract Officer (also KO) *or*

Construction-Operations Division (see OP)

CPAC - Civilian Personnel Advisory Center

CPOC - Civilian Personnel Operations Center

CPR - Cardiopulmonary Resuscitation

DA - Department of the Army

DOD - Department of Defense

DDE - Deputy District Engineer. Military officer second in command of the district

DE - District Engineer, a.k.a. the District Commander, a military officer charged with the responsibility of directing the activities of the Nashville District

DPMAP – Defense Performance Management and Appraisal Program

EC - Engineer Circular

EEO - Equal Employment Opportunity

EM - Engineer Manual

ENG Form - Engineering Form

EOC - Emergency Operations Center

EP - Engineer Pamphlet

ER - Engineer Regulation

ERGO - Environmental Review Guide for Operations (replaced by TEAM)

ES-BEST - Environment-Stewardship Budget Evaluation System

FAR - Federal Acquisition Regulation

FEMA - Federal Emergency Management Agency

FERS - Federal Employees Retirement System

GIS - Geographic Information System

GPS – Global Positioning System

GSA - General Services Administration

IDP - Individual Development Plan

IG - Inspector General

ISOP - Interpretive Services and Outreach Program

LAN - Local Area Network

LRD - Great Lakes and Ohio River Division

LRN - Nashville District (formerly ORN)

LWOP - Leave without pay

MOA - Memorandum of Agreement

MOU - Memorandum of Understanding

MP - Master Plan

NLT - Not later than

NPDES - National Pollutant Discharge Elimination System

NRMS - Natural Resources Management System

O&M - Operations and Maintenance

OCE - Office of the Chief of Engineers (Washington, DC)

OFA - Oracle Financial Analyzer

OM - Operations Manager (formerly OPM, Operations Project Manager)

OMBIL - Operations and Management Business Information Links

OMP - Operational Management Plan

OP - Operations Division, (formerly CO, Construction-Operations Division)

ORN - see LRN

PCS - Permanent change of station

PDT- Project Delivery Team

PFD - Personal Flotation Device

PMP - Project Mobilization Plan

PPSP - Project Physical Security Plan

PR&C - Purchase Request and Commitment

PUA - Public Use Area

PWC - Personal Water Craft

RIS - Recreation One Stop (formerly NRRS

Rec-BEST - Recreation Budget Evaluation System

REMIS - Real Estate Management Information System

RLAT - Recreation Leadership Advisory Team

RM- Resource Management Branch

RUDA - Recreation Unit Day Availability

Section 10 - Section of the Rivers and Harbors Act of 1899 concerning obstruction or alteration of navigable waters of the United States

Section 404 - Section of the Clean Water Act concerning the direct discharge of dredged or fill material in waters or adjacent wetlands of the United States

SF - Standard Form

SMP - Shoreline Management Plan

SOP - Standard (or s*tanding*) operating procedure

TDY - Temporary duty

TED- Total Employee Development

Title 36 - Rules and regulations governing public use of Corps of Engineers projects

TQM - Total Quality Management

USC - United States Code

VERS - Visitor Estimation and Reporting System

Abbreviation of Natural Resources Management Projects:

OPW-BR - Lake Barkley

OPN-CR - Cheatham Lake

OPN-OR - Old Hickory Lake

OPN-JR - J. Percy Priest Lake

OPM-HR - Cordell Hull Lake

OPM-CR - Center Hill Lake

OPM-DR - Dale Hollow Lake

OPE-WR - Lake Cumberland ("WR" refers to Wolf Creek Dam, which impounds Lake Cumberland.)

OPE-LR - Laurel River Lake

OPE-MR - Martins Fork

8. Operational Management Plans

An operational management plan (OMP) has been developed for each lake in the Nashville District in accordance with the approved master plan. The OMP is prepared as a separate document from the master plan and outlines in detail the specific operation and administration requirements for management of natural resources, recreation, other project programs, and shoreline management consistent with the approved master plan. The OMP is intended as a practical guide to be used in the day- to-day operation of the lake.

The OMP is used as a working tool and includes funding sources, labor, and time frames required to implement these strategies. Since the OMP is used as a working tool in the overall management of the lake, it is in loose-leaf format and should be updated as changes are needed. For example, the five-year work plan section will be updated annually with approvals through the Operations Project Manager and the Operations Section Chief. If possible, the complete OMP will be updated through the command approval process every five years. The command approval of the OMP and its updates rests with the District Commander, or their designee.

You will frequently find it necessary to refer to the OMP for guidance for the various programs at your project. You may also be assigned to assist in the annual or the five- year update of the OMP. Familiarize yourself thoroughly with the OMP for your project; refer to it frequently as you learn and carry out your day-to-day duties.

In 2013, policy guidance changed the format of the OMPs. Previously, The OMP included two parts: (1) Natural Resources Management and (2) Park Management. Now, OMPs are divided into four sections: (1) Natural Resources Management, (2) Recreation Management, (3) Other Project Programs, and (4) Shoreline Management.

Most OMPs for the Nashville District have not been updated to the most recent format. For the purposes of this training manual, section specific references will be for the old format. However, it is your responsibility to know your project's OMP and where to find pertinent information. If your project is in the process of updating their Operational Management Plan, you should assist Team Leads and the Resource Manager whenever possible.

Pre-2013 OMP Format

INTRODUCTION

1. Introduction
2. Staffing and Organization

PART ONE - NATURAL RESOURCES MANAGEMENT

1. General Management Objectives
2. Fishery Management
3. Wildlife Management
4. Forest Management
5. Pest Control
6. Wildfire Protection
7. Management for Special Plants, Animals or Habitats
8. Basin Surveillance
9. Administration of Natural Resources Management Programs
10. Compartment Plans

PART TWO - PARK MANAGEMENT

11. General Management Objectives - Park Management
12. Public Safety
13. Employee, Contractor, and Volunteer Occupational Health and Safety
14. Sign Management
15. Public Assistance (Law Enforcement)
16. Security and Emergency Operations
17. Managing Public Access
18. Administration of Outgranted Areas
19. Operation and Maintenance Practices
20. Administration of Use Fee Areas
21. Historic Properties Management
22. Interpretive Services and Natural Resources Communications
23. Trails and Primitive Camping Management
24. Environmental Management
25. Volunteer Services
26. Cooperation with Other Agencies and Organizations
27. Contract Administration
28. Administrative Facilities Management
29. In-Service Training
30. Restricted Areas for Hazardous Waters
31. Public Use Data Collection
32. Reserved
33. Five-Year Program

Current Format

SECTION ONE- NATURAL RESOURCES MANAGEMENT

1. Natural Resources Management- Area Compartment Descriptions
   a. Topography
   b. Aquatic Resources
   c. Vegetation
   d. Fish and Wildlife
   e. Species Considerations or Issues
2. Area (Compartment) Management Objectives
3. Area (Compartment) Work Plan
   a. Management Actions
   b. Five Year Schedule
   c. Labor and Equipment Needs
   d. Annual Cost
   e. Coordination

SECTION TWO- RECREATION MANAGEMENT

1. Area Descriptions
   a. Topography
   b. Aquatic Resources
   c. Vegetation
   d. Fish and Wildlife
   e. Special Considerations or Issues
2. Area Management Objectives
3. Area Implementation Plan
   a. Management Actions
   b. Five Year Schedule
   c. Labor and Equipment Needs
   d. Annual Cost
   e. Coordination

SECTION THREE- OTHER PROJECT PROGRAMS

1. Safety
2. Security
3. Visitor Assistance
4. Recreation Use Fee Program
5. Interpretation
6. Cultural Resources/Historic Properties Management Plan
7. Project Sign Management Plan
8. Special Programs
9. Private Exclusive Use
10. Outgrants
11. Maintenance
12. Partnering
13. Wildland Fire Management Plan

SECTION FOUR- SHORELINE MANAGEMENT

1. Shoreline Management Plan OR
2. Shoreline Management Policy

References

-ER 1130-2-540, Environmental Stewardship Operations and Maintenance Policies

-EP 1130-2-550, Project Master Plans and Operational Management Plans

-Project Operational Management Plan

9. The U.S. Army Corps of Engineers and the Environment

The Environmental Mission of the Corps is to carry out the mandate of the National Environmental Policy Act of 1969 to "...encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the nation;" and, as further defined in Section 101(a) "...to use all practical means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans."

In the conduct of its civil works program, the Corps of Engineers:

-Seeks to balance national environmental and developmental needs in full compliance with the National Environmental Policy Act of 1969 and other environmental authorities promulgated by Congress and the Executive Branch.

-Follows a systematic, inter-disciplinary approach to problem solving.

-Examines and evaluates environmental values carefully when studying alternative means of meeting the competing demands generated by human needs.

-Finds the best solutions for meeting the needs and hopes of the people—not merely by determining whether or not a specific engineering solution is economically justified.

-Brings the best available environmental knowledge and insight to bear on the planning, development, and management of the nation's water and related land resources.

-Gives environmental values equal consideration with economic, social, and engineering factors to ensure that Corps decisions are in the public interest.

-Considers all practicable means and measures—including "no-development" and "nonstructural" plans—to select the solution that will best satisfy human needs while, at the same time, *protecting, preserving,* and *enhancing* the quality of the environmental values previously lost, and minimizing and mitigating unavoidable adverse effects.

-Ensures, to the best of its ability, that options for managing natural resources are kept open for future generations.

-Undertakes early and continuing interchange of views with local, state, and federal agencies, with affected individuals, and with interested public groups.

-Encourages broad public participation in defining environmental quality objectives and elicits public expression of needs and expectations.

-Provides government agencies and the public with timely information on the social, economic, and environmental considerations involved before making recommendations.

-Identifies and makes provisions for preserving unique cultural and biological resources (such as historic and archaeological sites and threatened, endangered, and otherwise significant species and their habitats).

-Uses its regulatory authorities to protect the waters of the United States and their contiguous wetlands and applies to its own activities the same environmental criteria that apply to the activities it regulates.

-Periodically reviews, with interested publics, the operation and maintenance of completed projects to ensure that environmental quality exists consistent with project purposes.

-Formulates actions to improve environmental quality where necessary authorities promulgated by Congress and the Executive Branch.

-Follows a systematic, interdisciplinary approach to problem solving.

-Examines and evaluates environmental values carefully when studying alternative means of meeting the competing demands generated by human needs.

-Finds the best solutions for meeting the needs and hopes of the people—not merely by determining whether or not a specific engineering solution is economically justified.

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-Formulates actions to improve environmental quality where necessary.

10. Features of the Cumberland River Basin

Culture

The *culture* of a region is the total result of human activities as dictated by the constraints of the physical environment. The Cumberland Region served as a corridor from the rich, central heartland of the lower Ohio-Mississippi confluence, southward and eastward into the Kentucky- Tennessee country. Important migrations of peoples and cultural ideas took place in prehistoric America along the corridors of the Cumberland and Tennessee Rivers. Three distinct types of prehistoric American Indian cultures occurred in the Cumberland Basin: the Nomadic Hunters, the Mussel Eaters, and the Mound Builders. During the intervening period between the decline of the Mound Builders and the emergence of historic American Indians, the region was visited only occasionally by hunting parties from neighboring tribes.

The principal historic Native American tribes of this region were the Shawnees, Cherokees, Chickasaws, and Yuchis. The Shawnees settled along the Cumberland River, including the site of present Nashville, but they were driven out by Cherokees and Chickasaws in the first half of the Eighteenth Century. The Cherokees lived in the upper Tennessee River Basin but claimed most of the Cumberland Basin. The Chickasaws were dominant west of the Tennessee River, and they also claimed a portion of the Western Highland Rim. They ventured into the lower Cumberland Valley frequently and traded at the French trading post at the site of Nashville. The Yuchis buried their dead in the stone-slab coffins commonly found in Middle Tennessee. These Native Americans opened up trails and flourished in the area many years before the first settlers of European descent arrived.

Dr. Thomas Walker settled on the Cumberland River near the site of present Barbourville, Kentucky in 1750; it was he who named the river in honor of the Duke of Cumberland. Timothy Demonbreun settled at the site of Nashville in 1760 and lived in a cave in a bluff on the river. James Smith and his company explored the Cumberland and Tennessee River country in 1766. One of the parties was Uriah Stone, for whom the Stones River was named. In 1769, Lieutenant Thomas Hutchins, a native American and British Army Engineer, mapped the Cumberland and Tennessee Rivers. (During the Revolutionary War, Hutchins became a topographical engineer in the American Continental Army.) Daniel Boone explored the Upper Cumberland area alone. Kasper Mansker, a long hunter, and Isaac Bledsoe settled in the Cumberland Basin in Middle Tennessee in 1771. Nashborough (later Nashville) was founded when the Robertson-Donelson party arrived in 1779- 1780. James Robertson led the advance overland expedition, and John Donelson led a flotilla of flatboats and canoes down the Tennessee and up the Cumberland.

The river and its tributaries were the arteries of transportation and trade first for Native Americans and then for European settlers. As settlements grew up on the Cumberland River, their influence radiated outward into the surrounding country.

These settlements became the most important cities in the basin and remain so today. As population and industrial growth continue to expand in modern times, the area has not outgrown its need for waterways. Rather, its future, as was its past, is intricately entwined with the river.

Physiography

The Cumberland River Basin begins in the Greenville Province and extends to the Central Province, two of the seven major geologic provinces of North America. The Greenville Province was created approximately one billion years ago by a great mountain building event. The Central Province was created about 1.4 billion years ago and resulted from the great disturbance of the earth known as the Hudsonian Orogeny. The bedrock was laid down for the most part in the early Paleozoic Era. The Basin was formed primarily from the floors of ancient seas during the Ordovician period.

The irregular meanderings of the basin are most likely accounted for by movement of the earth's crust causing a slight uplift of the region at the time it began forming. This uplift offered only a slight grade which caused drainage to be slow and erosion to be uniformly dispersed over a wide area. In later times, greater uplifting occurred, and the accelerated run-off caused consolidation of streams and deep cutting of the river channel within the con- fines of the basin, whose general course was already formed.

Minerals

The most valuable mineral resource in the Cumberland Basin is coal. The availability of cheap water transportation greatly enhances the economic value of this product. Petroleum is also taken from the basin on a limited scale. Rich deposits of zinc currently are mined in the Carthage, Tennessee area. Iron is present, but development of this mineral resource was limited to small furnaces on the Western Highland Rim during the Nineteenth Century. Limestone and limestone products, abundant in the basin, are in demand in both local and nationwide markets. Sand and sandstone, found in the eastern part of the basin, are valuable building materials.

Geography

The Cumberland River is one of the major tributaries of the Ohio River. It is located entirely within the states of Kentucky and Tennessee. The basin is somewhat crescent in shape, embracing a large portion of southeastern Kentucky, the northern part of middle Tennessee, and a wide corridor across western Kentucky. The basin is bounded on the north by the watersheds of the Kentucky and Green Rivers and minor tributaries of the Ohio River, and to the south and west by the watershed of the Tennessee River. The total area of the Cumberland Basin is 17,720 square miles, of which 10,160 square miles are in Tennessee and 7,560 in Kentucky. The average width of the basin is about 50 miles and axial length is approximately 350 miles, extending from the Cumberland Mountains in the east to the alluvial valley of the lower Ohio River in the west. The average annual precipitation over the basin ranges from 46 inches at stations of least rainfall to 57 inches at stations of greatest rainfall.

The topography of the basin varies from rugged mountains in the eastern portion to the rolling low plateau in the western part, with elevations ranging from 4,150 feet above mean sea level in the Cumberland Mountains to Elevation 302 in the pool water at the mouth of the river. The upper portion of the basin above Burnside, Kentucky, lies in the Cumberland Mountains and Plateau, where the river and its tributaries flow in deep narrow valleys bordered by rugged, mountainous country.

In the central portion of the basin, between Burnside, Kentucky, and Carthage, Tennessee, the valley adjacent to the mainstream is hilly, except for a relatively narrow flood plain along the river. The tributary region through this section varies from hilly to mountainous, much of it lying along the western edge of the Cumberland Plateau. Below Carthage the entire basin is rolling to hilly with a flat flood plain of one quarter to a mile and a quarter in width along the river.

Flora and Fauna

Because of geographic, topographic, and climatic differences, the flora and fauna within the Nashville District vary from one lake to another. You should have a sound working knowledge of the species native to your lake. The Operational Management Plan, Part I, lists species of flora and fauna important to natural resources management activities at the lake. Field guides are available at the Resource Manager's Office to assist you in the identification of species.

The Cumberland River

The Cumberland is formed by the confluence of the Poor and Clover Forks at Baxter, Kentucky (near the city of Harlan in southeastern Kentucky). From that point it flows in a general southwesterly direction into Tennessee, to Nashville, then northwest into Kentucky again, where it joins the Ohio River. The entire length of the stream is 693 miles, and the total fall from source to mouth is about 842 feet making the average slope of the river 1.2 feet per mile. In general, the stream flows on or near bedrock from its source to a few miles upstream from Clarksville, Tennessee, while from there to its mouth itflows through an alluvium-filled valley. The channel is well defined with generally stable banks supporting a growth of timber and brush extending to the low-water line.

The principal tributaries of the Cumberland River, in their order from source to mouth, are the Laurel, Rockcastle, Big South Fork, Obey, Caney Fork, Stones, Harpeth, Red, and Little Rivers. The Caney Fork River is the largest tributary of the Cumberland River. All these tributaries have a number of common characteristics. They have stable banks supporting growth of brush and trees, and generally flow on or close to rock, with the exception of the lower ends of the Red and Little Rivers which are in alluvium-filled valleys. Occasional sand and gravel bars or rock reefs form successions of pools and shoals. They are relatively clear water streams.

Flooding

Due to the elongated shape of the Cumberland Basin and the usual path of storms in the area, no single storm has ever produced a record flood throughout the entire length of the river. Most floods occurring on the Cumberland River below Carthage, Tennessee, are caused by prolonged storms which have extended over a large part of the basin. On the upper Cumberland and its tributaries, floods are generally the result of short, intense, isolated storms, or of a succession of rains during a protracted period falling on saturated ground. Heavy rains falling on snow cover have produced several floods, but these floods were due principally to rainfall rather than melting snow.

Records indicate that the January-February 1937 flood was the highest from the mouth to Cumberland River Mile 160. The December 1926 - January 1927 flood was the highest from Mile 160 to Mile 320, with the exception of Nashville, where, according to a newspaper account, a flood in 1793 reached a stage 2.3 feet higher. The March 1826 flood was the highest from Mile 320 to Burnside (Mile 516), and above Burnside the March-April 1929 flood was the highest for nearly all locations.

1927 Nashville Flood, courtesy of Nashville Public Library

Backwaters from the highest known Cumberland River floods caused the highest stages in the lower reaches of the tributaries. Above backwaters, the March-April 1929 flood was the highest on the Caney Fork River and on the Obey River below the Byrdstown gauging station. The flood of March-April 1902 was the highest on the Stones River and the lower 85 miles of the Harpeth River, and the January-February 1937 flood was the highest on the Red River.

The flood of May 2010 within the Cumberland River Basin was a historic rainfall event, and the flooding which resulted was devastating to the impacted areas. The Corps' flood risk management projects were able to minimize the flood levels; however, flooding could not have been eliminated given the nature of the event and the design intent of the Corps' flood risk management projects.

2010 flood at Cheatham

Portions of the Cumberland and Tennessee River Basins experienced a 36-hour rainfall from May 1 through May 2, 2010, that produced record flooding. The National Weather Service estimated the two-day storm to be greater than a 1,000-year rain event. Rare weather conditions produced nearly stationary and intense storm activity causing large scale extreme flooding along the Cumberland and Lower Tennessee Rivers and their tributaries. During this two-day event some areas received rainfall amounts that exceeded 17 inches, the highest amount in more than 140 years of record. The Nashville area received more than 13 inches of rain in 36 hours, more than double the previous two-day rainfall record set in September 1979. The actual rainfall was also more than double the National Weather Service's projections over most of the affected area.

During the 2010 flood, in the Stones River Basin, J. Percy Priest Dam utilized 100 percent of its available flood storage capacity in an effort to reduce crest levels downstream. During this flood event, much of the rain fell in areas downstream of the Corps' flood risk management projects; therefore, they were unable to play a major role in reducing flood crests along the Cumberland. Water from the Harpeth River, Red River, Mill Creek and numerous small tributaries flowed unchecked into the mainstem, producing the historic crests observed at Nashville, Cheatham Lock and Dam, and Clarksville. The event set water level and discharge records on numerous tributaries and at several mainstem locations across the Cumberland and Tennessee River Basins during the event.

Another major flood event occurred in February 2019. The Cumberland River Basin projects utilized record amounts of flood storage. This was most apparent at Wolf Creek, where a new pool of record was set at elevation 756.5 feet significantly surpassing the previous record of 751.69 feet set in May 1984. While they did not set pool of records, both Dale Hollow and Center Hill Dams were also being tightly managed due to their near record setting pools and the ongoing Interim Risk Reduction Measure (IRRM) pool restriction at Center Hill. As a result, Water Management requested a deviation from downstream control flows on the main stem of the Cumberland River which allowed for a more aggressive approach to regaining flood storage in our reservoirs. While this was a positive for regaining flood storage in the reservoirs, it did create longer duration, higher flows along the Cumberland River. These high stages had significant impacts on navigation along the Cumberland River and closed navigation through the locks for 31 days. By utilizing the Nashville District's reservoirs for their Congressionally-authorized purposes, flood waters were able to be stored so that flood damages were minimized and/or eliminated downstream along the main stem of the Cumberland River.

Project Name	**Pool of Record Elevation**	**Winter Event 2019 Pool Elevation**	**Flow of Record**	**Winter Event 2019 Flow Releases**
	(ft)/date	(ft)/date	(cfs)/date	(cfs)/date
Laurel Dam	1022.50 Mar-75	1019.67 24 Feb	14,030 Mar-75	5,480 24 Feb
Martins Fork Dam	1331.63 Apr-98	1327.87 25 Feb	1,261 Apr-98	1,204 25 Feb
Wolf Creek Dam	751.69 May-84	756.52 26 Feb	40,000 Jan-74	59,910 27 Feb
Dale Hollow Dam	660.98 Mar 75	660.09 25 Feb	12,000 Mar-75	10,150 25 Feb
Cordell Hull Lock & Dam	508.33 May-10	504.11 18 Feb	103,100 May-10	73,105 23 Feb
Center Hill Dam	681.52 May 84	678.02 26 Feb	30,000 Jan-70	25,303 27 Mar
Old Hickory Lock & Dam	451.45 May-10	446.61 07 Feb	212,260 May-10	111,100 24 Feb
J. Percy Priest Dam	505.18 May-84	500.67 25 Feb	20,100 May-75	11,820 03 Mar
Cheatham Lock & Dam	404.15 May-10	392.37 24 Feb	240,000 May-10	151,000 24 Feb
Barkley Lock & Dam	372.50 May-10	366.85 03 Mar	303,200 May-10	193,900 11 Mar

References

Appraisal of Archaeological Resources of the Center Hill Reservoir, Tennessee, prepared by River Basin Surveys, Smithsonian Institution, 1947.

Early Times in the Cumberland Valley, James A. Crutchfield, First American National Bank, Nashville, Tennessee, 1976.

Essentials of Earth History, William L. Stokes, Prentice Hall, Inc., Englewood Cliffs, New Jersey, 1973.

May 2010 Nashville Flood Final After-Action Report, Executive Summary, November 2010.

February 219 High Water Event Cumberland River Basin, Executive Summary, February 2019.

Project Operational Management Plan, Part I.

"Report on the March 1975 Cumberland River Basin Flood," Nashville District, Corps of Engineers.

Seedtime on the Cumberland, Harriett Simpson Arnow, The MacMillian Company, New York, 1960.

Steamboatin' on the Cumberland, Byrd Douglas, Tennessee Book Company, Nashville, Tennessee, 1961.

The Cumberland, James McCague, Holt, Rinehart, and Winston, New York, 1973.

II. Tools of the Trade

1. Vehicle Operation

Due to the nature of a park ranger's job, it is essential that you develop your driving skills to a highly proficient level. Every ranger is considered a professional driver and will be looked to by the public to set a good example. Rangers encounter a multitude of adverse driving conditions whether on routine patrol or in emergency situations. Use extreme caution when patrolling crowded recreation areas**. "Hot pursuit" of violators is not allowed either on or off government property.**

AR 58-1 and ER 56-2-1 contain specific guidance for operation, maintenance and reporting of all vehicles under Army command and assigned to USACE. You must become thoroughly familiar with the EM 385-1-1, Section 18. You are required to possess a valid in-state driver's license to operate a government vehicle rated less than one ton. You must also complete the GSA Driver Safety Course prior to operating a government vehicle. Operation of vehicles rated over one ton or other heavy equipment requires a Commercial Driver's License (CDL) and a government license. The government driver's license has no expiration date but must be surrendered when the individual leaves the employ of the Corps of Engineers.

Drivers and all passengers are required to wear a seat belt at all times while in a government vehicle. When a motor vehicle is assigned to you, the responsibility for the care and maintenance of the vehicle is yours until returned to its designated storage point or released to another qualified operator. While operating a government vehicle, the following must be followed in accordance with cell phone use:

1. You may only use cell phones with hands-free devices while the vehicle is in motion.
2. Prior to using a hand-held cell phone, drivers shall find a safe place to bring their vehicle to a stop.
3. Text messaging is strictly prohibited while operating motor vehicles.

No employee shall operate a government vehicle while under the influence of alcohol or drugs. Even over-the-counter medications such as cold remedies can cause drowsiness and have a detrimental effect on driving abilities. If you have any doubts about your driving capabilities—don't drive!

You will soon find that your vehicle is your rolling office which you will need to equip with various items in order to manage assignments and situations while on patrol. Check with other park rangers at your project as to what you will need to get started.

You will also be required to tow a trailer as a part of your duties, whether to launch a boat or to transport recreation supplies around the project. LRN Policy Memorandum #19 (Trailer Towing Operations) establishes the requirements for certification in order to tow a government owned trailer including a Driving Proficiency Test. Completion of this training will be a requirement of this training program.

Routine service station purchases, such as gas and oil, will be made by use of a government vehicle fleet credit card. Refer to the "Guide to Your GSA Fleet Vehicle" and the back of your credit card for information as to which purchases and repairs may or may not be made on the vehicle credit card. Do not confuse the fleet card with the government travel card. It is very important that credit card tickets or receipts for purchases are completed correctly. Be sure to check the following:

- The date on the receipt is correct.
- The number of gallons, price per gallon, and total price are shown for gasoline purchases.
- The vehicle's odometer reading appears on the receipt.
- The receipt is signed (if required).
- All printing on the receipt is legible and shows on all copies.

Your vehicle should contain an equipment logbook containing the Guide to Your GSA Fleet Vehicle, Standard Form 91 (Operator's Report of Motor Vehicle Accident) and ENG Form 3662 (Administrative Vehicle Operational Record).

EP 1130-2-550, Chapter 6 outlines requirements for your vehicle under the Visitor Assistance Program. It is important that your vehicle can be readily identified by the visiting public. Some of these requirements include:

1. Vehicle Color is required to be white.
2. The vehicle should be marked with the Corps communication mark and signature decal. A "PARK RANGER" decal will be placed on the driver and passenger side door.
3. Each vehicle should have emergency warning lights, sirens, and a public address system.
4. Each vehicle should be equipped with a first aid kit, fire extinguisher, blood-borne pathogen handling kit, rescue throw bag, binoculars, camera, flashlight and life jackets.

Whenever you are assigned a vehicle at your project, inspect the vehicle for these items and if you are missing a required item, work with your Resource Manager to purchase the required item.

References

- ER 56-2-1, Administrative Vehicle Management – Civil Works, 15 January 1999
- AR 58-1, Management, Acquisition, and Use of Motor Vehicles, 23 March 2020
- CELRN SOH Program Guide, Motor Vehicle Accident Prevention Program, 8 May 2018
- GSA- Guide to Your GSA Fleet Vehicle
- EM 385-1-1, Section 18
- LRN Policy Memorandum 19: Trailer Towing Operations, 28 June 2019
- EP 1130-2-550, Chapter 6- Visitor Assistance Program

Training Requirements

- Demonstrate safe driving abilities and habits.
- Be familiar with ER 56-2-1 and AR 58-1.
- Be familiar with EM 385-1-1, Section 18.
- Wear a seat belt at all times in a government vehicle and ensure that all passengers do so.
- Take responsibility for the care and maintenance of your vehicle. Keep your vehicle clean and well maintained.
- Know how to complete Vehicle Inspection Forms correctly.
- Complete credit card fuel purchases and trip tickets correctly.
- Complete the defensive driving and trailer towing trainings.
- Inspect your vehicle for compliance with the Visitor Assistance Program requirements.

Click here to open Evaluation 1 to print

2. Radio Operation

Each park ranger should be completely familiar with the communications equipment available at your project. Knowing your communication capabilities is an important tool when responding to situations while on patrol. In recent years, cell phones have become more and more reliable as a means to communicate with other rangers and emergency personnel. However, there may be times when you do not have a cell phone signal or need to speak directly with the responding emergency service. You should know how to make necessary operational adjustments to the radio equipment in your vehicle and be well versed in the proper manner of communicating over radio systems.

The project's radio system is capable of communicating with numerous agencies using multiple frequencies. In addition to the Corps frequencies, each law enforcement agency from the surrounding counties, Marine Channels, Weather Channels, and Homeland Security Channels are included. In Tennessee you may have frequencies for the Tennessee Wildlife Resources Agency (TWRA) Region II and III and in Kentucky you may be able to communicate with the Kentucky Department of Fish and Wildlife Resources (KDFWR). Recently, communications with state agencies and some local counties have become more challenging, due to them moving to new systems as a cost cutting measure. The Motorola XTL radios currently used by most projects utilize the "trunking" system, while some local emergency agencies use a new digital system.

When using the Corps frequencies, the LOCAL channel will utilize the project's repeater system and transmit/receive the greatest distance. When communicating in close proximity to other Corps personnel, the HT/2, HT/3, and HT/4 channels may be used which do not go through the repeater system.

Communication with local law enforcement is done by switching to the desired county's radio frequency (if not operating on a different system). Each law enforcement agency utilizes a repeater system for maximum coverage when transmitting/receiving.

There are several Marine Channels that can be used with your radio. Marine 16 is the emergency marine channel and should be included in your scan list. Several of the other marine channels are used by local marinas and houseboaters to communicate. Marine 22 will broadcast updates and advisories from the U.S. Coast Guard.

The Homeland Security channels are a set of frequencies that are designed to be used in the event of an emergency such as a natural disaster, etc. The Homeland Calling (HSVCALL10) channel is used to make initial contact and then switch to one of the Homeland Tactical (HSVTAC) channels for further communications.

You should know the range for local radio operations, and the range when using a repeater. Use the lowest range sufficient to avoid cluttering the entire frequency. Remember, radio transmissions can be monitored by anyone having a receiver (including a scanner) tuned to the transmitter's frequency. Be careful what you say and do not give out confidential information over the radio.

Standard Procedures

Standard procedures are necessary when utilizing radios to assist both the speaker and the listener in understanding the message.

Prowords have been established as a code to simplify and shorten transmissions and still convey the exact meaning:

Proword	**Meaning**
Over	My transmission is complete, and a reply is required.
Out	The conversation has ended, no reply required.
Roger	Your message received and understood.
Stand By	Indicates a delay in transmission. If longer than a minute, you should sign out.
Say Again	Your message is not understood, repeat the message.
Correction	I made a mistake and will repeat correct info.
Affirmative	Yes
Negative	No
Break	Used to separate long messages into smaller parts to ensure receiver is copying message.

Numbers- You should be assigned a "call sign" at your project. Example- 6210 or 6005

Phonetic Alphabet- Often a word or a letter may sound like another in radio messages. To avoid this error, the phonetic alphabet may be used when necessary to spell out words or letters:

Alpha	Foxtrot	Kilo	Papa	Uniform	Zulu
Bravo	Golf	Lima	Quebec	Victor	
Charlie	Hotel	Mike	Romeo	Whiskey	
Delta	India	November	Sierra	X-Ray	
Echo	Juliet	Oscar	Tango	Yankee	

Radio Operating Procedures

Prior to Calling- Think through what you intend to say, who you are saying it to, and be clear in your message. Check that you are using the proper frequency or channel. Speak in a normal tone and hold the microphone about 2 to 3 inches from your mouth.

Making a Call- Key the radio, then pause for a second or two before speaking. State your call sign, who you are intending to speak to, and the channel. Example: "6210 to 6205 on Local" or if speaking to an outside agency (like local law enforcement) "Corps of Engineers 6210 to County Central". When speaking to local law enforcement, use the "10 code" system when possible and appropriate. For example, to run a license plate check on a vehicle in the campground you would say, "I need a 10-28 check on Tennessee plate ABC-123." If you need this information to issue a citation, you can also ask for the address, otherwise they will usually just give you the name and city of the subject.

References

- ER 25-1-111 Radio/Satellite Transmission Systems and Frequency Management Policy, 14 May 2015
- EP 1130-2-550, Chapter 6, Section 8- Communications
- Nashville District Radio Operator's Handbook

Training Requirements

- Demonstrate knowledge of the project's radio systems and how to use the local repeater system.
- Demonstrate proper sign-on, sign-off, and prowords.

Click here to open Evaluation 2 to print.

3. Boat Operation

Since your job requires the frequent use of a boat, it is important that you are familiar with boats and how to operate them under different conditions. The fact that the public expects a park ranger to be an expert around the water is reason enough to strive to set a good example. Perhaps the single most important factor in boat operation is safety. You have a responsibility not only for your own safety, but also for the safety of visitors.

In addition to routine boat patrol, you may be called upon to operate a boat in emergency situations such as drownings, floods, storms, or oil spills. Other duties involving boat operation include aquatic plant control, buoy maintenance, fish attractor installation, special events (dedications, fall color cruises, canoe races, water skiing contests, etc.), and occasional tours for official visitors and personnel from the district or division offices.

Park Rangers must be familiar with boats and how to operate them.

Each park ranger is required to receive comprehensive motorboat training under the supervision of a licensed motorboat operator. This training can be conducted on- the-job under the instruction of a licensed co-worker. After you reach an adequate level of proficiency and complete the online NASBLA certified boating safety course, you will attend a three-day motorboat operator's course. This course is designed as a testing course and is not intended for the comprehensive training of rangers.

During the course, you will be required to pass both written and practical tests in order to obtain a government motorboat operator's license (boats up to twenty-six feet long). The course will be conducted by certified license examiners in the district. Your motorboat operators license will be issued for a five-year term; an eight-hour refresher course will be required for renewal. During this course, you will also be allowed the opportunity to test your Type III inflatable life jacket, which is a requirement of EM 385-1-1.

The LRD Boat Patrol Manual was developed by the Ranger CoP advisory board was developed in 2016 to provide guidance for boat patrols within LRD so that patrols are conducted with consistency, in accordance with Corps' Visitor Assistance regulations, and within command expectations. You should become familiar with this manual and incorporate it anytime you are on the water conducting patrols, including utilizing the Vessel Inspection Checklist Form. This manual defines the primary roles of a park ranger on the water in order of precedence:

RESCUE/ASSIST: Assisting the visitor is the primary objective of boat patrols. This may include towing a disabled vessel if the situation allows.

ENFORCEMENT: Enforcement should be viewed as "prevention". Many of our enforcement actions are to correct visitor behavior while avoiding an aggressive law enforcement appearance.

EDUCATION: This is not intended to be a "meet and greet", but to have real interactions with the public and potentially save lives.

Locking Through

As recreational boating continues to increase, the navigation locks on the Tennessee and Cumberland Rivers are receiving more use than ever before. As a park ranger, you need to know the correct procedures for locking through to perform your duties and to be able to better answer questions from visitors.

There is no charge for the use of a Corps of Engineers navigation lock, although vessels are locked through by certain priorities, so there might be an occasional short wait. Government vessels have top priority, followed by commercial passenger boats, commercial cargo vessels, commercial fishing boats, and recreational boats.

When locking through, follow all buoys and markers and travel at a no wake speed at all times. While waiting your turn to lock through, be sure to stay clear of the danger areas marked by buoys and signs and never approach the dam itself. There may be strong currents present capable of drawing your boat to the structure. Turbulent waters are often present below the spillway and powerplant, so avoid these areas and approach the lock by heading directly for it while keeping a watchful eye for other boats in the area.

First, you must first signal the Lockmaster of your intentions. You can do this by radio, by a four-to-six second blast of your horn, or by use of the small craft signal device near the end of the lock wall. Watch the flashing signal light, which closely resembles a traffic light, on the lock wall. If it is red, stop and stay clear of the lock. Yellow indicates the lock is being made ready, and green is the signal to enter the lock. When the light turns green, the Lockmaster will also give a short blast on his or her air horn. After the proper signal, proceed inside the lock and pull alongside one of the floating mooring bits (i.e. a ring or post that is recessed into the lock that can rise or fall with the water level).

Your boat should be equipped with fenders to keep it from being scraped or banged against the wall, at least fifty feet of mooring line, and adequate deck fittings (bitts, cleats, chocks, or rings). When tying up, always fasten lines to a floating mooring bit or loop the line over a floating bit and hold the other end. **Above all, never tie to one of the ladders in the lock.** Remember, the water level inside the lock is going to change.

Stop the engine as soon as your boat is properly moored. All passengers should remain seated with their life jacket on. Only those who are directly involved with the locking process should move about, and they should wear non-skid shoes. Extinguish all open flames; gas fumes can accumulate more readily in the lock chamber. After the raising or lowering process is complete, the Lockmaster will open the gate and give a short blast on the air horn signaling that it is all clear to proceed slowly (no-wake speed) out of the lock.

References

-ER 385-1-91, Training, Testing, and Licensing of Small Boat Operators, 30 September 1994

-EM 385-1-1, Safety and Health Requirements Manual, 30 Nov 2014

-LRD Water Safety Boat Patrol Manual, Sep 2019 Final

-LRD Vessel Inspection Checklist Form

-USACE- Safety in Locking Through Pamphlet, March 2016

-Chapman's *Piloting*, Hearst Corporation, New York, NY

Training Requirements

-Receive comprehensive motorboat training.

-Complete the three-day motorboat operator's course and obtain a license.

-Test your inflatable life jacket to become familiar with the feel and operation of it.

-Become familiar with state boating laws, especially requirements for personal flotation devices.

-Become familiar with LRD Boat Patrol Manual.

-Complete a vessel inspection using the LRD checklist.

Click here to open Evaluation 3 to print.

4. Computer Applications

The first electronic digital computers were developed between 1940 and 1945 in the United Kingdom and United States. Originally, they were the size of a large room, consuming as much power as several hundred modern personal computers (PCs). In this era mechanical analog computers were used for military applications. Modern computers based on integrated circuits are millions to billions of times more capable than the early machines, and occupy a fraction of the space. Simple computers are small enough to fit into mobile devices, and mobile computers can be powered by small batteries. Personal computers in their various forms are icons of the Information Age and are what most people think of as "computers." However, the embedded computers found in many devices from mp3 players to fighter aircraft and from toys to industrial robots are the most numerous.

The Information Age formed by capitalizing on the computer micro- miniaturization advances, with a transition spanning from the advent of the personal computer in the late 1970s to the internet's reaching a critical mass in the early 1990s, and the adoption of such technology by the public in the two decades after 1990. Bringing about a fast evolution of technology in daily life, as well as of educational life style, the Information Age has allowed rapid global communications and networking to shape modern society.

Computers have been used to coordinate information between multiple locations since the 1950s. In the 1970s, computer engineers at research institutions throughout the United States began to link their computers together using telecommunications technology. The effort was funded by ARPA (now DARPA), and the computer network that resulted was called the ARPANET. The technologies that made the ARPANET possible spread and evolved.

In time, the network spread beyond academic and military institutions and became known as the Internet. The emergence of networking involved a redefinition of the nature and boundaries of the computer. Computer operating systems and applications were modified to include the ability to define and access the resources of other computers on the network, such as peripheral devices, stored information, and the like, as extensions of the resources of an individual computer. Initially these facilities were available primarily to people working in high-tech environments, but in the 1990s the spread of applications like email and the World Wide Web, combined with the development of cheap, fast networking technologies like Ethernet and ADSL saw computer networking become almost ubiquitous. In fact, the number of computers that are networked is growing phenomenally. A very large proportion of personal computers regularly connect to the Internet to communicate and receive information. "Wireless" networking, often utilizing mobile phone networks, has meant networking is becoming increasingly ubiquitous even in mobile computing environments

Computers have been used in some capacity for many years in the Nashville District and are an integral part of our daily activities and duties.

Websites such as the NRM Gateway can be valuable sources of information.

Software applications for these machines include the Microsoft Windows Operating System; the Microsoft Office Suite, which includes Word (word–processing), Excel (a spreadsheet application), PowerPoint (presentation graphics), and Access (database management); Internet Explorer (web browser), and Adobe Acrobat form filler. Some computers also have Microsoft Publisher (desktop publisher) installed. In addition to these applications, a powerful computer tool has been developed for the management of government monetary funds. This tool is a computer program (really a system of several databases and financial management programs) called CEFMS, or Corps of Engineers Financial Management System. This system is accessed through an intranet site, and all employees have some rights to it through User IDs and passwords. CEFMS is used to create purchase requests, request travel reimbursements, enter time, etc.

Since recurring reports and lengthy documents that need periodic updating are a significant part of work at all levels of government, word processing software (Microsoft Word) offers great savings of time. Contract specifications, operational management plans (OMP's), and other documents easily can be updated and revised with limited retyping. Other correspondence can be saved and used later. Many existing reports and forms that are transmitted electronically are composed with word processing software.

Spreadsheet software (Microsoft Excel) is convenient for small data and mathematical applications such as tracking budget expenditures. This software has been used to track use fee fund expenditures, vehicle mileage and performance, accruals for requirements contracts, purchase expenditures, training records, etc. This software can also be used to generate graphics including pie charts, trendlines, historiographs, and bar charts.

Database management software (Microsoft Access) can be used to handle relatively large databases. It can generate reports containing specific parts of a database in a particular order or format.

There are several online databases that you will need to be familiar with for data entry, information sharing, and other important processes. Some of them include:

Civil Works Business Intelligence Hub (CWBI-Ops) (formerly NRM Assessment and OMBIL)- An online database that collects data annually from all business lines: Recreation, Environmental Stewardship, and Partnerships. The purpose of CWBI-Ops is to provide the data and information requirements for program and project management at all levels of the Corps' Operations and Maintenance (O&M) community. It is intended to increase effectiveness and efficiency in data management by using and linking present data management systems and providing Corps-wide distribution and easy access to the same data. It has replaced NRM Assessment as the system of record for Recreation, Environmental Stewardship, and Citations.

VERS- The Visitation Estimation and Reporting System (VERS) is a tool for estimating recreation visits, visitor hours, and activities at Corps of Engineers recreation areas.

Qualtrax- An online database that can be used to find policies and procedures for all divisions and ensures USACE is delivering a quality product.

NRM Gateway- The Natural Resources Management (NRM) Gateway website is an important source of information on various aspects of Natural Resources Management. The Gateway takes Corps staff into the world of the Corps' recreation, environmental stewardship and environmental compliance programs. This tool will improve communication within the NRM community and preserve the organization's institutional knowledge. The NRM Gateway can be accessed at: https://corpslakes.erdc.dren.mil/nrm.cfm

Within the Gateway, the NRM Smart Book is designed to be the resource to locate field staff responsible for various NRM program areas. In order for the system to be useful, it is necessary for field staff to review and correct the content, keeping it current. The NRM Smart Book is only accessible from an official office (army.mil) computer and is not available to the general public, due to regulatory restrictions.

There are two levels of information entry in the Smart Book: (1) contact information posted by an individual, and (2) information on program area assignments posted by a supervisor. Information is provided for staff at the District, Division, Laboratory, and Headquarters levels.

The equipment and software used in the Nashville District are some of the best available and offer park rangers excellent potential to develop their knowledge and use of personal computers, as well as generate new applications to improve management techniques using existing software. The variety of software available and the capability of existing hardware offer the potential for many new applications.

Training Requirements

-Complete the Annual OPSEC Level 1 training (Operations and Information Security).

-You should have a basic knowledge of the use of the Microsoft Office suite- Word, Excel, Access, PowerPoint, and Outlook.

-You should become familiar with navigating through CEFMS.

-You should be able to use the local area network in the Resource Manager's Office to share files and access printers.

-Become familiar with the NRM Gateway and how to find resources. Enroll in or update your NRM Smartbook account.

Click here to open Evaluation 4 to print.

III. ROTATIONAL JOB ASSIGNMENTS

District Office

Near the end of your first year of duty, you will spend one week in the Nashville District Office. During this period, you will receive an orientation with the Operations Division, Operations Section, as well as orientations with the following elements:

- Emergency Management
- Maintenance Section
- Hydropower Section
- Management Support Branch
- Real Estate Division
- Resource Management Division
- Contracting Division
- Planning, Programs and Project Management Division
- Engineering-Construction Division
- Safety and Occupational Health Office
- Public Affairs Office
- Office of Counsel
- Equal Employment Opportunity Office

Field Projects

Visits to field projects will be coordinated and timed to provide the best training opportunities. You will visit each lake with emphasis on unique facilities, characteristics, problems, and major management activities.

Center Hill Lake

Tour the project with special attention to the completed dam rehabilitation project, including the Center Hill Recreation Area and the RCC dam.

Cheatham Lake

Tour the project with special emphasis on the Port of Nashville and state waterfowl and game management areas. Observe the erosion problems on the main channel.

Cordell Hull Lake

Tour the project with emphasis on the state wildlife management area.

Dale Hollow Lake

Visit the National Fish Hatchery, state park, and primitive camping areas.

J Percy Priest Lake

Tour the project, focusing on the visitor assistance program, state park, and wildlife management areas.

Lake Barkley

Tour the project with emphasis on the U.S. Forest Service (Land Between the Lakes), TVA, and other federal/state agencies with which the Corps works. Visit Fort Donelson National Battlefield and Smithland Lock and Dam.

Lake Cumberland

Visit Mill Springs Mill and become familiar with Corps role in its restoration. Tour the state parks and the dam rehabilitation project if time allows.

Laurel River Lake

Tour the project and National Forest. Observe area strip mining operations.

Martins Fork Lake

Tour the lake and the Harlan and Pineville Flood Control Projects. Observe strip mining in the watershed. Become familiar with the NRM staff's role in operating the sluice gates in the dam.

Old Hickory Lake

Tour the project with special emphasis on shoreline management, control of exotic invasive plant species, environmental conservation and restoration program, and management practices for control of erosion and siltation.

Other Assignments

As time and training opportunities arise, you may be assigned to temporary work details in other Corps elements, both within and outside the Nashville District. These assignments are excellent opportunities to broaden your perspective of the functions of the Corps and to learn valuable new skills.

IV. ON-THE-JOB TRAINING AND EXPERIENCE

1. Public Relations

The term, "public relations," may be variously defined depending upon the situation. According to Webster's Dictionary, public relations is "the business of inducing the public to have understanding for and goodwill toward a person, firm, or institution; also, the degree of understanding and good will achieved."

One central fact is important; in your work as a park ranger, public relations is always present and ongoing, whether good or bad. Possibly the most important single function you will perform is your contribution to positive public relations. The quality and success of most of your work is directly influenced by your level of competence in practicing good public relations.

In Person Communications

The ability to communicate effectively is absolutely essential. Research has shown that seventy-five to eighty-five per cent of a park ranger's duty time involves some form of communication.

The most common and important type of communication is person-to-person contact. Some important principles to remember are:

- In person-to-person communication, you should be sincere, open, factual, and honest with the other person, but most of all honest with yourself.
- Be prepared to deal with prejudices, which may hinder communication.
- Communication is a two-way street; be a creative listener as well as a speaker. Avoid disarming the other person prematurely if he or she disagrees with you, no matter how good your defense is. You owe it to the other person and to yourself to hear the full value of their opinion.

Establishing and accomplishing communications with a group is an exciting challenge. With the ever-increasing contact with the public, the park ranger takes the role of instructor and public speaker more often. When speaking to a group, keep your objective in mind and know your audience. Be open and aboveboard; this inspires confidence. Be enthusiastic, as this inspires enthusiasm, maintain eye contact, and solicit feedback.

Ready, set, inflate allows pubic to become involved.

Telephone Communication

The telephone is a very basic and important public relations tool used by the park ranger.

- When answering the telephone, identify your project, title and name, e.g., "*Center Hill Lake, Resource Manager's Office, Ranger Doe speaking."*

- Obtain the name, address, and phone number of the caller if a return call or letter is required. All important points should be recorded along with the date and time of the call. A notation should be made of any follow-up action required.

- Be courteous, alert, helpful, and concise. Ensure that all important points are covered and cleared up.

Drafting Correspondence

Effective letter writing is "producing desired results by written communication." Writing letters is an important aspect of your job. You will be drafting letters of many types and a good understanding of proper writing techniques is necessary. Clear, concise, and properly worded written communications represent our agency favorably and must not be taken lightly. All letters should answer the appropriate questions of who, what, when, where, why, and how.

Using email has become a primary form of communicating with other Corps elements, outside agencies and the public. In order to best communicate effectively via email, the LRD Email Etiquette 101 guide provides some rules to remember:

1. Emails are official business correspondence that reflect on you and the U.S. Army Corps of Engineers. They are all subject to the Freedom of Information Act (FOIA) which gives anyone the right to access information from the federal government. You must assume your emails will be forwarded within and outside the Corps and you will have no control over who eventually receives them. Keep emails professional. Significant disagreements, sensitive issues and "emotional issues" are best solved face-to-face or over the phone.

2. Personal email should be kept at a minimum. Emails are not private, and your employer does have the right to retrieve those emails. The server has a copy of every email that you've ever sent, so you need to be very careful with what you are sending, and to whom, because it never disappears.

3. Remember to respect the chain of command in your emails. When sending an email to your supervisors do not routinely CC his or her supervisor. This undermines your supervisor's ability to prioritize, evaluate, and staff information before his/her supervisor sees it. Similarly, when sending email to a subordinate, do not routinely CC his/her subordinates for the same reason.

4. Ensure your signature block is correct and includes your name, title, organization, and contact numbers.

Example of a signature block:

Jane Doe
Park Ranger
Center Hill Lake
US Army Corps of Engineers
158 Resource Lane
Lancaster, TN 38569
(931-858-3125)

Internet: http://www.lrn.usace.army.mil/Locations/Lakes/CenterHillLake
Facebook: http://www.facebook.com.nashvillecorps

Public Affairs Office

The news media consists of the press, radio, and television. In the course of your duties as a park ranger, you will occasionally contribute to the production of news.

Refer requests by reporters for information or interviews to the Resource Manager, who will coordinate with the Public Affairs Office. **Be sure you have received media training before participating in media interviews.** After training, you may participate in media interviews that are in your area of expertise but notify PAO prior to the interview or as soon as possible after the interview.

If you are assigned to talk with a reporter, it is important that you maintain presence of mind, be alert, and straight- forward in your answers. Don't skirt the issue—if you don't know the answer to a question, say so. Follow-up by finding the answer and providing it to the person as soon as possible.

Most reporters are extroverted, exuberant individuals who have the unusual ability to draw people out. Remember this and be prepared to furnish positive, accurate responses.

Park rangers often write articles about their lake and submit them for publication in many of the local papers. This is an excellent method of communicating management methods and goals. A news article should be concise, include a photograph, if possible, avoid technical or official language, and directly relate to the intended audience.

Social Media

The newest form of communications is social media. Social media in the most general terms is an instrument for communication through various Internet applications. The media can be of various forms: forums, blogs, wikis, podcasts, photos, video, posts or comments. Some of the most popular social media sites are Facebook, Twitter, Instagram, LinkedIn, Snapchat and TikTok. Social media blends technology with social interaction to create added value for business, industries, or government agencies. Rangers respond to questions from the public through various internet communications and post project updates on the social media network. Please remember that, while information provided through social media is perceived as less formal than other communication, you are still representing our

agency, and, as such, the information should meet the same requirements as other written communications: clear, concise, properly worded, and grammatically correct. Social media sites for lake projects must be coordinated through the Public Affairs Office for prior approval. Rangers who monitor these social media sites must complete training with annual refresher courses.

Information

The public expects you to be an expert on information concerning your project, such as statistical information on the dam, power plant, and lake; visitation and the economic impact of recreation; the locations of commercial docks, multipurpose recreation areas, and access points; the condition of roads; crowding conditions in parks; wildlife identification; and the location of hospitals, doctors, law enforcement agencies, etc. Be prepared to provide this information; equip your vehicle with appropriate maps, brochures, statistics, phone numbers, state hunting and fishing guides, and other handy references.

References

- AR 25-50, Preparing and Managing Correspondence, 15 Oct. 2020
- CELRN, Policy Memo #5, Use of Internet Capabilities (Social Media), 24 September 2021
- LRD- Email Etiquette 101

Training Requirements

- Demonstrate your writing abilities by preparing a general information letter to the public, news release, and agency memorandum.
- If assigned the social media accounts for the project, complete the Social Media Training.
- Become Familiar with AR-25-50, Managing and Preparing Correspondence

Click here to open Evaluation 5 to print.

2. Standards of Conduct

It should be clearly understood that this section does not supersede, add to, or delete from the referenced regulations. The purpose here is to provide the trainee with a brief standard that should be helpful in performing the duties of his or her position.

Wear your uniform with pride!

Image

As a park ranger, you represent the Corps to the public because of your visibility and accessibility; the manner in which you carry out your job is constantly under scrutiny. The public may not understand what your duties are, but they do understand the image you project. It is this image which must reflect professionalism and expertise. Actions which reflect competence and integrity are quickly noted—likewise, incorrect actions such as "horsing around," loafing, and inappropriate language are remembered and detract from one's ability to perform in a competent manner.

You must walk a straight and narrow line between being sincerely friendly and being too familiar. You must strike a balance between warm hospitality and personal dignity. The public expects a uniformed park ranger to be dignified and will usually afford respect if merited by his or her personal conduct. Therefore, the manner in which you conduct day-to-day business with the public is vital to the success of the Corps mission. The following paragraphs contain wise advice that will be helpful for you to follow to maintain a good image:

-Always drive safely and courteously. Follow the law to the letter, practice defensive driving, and sit upright in your vehicle with an alert look. As a park ranger, you are considered a professional driver. Always keep your vehicle clean inside and out. Check your oil, water, windshield wipers, etc., on a regular basis, and report any needs to your supervisor.

-Stop to assist people who need guidance and help. When patrolling a recreation area, roll down the window and be approachable. Be friendly and courteous; remember, you are a public servant.

-Do not frequent the same restaurant, boat dock, service station, etc., all the time.

-If approaching an unruly or uncooperative group, try to control your emotions. You may be angry or anxious, but don't let it show. Talk in an even, clear voice. Speak strongly enough so that people can easily understand you, but don't raise your voice above normal levels. If your contact involves a citation, make your visit as brief as possible.

-When visiting with people to answer questions, be courteous and helpful, but don't overdo it. The party may be enthusiastic with questions, but if you delay too long, he or she may be critical of you later with a statement such as, *"These rangers have got it made; all they do is stand around all day and talk to people."*

- ER 1130-2-550, Chapter 8 provides clear guidance for uniform wear for park rangers and NRM staff with citation authority. The LRD Ranger CoP Advisory Board created a Uniform Guide to assist new park rangers with deciding what uniforms to purchase. This can serve as a good tool when spending your yearly allotment.

-Wear your uniform with pride. When you put it on you carry the responsibility for playing the role expected of persons who wear the uniform.

-Wear only authorized articles for the uniform, never just part of it, and don't wear the uniform or parts of it when off duty. There is no "casual" dress with a uniform.

-The uniform should be purchased only from the authorized supplier. (A uniform account will be set up for you with the supplier.) The uniform should be carefully maintained and replaced when it becomes worn or damaged.

-Keep the uniform clean and pressed at all times. Keep polish and cleaning material for your shoes and buckle in the office or your vehicle. Take pride in keeping a good shine on your shoes and belt buckle.

-Keep all buttons fastened and your hair neatly trimmed and combed. Avoid wearing glasses, jewelry, or accessories that detract from the uniform.

-Good bearing and posture are important to everyone, especially a uniformed park ranger. The most carefully fitted, best quality uniform will present a sorry appearance if the wearer habitually slouches or stumbles along in an uncertain gait.

Your appearance can increase your effectiveness and ensures the public encounters a readily identifiable employee. In 2020, LRD implemented Policy Guidance- Appearance Standards for the Great Lakes and Ohio River Division (LRD) Natural Resources Management Uniformed Employees to standardize the expectation for a park ranger's appearance. In addition to the uniform standards listed in ER/EP 1130-2-550, this policy states:

a. NRM uniformed employees are required to minimize personal adornments while wearing the Corps NRM uniform. Makeup and jewelry must not unreasonably detract from the overall appearance of the uniform. Excessive amounts, large size, and bright or contrasting colors should be avoided.

b. Tattoos. Tattoos that are extremist, indecent, sexist or racist are prohibited from being visible. Tattoos are prohibited on the hands, head, and neck. Ring and Cosmetic tattoos are authorized.

c. Body Piercing. Other than earrings, NRM uniformed personnel may not attach or display objects or ornamentation to or through the skin/body while they are in uniform, including the tongue, lips, nose and inside the mouth. Rings, gauges, and studs associated with body piercing must be removed (where visible) while in uniform.

d. Hair/Beards. Hair and beards will be neatly trimmed and must not obscure any part of the *nameplate or badge. Beards will be free of ornaments and braiding. Coloration not normally found in human hair is prohibited. *The LRN addendum further states that beards should no obscure any part of the front of the uniform, including the shirt collar or tie.

You should become totally familiar with these policies and abide by its requirements

Professional Conduct

Always be on time for work. If you are going to be late for work, always call and let your supervisor know. Do not exceed the prescribed time limits for breaks or lunch. Be sure to ask for leave well in advance so that your supervisor can plan efficiently.

When you have an appointment, arrive slightly early with your materials already organized. If you can't keep the appointment or are going to be late, get word to the other party. Always follow-up and take the initiative in rescheduling the appointment.

Park rangers have frequent contacts with contract personnel such as park attendants. Cultivate a good working relationship with these people but avoid becoming too familiar—keep everything at a professional level and never accept a gratuity or special favor from a contractor.

Many times, you must make quick decisions on small matters that affect campers and other visitors. Be impartial in rendering these decisions regardless of personal feelings. Your decisions must be based on existing rules, regulations, and policies. You must avoid giving permission for some people to do things that are forbidden to others.

As a Corps Park Ranger, you must be constantly aware of the fact that you are the representative of the federal government. You bear the responsibility for maintaining an orderly two-way flow of information, with emphasis on promptness and accuracy. You must accurately state Corps policy and regulations and be alert to significant points presented by the other party.

In dealing with commercial marina operators, park ranger must ensure that positive understanding exists concerning the position of the Corps and the concessionaire. Carry out discussions in a friendly but businesslike manner. Avoid levity as this may cause misunderstanding as to the seriousness of the purpose. Do not be apologetic for regulations and policy, and do not belittle or criticize the government in order to gain favor with the other party. However, you should show interest in the well-being of the concessionaire and readily carry his or her requests and recommendations back to the resource manager.

When dealing with an adjacent landowner, strive to present yourself as a good neighbor. Show respect for the dignity and rights of the landowner, yet diligently guard the interests of the government. A condition of friendly, cooperative, mutual respect should exist between the Corps and adjacent landowners. The quality of being personable is an important asset because often you must depend upon the good will of the other party in order to obtain information.

Your conduct and actions off duty affect your relations with people in your area with whom you must deal while on the job. Never accept any "favors" from people with whom you may come in contact while on the job. Always be fair and truthful with everyone. Do not hesitate to tell people that you must treat everyone equally. While off duty, keep your activities on the job confidential. Never discuss trespass cases, etc., with people who are not directly involved. Never use government property or information for personal purposes.

References

- DOD Employees' Guide to the Standards of Conduct, Jan. 2019
- ER 1130-2-550, Chapter 8 - Uniforms for Natural Resources Management Team
- LRD NRM Appearance Policy, 24 Feb. 2020
- LRN NRM Appearance Policy, 8 April 2020
- LRD Uniform Guide, October 2021

Training Requirements

- Be on time for work and appointments.
- Wear your uniform correctly in accordance with ER 1120-2-550, Chapter 8, and present a well-groomed appearance in accordance with LRD & LRN NRM Appearance Policies.
- Become familiar with the standards of conduct found in the DOD Employees Guide to the Standards of Conduct.
- You should be conscious of your professional image, both on and off the job.

Click here to open Evaluation 6 to print.

3. Protection

1. Emergency Management

The Corps of Engineers emergency management program addresses natural disasters such as floods, earthquakes, tornadoes, explosions, and droughts; and man-made emergencies including oil or chemical spills, riots, terrorism, and warfare (nuclear, biological, chemical and conventional).

Park rangers are the primary field representatives of the Corps of Engineers and as such will be called upon to make the initial survey of the severity and extent of damage in a national or local emergency caused by natural or man-made forces. The Emergency Action Plan (EAP) for each lake outlines the actions to be taken in the event that emergency situations arise.

Natural Disasters

The mission of the Nashville District during natural disasters is to respond to the public need by implementing the policies and objectives of the Corps of Engineers as outlined in ER 500-1-1, Civil Emergency Management Program. This regulation emphasizes that the broad objective of the Corps of Engineers is to be responsive to the public need and be prepared to utilize its full capabilities and authorities for the common good in order to save human life, prevent immediate human suffering, or mitigate property damage.

The district is to use available resources to protect Corps of Engineers facilities, to provide and perform supplemental aid to civil authorities, and to perform tasks as directed by the Federal Emergency Management Agency (FEMA). An All-Hazard (OPLAN) has been developed for the District as well as each project. You should become familiar with these plans to prepare for emergency situations.

Flooding below Wolf Creek Dam during 2019 high water event

Floods

Public Law 84-99 requires the Corps of Engineers to conduct emergency operations when flooding conditions exist or are imminent. Rangers may be directed to provide initial technical assistance and contact local officials of affected communities to inform them of the assistance available from the Corps of Engineers. Sandbags, pumps, generators, etc., are examples of equipment available for loan to local entities. Federal assistance under PL 84-99 shall always be supplementary to and not a substitution for local efforts.

Other Natural Emergencies

When a major natural disaster occurs (e.g., earthquake, tornado, major fire, etc.), rangers may be called upon to make a preliminary survey to evaluate the overall damage. With the help of the initial damage survey, the Federal Emergency Management Agency (FEMA) determines under Public Law 93-288 whether the severity and magnitude of the damage warrant federal assistance. Only after a presidential declaration of a "major disaster" or "emergency" has been made, can the affected state or municipality receive federal aid.

Preparation of Damage Survey Reports (DSR), providing ice and water, temporary housing and roofing, debris and wreckage clearance, and emergency repairs or replacement of roads, highways, utilities, dikes, or levees are examples of tasks that may be assigned to the Corps of Engineers by FEMA. This is only as a result of an application for federal aid after a disaster has been declared.

Oil or Chemical Spills

If you detect or are notified of a discharge of oil or hazardous substance, you should immediately ascertain the nature of the discharge, the estimated amount, and location; its potential impact on the environment; the probable direction and rate of travel of the material; the resources and installations which may be affected; and actions necessary for protection.

You should immediately notify the Project Emergency Manager (the Resource Manager) or his or her alternate (the Power Plant Superintendent) of the spill. Detailed contingency and action plans, which include precautionary measures and the procedure for further notification are contained in Part II of the Project OMP.

References

- ER 500-1-1, Civil Emergency Management Program, 30 Sept. 2001
- CELRN-EM All Hazard OPLAN, Sept 2018
- Project Emergency Action Plan
- Project Oil and Hazardous Substances Pollution Contingency Plan
- Project Operational Management Plan, Part II

Training Requirements

- Become familiar with the referenced materials.
- Become involved in emergency operations, such as flood reporting, if circumstances dictate.

Click here to open Evaluation 7 to print.

2. Crime Prevention and Physical Security Programs

The term "crime prevention," can be defined as "those courses of action or measures to prevent criminal acts from occurring or to minimize the opportunity or motivation to commit, conceal, or engage in criminal activities." "Physical security" can be defined as "that part of security concerned with the physical measures designed to safeguard personnel; to prevent unauthorized access to equipment, facilities, material, documents; and to safeguard them against espionage, sabotage, damage and theft." These programs apply to Corps employees as well as outsiders.

As a park ranger, you provide surveillance vital in the observation of security problems and detection of evidence of criminal activities. Your liaison role with local law enforcement officials is also vital to project security. The responsibility for crime prevention and physical security is continuous, not just limited to emergency situations or to any particular time or event. You must always be alert and safeguard both personnel and property. Many security hazards may also be related to safety; therefore, in many cases physical security measures will be closely coordinated with the safety program. Each project is required to have a Project Physical Security Plan (PPSP) in accordance with the LRN Physical Security Plan and provides the planning and organizational structure necessary to protect the project structures, i.e., the lock, dam, and power plant, in case of a major threat or disaster. The plan contains duty assignments corresponding to designated threat and security response levels.

Another aspect of physical security is bombing and/or bomb threats. Terrorist acts which include the use or the threat of use of explosives against public facilities place an urgent responsibility on the Corps of Engineers and law enforcement agencies for the protection of life and property. The PPSP contains bomb search team assignments and procedures for searches. It also provides guidance on what to do if you receive a bomb threat. You must be prepared to act properly in the event of a bombing or bomb threat.

A brief incident report (BIR) is used to report criminal activity or other incidents occurring on public property. Incidents of theft or vandalism of property amounting to $1000 or less are consolidated in a monthly report. You should learn how to complete this form properly for both cases. See ER 385-1-99, USACE Accident Investigation and Reporting, and ER 190-1-50, Law Enforcement Policy for USACE for additional information.

References

- AR 190-13, Army Physical Security Program, 27 June 2019
- LRN Physical Security Plan, 20 Apr 2015
- Project Physical Security Plan
- ER 385-1-99, USACE Accident Investigation and Reporting
- ER 190-1-50, Law Enforcement Policy, 30 Nov. 1987

Training Requirements

- Become familiar with the referenced materials concerning the crime and physical security regulations and policies, and become knowledgeable in the following subjects:
    - Reporting of offenses and incidents
    - Care and custody of equipment
    - Procedures concerning classified information
    - Security of vehicles, keys, and credit cards
- Read and become familiar with the Project Physical Security Plan, particularly your security assignments.

Click here to open Evaluation 8 to print.

3. Visitor Assistance

The authority for designated Natural Resources Management personnel of the Corps of Engineers to enforce rules and regulations (as set forth in Title 36, Chapter III, Part 327 of the Code of Federal Regulations) was granted by Congress in Section 234 of the Flood Control Act of 1970, PL 91-611, (84 Stat. 1818). A citation for violation of these regulations requires the violator either to forfeit collateral (pay a fine) or appear before the United States Magistrate within whose jurisdiction the water resources development project is located.

The Corps of Engineers maintains only proprietary jurisdiction at civil works projects, i.e., the same jurisdiction maintained by any other landowner. Consequently, the local and state law enforcement agencies maintain their statutory authority and inherent responsibilities to keep the peace and protect persons and property.

It must be emphasized that the Corps of Engineers Visitor Assistance Program involves the authority to issue citations only and that no authority exists for arresting or searching an offender.

Corps Park Rangers have the authority to enforce the rules and regulations published in Title 36, Chapter III, Part 327, C.F.R. only and only on public property. It is your responsibility to maintain good rapport with local and state law enforcement officers and keep them aware of the limitations of the citation authority granted to rangers

Generally, a criminal act is classified as either a felony or a misdemeanor. Under federal law, a felony is any criminal violation which is punishable by imprisonment for one year or more. Anything less is classified as a misdemeanor. Misdemeanor crimes for which the penalty does not exceed a $5,000 fine or six months imprisonment, or both, are further classified as petty offenses. Violations of the regulations in Title 36, Chapter III, Part 327, C.F.R. are classified as petty offenses.

It is a felony under Title 18 of the United States Code to forcibly assault, resist, oppose, impede, intimidate, interfere with, or kill any civilian official or employee of the Corps of Engineers assigned to perform investigations, inspections, law or regulatory enforcement

functions, or field level real estate functions while they are in the performance of their official duties. In 1983, Corps of Engineers personnel were added to the federal officials covered by this law.

Common sense is important in all aspects of visitor assistance. A prerequisite to a successful visitor assistance program is the education of the public about Corps of Engineers policies and regulations. Enforcement action should be taken only as a last resort. Individuals should be warned for minor infractions and cited for aggravated violations. A Park Ranger should approach every contact with the mindset of using the lowest level of enforcement necessary to gain compliance. In most cases, visual presence will remedy most situations and get the contact in compliance. It is always good practice to make an effort to verbally communicate with the potential offender. This is how you build rapport and in most cases, practice makes perfect.

Once you move past a verbal warning, a written warning or a citation may be necessary. Refer to the LRD Citation Manual for reference as to how a citation should be completed properly for efficient processing at the Central Violations Bureau (CVB). After writing a citation or warning, that information must also be entered into the Citation Module for accurate recordkeeping and tracking purposes. As a federal officer, you must be fair but firm. You must be emotionally stable, react quickly and decisively under pressure, and be willing to accept harsh criticisms and even profanity directed toward you in the performance of your duties. Remember, no individual likes to be told that he has done something wrong, especially if there is a penalty involved.

You will receive formal classroom and practical field training in visitor assistance before being designated as an Officer of the United States. This training program will include instruction on authority and jurisdiction, procedure for issuing citations, enforcement considerations, investigative techniques, liaison with law enforcement and court officials, courtroom demeanor and testimony, standards for park rangers, patrol and observation, conflict resolution, and personal protection. Appropriate tests will be administered upon completion of the formal training course to determine if you are qualified to exercise citation authority. Once your citation authority has been issued, you will be required to complete annual refresher training including personal protection training in order to keep your authority current.

Cooperative Law Enforcement Contracts

As mentioned previously, local and state law enforcement agencies maintain the statutory authority to keep the peace and protect people and property. The Corps of Engineers is authorized to enter into contracts with local law enforcement agencies to provide increased patrolling of water resources projects. You should become familiar with these contracts at your lake. You will assist in formulating specifications and strive to build good working relationships with the local deputies during your daily assigned duties. These contract requests should be submitted to the OPS-O POC by November 1 of each year to ensure no lapse in service for the following year.

References

- Section 234, Flood Control Act of 1970, PL 91-611, (84 Stat. 1818).
- Title 36, Chapter III, Part 327, C.F.R.
- ER 1130-2-550, Chapter 6 - Visitor Assistance Program
- ER 1130-2-550, Chapter 7 - Cooperative Agreements for Law Enforcement Services at Civil Works Water Resources Projects
- Sections 111, 1111, 1112, 1114, Title 18, U.S.C.
- Federal Magistrates Act of 1968. PL 90-578, (82 Stat. 1107).
- AR 190-29, Misdemeanors and Uniform Violation Notices Referred to U.S. Magistrate
- LRD Citation Manual

Training Requirements

- Complete Visitor Assistance Prospect Course
- Attend at least one session of the U.S. Magistrate's Court and observe courtroom demeanor and development of cases.
- Become thoroughly knowledgeable of Title 36, Chapter III, Part 327, C.F.R., Rules and Regulations.
- Be thoroughly knowledgeable on when and how to issue citations and warnings. Assist the Citation Module POC with inputting warning and citations into the system.
- Participate in developing specifications and executing a contract for law enforcement services.

Click here to open Evaluation 9 to print.

4. Safety

Safety is every employee's responsibility. The objectives of the safety program are to prevent loss of life, personal injury, and damage to property. The basic safety philosophy of the Corps of Engineers is to create and maintain safe conditions of employment, to promote safe practices by all Corps employees and contractors, and to provide for the safety of all persons while they are on premises under the jurisdiction of the Chief of Engineers.

Park Rangers are in a key position to promote safety consciousness.

Every employee has the responsibility to comply with rules, regulations, and standard operating procedures (SOP); correct or report unsafe conditions immediately; report all accidents; use protective devices; and warn others of known hazards or their failure to observe appropriate safety regulations. You should become familiar with the Activity Hazard Analysis (AHA) for each activity that you participate in while completing your daily tasks as a ranger. Each ranger should also review their Position Hazard Analysis (PHA) and ask for clarification on any potential hazards they are concerned with. You will lead a project safety meeting, where you will pick a safety topic from EM 385-1-1 and provide tips for using safe practices while working.

As a park ranger, you are in a key position to promote safety consciousness because you are involved in a wide variety of activities and are in direct contact with the general public as well as co-workers. The public expects a ranger to set a good example of safety and courtesy. You should observe all activities and facilities on public property to ensure safety in construction, operation, and maintenance. If your project has a life jacket loaner program, be sure to inspect it during your routine patrols and if there are PFDs missing, restock it.

You should be thoroughly familiar with the project safety program outlined in Part II of the Project Operational Management Plan (OMP). Safety guidelines in the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, also must be followed at all times.

Dragging Operations

Generally, recovery of drowning victims is carried out by local law enforcement agencies or rescue squads. However, at some locations and under certain situations, Corps of Engineers equipment and personnel may be called on to assist in dragging operations. This may involve traffic and crowd control at the site or may involve boat operation to assist in the location of the victim below the surface of the water. Many of the lake projects in LRN now have side/down scan with sonar units on their respective patrol boat. It is critical that you become familiar with these units to assist in recovery operations at your project. Your experience with these units can greatly assist local law enforcement agencies with recovery efforts. Your Resource Manager will instruct you on the procedures at your lake and see that you receive any training required.

Rescues

You should know the "Reach-Throw- Row-Go" order for rescuing persons in distress in the water. First, try to reach for the person with an object, such as a paddle or a branch. If that doesn't work, try throwing a floating object, such as a personal flotation device (PFD), a cooler, or spare tire. Next, row out to the person in a boat. If all previous attempts fail, you should go in after the drowning person yourself **only** if you have been trained in rescue procedures; attempting to rescue a drowning person without proper training is dangerous to both you and the victim. The American Red Cross Water Safety Website is an excellent resource for all things water safety, but particularly for water rescues.

Accident Investigation and Reporting

Thorough accident investigation is important in preventing additional accidents of a similar nature. In conducting an accident investigation, the investigator should be concerned with the following:

- What hazards were involved?
- How can hazards be eliminated?
- What unsafe behavior was involved?
- How can the unsafe behavior be corrected?

Proper reporting of accidents is extremely important because the effectiveness of an investigation is seriously reduced if the report is not accurate and complete. For any reportable incident, a brief incident report (BIR) should be completed that outlines the 6W's of the event (Who, What, When, Where, Why, Way Ahead). More serious incidents (including public fatalities) will also require a "Mishap Report" in ENGLink and require reporting to the Chief of Operations following the chain of command.

References

- EM 385-1-1, Safety and Health Requirements Manual
- LRN Policy Memorandum #48, Safety Policy
- Part II, Project Operational Management Plan
- American Red Cross- Water Safety
- Memorandum for Operations Managers and Field Supervisors dated 18 October 2022, Subject: Reporting Public Fatalities and Serious Injuries.
- Life Jacket Loaner Program Guidelines, 1 Aug 2011

Training Requirements

- All park rangers are required to complete an approved first aid and cardiopulmonary resuscitation (CPR) course. You should be thoroughly familiar with first aid and CPR procedures and be able to administer them when necessary.
- Organize and conduct a monthly safety meeting for project employees.
- Complete a Brief Incident Report (BIR) and Mishap Report, for an accident at your lake.
- You should become familiar with the referenced documents.

Click here to open Evaluation 10 to print.

4. Fire Prevention and Control

The park ranger's role in fire prevention and control will vary at each lake due to type and amount of forest cover, terrain, human activity, and other factors. However, it is essential that all rangers be familiar with fire suppression methods and equipment. In many cases, a ranger will be the first person to arrive at the fire. Refer to Part I of the Project Operational Management Plan (OMP) for detailed information on fire prevention and control at your lake.

This section deals primarily with wildfire prevention, suppression, and control. Fire prevention in administrative and maintenance buildings and areas is also of concern, but it is better addressed through the safety program. You should become familiar with the location of storage areas for flammable materials; the location of fire alarms; and the type, location, and use of the firefighting equipment in administrative and maintenance areas.

Wildfires on public lands usually result from human activity, with less than one percent being started by natural causes such as lightning. The majority of wildfires are caused by careless acts such as adjacent landowners not adequately controlling debris, brush, or grass fires on their property or visitors not completely extinguishing campfires and cigarettes. Regardless of the actual cause of a wildfire, the effects can be devastating to the environment as well as life threatening. Prevention includes controlling risks through employee awareness, public education, law enforcement, and closure of high hazard areas. The cooperation of state forestry agencies and local fire departments is an important factor in the detection, suppression, and control of wildfires on public land. Refer to Part I of the OMP for the fire telephone directory and location of fire towers.

Investigation and Reporting

Aggressive action will be taken to discover, investigate, and properly report all fire trespasses involving public land. Knowledge of the topography, roads, and trails and of the people who frequent the area and adjoining private property will be of assistance in a fire investigation.

If there is an indication that the fire has been maliciously set, the first person to arrive at the fire will seek and preserve evidence if possible. Signed written statements will be obtained from witnesses and the violator. Detailed procedures for investigating the causes of wildfires and making proper fire reports are contained in Chapter 19, Part II of the Project OMP.

A sanitation cut may be required in case of extensive forest fire damage in order to prevent insect infestation, disease outbreak, and redevelopment of fire hazards in the dead and dying timber.

References

- Project Operational Management Plan
- CELRN-SOH Program Guide- Fire Protection and Prevention Program, 3 May 2018
- "*Incident Response Pocket Guide*", National Wildfire Coordinating Group, PMS 461

Training Requirements

- Become familiar with the sections of the Project Operational Management Plan pertaining to wildfire protection and wildfire trespass investigation and reporting (Chapters 8, Part I and 19, Part II).
- Become familiar with the "*Incident Response Pocket Guide",* National Wildfire Coordinating Group, PMS 461
- Take part in an actual firefighting operation if any occur during the training period. Assist in investigating and reporting any wildfires occurring on public property during the training period.
- Demonstrate the proper use of firefighting equipment (fire extinguisher, fire flapper, water backpack, fire rake, and Pulaski) at a safety meeting.

Click here to open Evaluation 11 to print.

5. Pest Control and Invasive Species

Pest control refers to the regulation or management of a species defined as a pest, usually because it is perceived to be detrimental to a person's health, the environment or the economy. Chemical pesticides date back 4,500 years, when the Sumerians used sulfur compounds as insecticides. One *circa* 4,000-year-old manuscript also mentions the use of poisonous plants for pest control. It was only with the industrialization and mechanization of agriculture in the 18th and 19th century, and the introduction of the insecticide's pyrethrum and derris that chemical pest control became widespread. In the 20th century, the discovery of several synthetic insecticides, such as DDT, and herbicides boosted this development. Chemical pest control is still the predominant type of pest control today, although its long-term effects led to a renewed interest in traditional and biological pest controls towards the end of the 20th century.

Although generally associated with insect control, this discipline can include any form of terrestrial or aquatic plant or animal life, virus, bacteria, or other microorganisms considered nuisance or invasive.

These nuisance and invasive species can threaten our nation's natural resources, prevent or seriously hinder navigation, adversely affect flood risk management, hydropower generation, water supply, and limit recreation use by the public. The economic costs are staggering, and introductions of new invasive species continues. As a result of centuries of habitat manipulation and plant and animal introductions (both intentional and accidental), numerous species have been allowed to reach invasive and/or nuisance status and threaten the integrity our ecosystems. These species present a management challenge to the USACE.

USACE has been involved with invasive species management since the late 1800's. The River and Harbors Act of 1899 directed the Corps of Engineers to control both terrestrial and aquatic invasive and nuisance species. Through various other congressional actions, executive orders and with the introduction of new invasive species, the Corps has been involved in invasive species management ever since.

Chemical pesticides also include herbicides used for control of unwanted plant growth. Due to the toxic effect of some chemical pesticides, several have been discontinued (DDT, Chlordane, etc.) or placed on a restricted use list by the EPA. Due to the residual effects of chemical pesticides, emphasis has been on the use of more environmentally sensitive methods of pest control.

Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment. The IPM approach can be applied to both agricultural and non- agricultural settings, such as the home, garden, and workplace. IPM takes advantage of all appropriate pest management options including, but not limited to, the judicious use of pesticides.

The IPM strategy:

- Identifies the nonnative, invasive or nuisance species.
- Assesses the means of introduction or dispersal to prevent new areas from being contaminated.
- Identifies desirable species.
- Determines the pest control goal(s) based on site-specific information.
- Establishes acceptable levels of individual species, both native and desirable species and nonnative, invasive or nuisance species.
- Determines available control methods to achieve the goal(s) of the strategy.
- Evaluates the benefits and risks of each method, or a combination of methods.
- Selects a strategy based on effectiveness and least possible hazard to people, property, and the environment.
- Utilizes each tactic correctly, observing all applicable Federal, State, and local regulations.
- Educates the public and stakeholders about invasive species, their effect on the environment, and the importance of maintaining healthy ecosystems.
- Monitors results of the strategy and reevaluates management options

Non-chemical means have been encouraged in recent years such as biopesticides. Biopesticides include naturally occurring substances that control pests (biochemical pesticides), microorganisms that control pests (microbial pesticides), and pesticidal substances produced by plants containing added genetic material (plant-incorporated protectants) or PIPs. Biopesticides are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals.

Policy and Authority

There are numerous Executive Orders, laws, and policies dealing with invasive species that apply to USACE. Here are the top 5 you should be aware of:

- Executive Order 13112, Invasive Species. This executive order requires federal agencies including USACE to meet the National Invasive Species Management Plan (NISMP) goals and established the National Invasive Species Council (NISC) to oversee implementation of the order, encourage proactive planning and action, develop recommendations for international cooperation, and take other steps to improve the Federal response to invasive species.
- Executive Order 13751, Safeguarding the Nation from the Impacts of Invasive Species. This order amends Executive Order 13112 and directs actions to continue coordinated Federal prevention and control efforts related to invasive species.

- John D. Dingell, Jr. Conservation, Management, and Recreation Act of 2019. This act calls for a substantive annual net reduction of invasive species populations or infested acreage on land or water managed by USACE.
- USACE Invasive Species Policy Memorandum, 2 June 2009. This policy memorandum requires all USACE Civil Works projects and programs to address invasive species in accordance with the NISMP.
- Engineer Pamphlet and Engineer Regulation 1130-2-540, Environmental Stewardship Operations and Maintenance Guidance and Procedures. This regulation establishes land management policy for USACE-administered project lands and water, based on various authorizing legislation and the principles of good environmental stewardship.

History of Nashville District Challenges

One of the first pesticide issues that Natural Resources Management dealt with was mosquito control in slack water areas of shallow lakes such as Barkley. This was the main reason the Corps sub-office at Dover, Tennessee was constructed as a base for control efforts in the upper reaches of the lake. However, the insect problem never materialized to any great extent. Most mosquito control efforts were fogging applications in campgrounds during the wet season. Mosquito complaints do come occasionally from adjacent residents. These are usually related to stagnant pools of water on private land, and residents are asked to direct the complaints to the local health department.

The next two concerns came in the early 1990's with zebra mussels and nuisance aquatic plants such as Eurasian water milfoil and hydrilla. Zebra mussels are small, fingernail-sized animals that attach to solid surfaces in water. Adults are 1/4 to 1 1/2 inches long and have D-shaped shells with alternating yellow and brownish colored stripes. Female zebra mussels can produce 100,000 - 500,000 eggs per year. These develop into microscopic, free-living larvae, called veligers, that begin to form shells. After two to three weeks, the microscopic veligers start to settle and attach to any firm surface using "byssal threads." It is the only freshwater mussel that can attach to objects. They are native to Eastern Europe and Western Russia and were brought over to the Great Lakes in the ballast water of freighters. Populations of zebra mussels were discovered in the Great Lakes about 1988.

Concerns about zebra mussels include clogging of water-cooling pipes in power plants, cooling intakes on vessels, and water intakes. Another concern is the filtering of phytoplankton out of the food chain used by native beneficial aquatic species. District power plants were fitted with chlorine injection units to control the formation of mussel colonies. Fortunately, this threat did not materialize to a significant degree, possibly due to the warmer water temperatures in southern reaches that inhibit their growth. However, small colonies of zebra mussels are still occasionally found on navigation lock gates and quoin blocks.

A potential threat that appeared at this time in the warmer southern climates were nuisance aquatic plants. The introduction of non-native aquatic plants and excessive plant nutrients has created many aquatic plant problems for lakes and streams particularly in Florida. These pests have also caused concerns as far north as the Nashville District, particularly in the Tennessee River lakes in Alabama.

Eurasian water milfoil and hydrilla are two of the most problematic species. These plants can make recreational boating in shallower bays and inlets difficult. On the other hand, many fishermen welcome the outgrowths as desirable cover for certain sport fish species, especially bass.

Herbicides such as 2,4-D granules have been used for Eurasian water milfoil and other similar species. Since 2,4-D is a broadleaved weed killer, it can be used to selectively remove these target species and retain grasses and grass-like species (many of which are native). The granules are applied by evenly distributing them over the infested area. Within the Nashville District, this problem was limited primarily to Old Hickory Lake and to a lesser extent, Lake Barkley. The Corps used contracts to apply aquatic herbicides to some infested areas and even established a permit program to allow private residents to apply controlled measures. After a few years there was a die- off of the problem plants that extended to the southern Tennessee River lakes. After 2002, there has not been a significant emphasis upon aquatic plant control. It is postulated that the cooler waters north of Florida became a natural control for the worst effects of the pest plants.

In the late 2010's, invasive carp (bighead, black, grass, and silver carp) began to inhabit the lower end of the Cumberland River system, particularly at Lake Barkley. These four species of fish were introduced to the U.S. in the 1970's to control algae, weed, and parasite growth in aquatic farms, weeds in canal systems, and as one form of sewage treatment. However, they eventually escaped into the Mississippi River and established breeding populations. Invasive carp cause serious damage to the native fish populations in the lakes and rivers that they infest because they out-compete other fish for food and space. Carp are also thought to lower water quality, which can kill off sensitive organisms like native freshwater mussels. Asian carp have been known to dominate entire streams, effectively pushing out the native species.

Silver carp are known to jump out of the water to escape threats. This behavior, by such large fish, can injure boaters, skiers, and damage boats and onboard equipment. In 2019, a bio-acoustic fish fence, an experimental project designed to deter carp, was installed at Barkley Lock. It marked the first time such a fence had been tested at a lock and dam on a large river.

Harmful Algal Blooms (HABs) are another recent development on the Cumberland River system. Harmful Algal Blooms (HABs) are blooms of cyanobacteria (often called blue-green algae) that produce cyanotoxins. These toxins can occur in any body of water throughout the year, but generally occur in waters affected by nutrient pollution, stagnation, and warm temperatures. Favorable water quality conditions have been noted where there are declines in dissolved oxygen, low specific conductance levels, and a pH between 10 and 11 units.

There are three types of cyanotoxins: (1) neurotoxins which are harmful to the nervous system, (2) dermatoxins which affect the skin, and (3) hepatotoxins which affect the liver. These toxins can cause serious illness and lead to death of people and animals. Microcystin, a type of hepatotoxin, has been detected in low levels within Nashville District (LRN) reservoirs, but blooms and/or hazardous levels of the toxin have not been recorded. The Nashville District has developed a HAB Response Plan and if you observe any HAB-like conditions on your project, you should report it following its guidelines and requirements.

Tree insect pests have been a concern for several years. Starting in the 1970's, spongy moths (formerly named "gypsy" moths) have been monitored in cooperation with the U.S. Forest Service. Although moving gradually south from the Boston, Massachusetts area where first introduced, this pest does not yet appear to be a significant problem around Nashville District lakes. On the other hand, in the mid 1990's there was a significant outbreak of Southern pine beetles. It was not practical to treat large, forested areas and many non-native or less tolerant pines succumbed to this infestation.

Extensive tracts of pines died off in areas such as Lilydale Recreation Area on Dale Hollow Lake and the pine plantation below Wolf Creek Dam. After the initial die off, the problem appears to have stabilized. Other tree insect pests such as the Hemlock wooly adelgid and Asian long-horned beetle are more recent concerns. Hemlock trees have suffered in the upper elevations of east Tennessee due to the adelgid. Imidacloprid has been used on selected stands of Hemlock trees by the U.S. Park Service.

The Emerald Ash Borer (EAB) probably arrived in the United States in wood packing materials from Asia, possibly as early as 1993. The EAB attacks all 16 native ash species and there is a 100% fatality rate in ash trees that are attacked. The EAB was first detected in the Nashville District at Cordell Hull Lake in 2012 at Indian Creek Campground. The likely cause was from the movement of untreated firewood. In 2017, a policy was implemented that prohibits the possession, transportation, use, or storage of non-certified heat-treated firewood on Corps property.

Until the advent of the warm season grasses program at some lakes, herbicide use on any significant scale was largely confined to spraying riprap areas on the face of dam and tailwater areas. Campground impact sites are sprayed occasionally to control unwanted vegetation. Some projects allow or have the O&M services contractor use herbicide around trees, sidewalks, roadway shoulders, drains, etc., to reduce weedeating. This work usually involves glyphosate-based herbicides such as Roundup or selective herbicides such as Pyramid. Projects that established plots for warm season grasses began to use larger quantities of herbicides to remove all vegetation in preparation to seed and establish these plots. Some of these warm season grass plots are prepared in cooperation with the state wildlife agency.

Brown recluse spiders are found in cool, dark spaces in warehouses and shop buildings often on concrete floor spaces such as the area between the slab and wall. These spiders have been found in many locations in the District making them an pest of concern. Bug insecticide bombs released in buildings when unoccupied are an effective control method, but it is difficult to completely eradicate them. Glue traps are effective for detection and to control small populations.

Brown recluse spiders are non-aggressive and usually bite only when pressed against the skin, such as when tangled within clothes, towels, bedding, inside work gloves, etc. The fangs of the brown recluse are so tiny they are unable to penetrate most fabric. However, bites can cause necrosis of the skin and underlying tissue and cause systemic effects. The majority of brown recluse spider bites do not result in any symptoms (49% do not result in necrosis or systemic effects according to one study). The study also showed that skin necrosis occurred 37% of the time, while systemic illness occurred 14% of the time. Due to the potential serious effects in some people, one should be able to identify this spider and be aware of habitats in which they may be present.

Since the mid-1990's the control and eradication of non-native invasive plants has been an area of emphasis. This term applies to introduced species (also called "non-indigenous" or "non-native") that adversely affect the habitats and bioregions they invade, whether it be economically, environmentally, and/or ecologically. Such invasive species may be either plants or animals and may disrupt by dominating a region, wilderness areas, particular habitats, or the wildland-urban interface land from loss of natural controls (such as predators or herbivores). Examples include autumn olive, multifora rose, Japanese honeysuckle, periwinkle, and many others. Autumn olive (and other non-native, invasive plant species) can be found on Corps land since planting was once encouraged by wildlife agencies for desirable habitat. Multifora rose was once encouraged by state agriculture extension offices as a natural fence row or hedge. One of the more common invasive plants in the south is kudzu which was imported from China to control erosion on railroad embankments in southern states.

One of the control methods used by the state and other groups in smaller areas has been mechanical removal. Usually, a strong brush herbicide is used to kill plants in areas where there is no risk to surrounding growth. No chemical eradication efforts have been employed by the Corps on a large scale on upland invasive plants. Selecting native species and discontinuing the planting of invasive species have been two of primary ongoing emphases to control these species. Nuisance aquatic species discussed earlier are also examples of exotic invasive plant species with targeted control programs.

Up until the mid-1980's when NRM projects had maintenance staffs, one employee at each lake typically had an herbicide applicator certification. When projects transitioned to utilizing O&M service contracts, it was still common for a Corps employee to maintain his certification to help inspect contracted work and, at times conduct small applications. At some projects park rangers obtained their certification to meet the training requirements in ER1130-2-540 to be able to apply herbicides. One powerhouse has certified applicators for vegetation control around the rock face of the dam. For the most part, however, contractors are now used for routine, recurring herbicide application and spraying for insects in offices and buildings. This is done to make it easier to meet the requirements for this type of work and eliminate the storage and handling of pesticides. Most of the requirements can be reduced significantly if you don't store pesticides (building requirements, signage, inspection, chance of a spill, etc.). Mixing areas have special requirements. You should appreciate the emphasis on the use of service contractors for most application work; training, certification, storage, handling, mixing, PPE, and medical surveillance are the responsibility of the contractor.

When payment is made for pesticide application work, the contractor has to ensure that the work is accomplished by a state-chartered company using licensed/certified applicators. Service contractors cannot use their cleanup or mowing employees to apply herbicides in recreation areas (impact sites, sidewalks, etc.) unless the above requirements are met. Corps employees can apply herbicides if certified, or if using a non-restricted herbicide while working under the direct supervision of a certified applicator. The county extension office and state agriculture department can provide information on requirements for certification. These requirements do not apply to consumer size aerosol containers such as cans of wasp or roach spray. Environmental compliance requirements for the storage and handling of pesticides, and the spill contingency and response requirements related to pesticides are listed in Section 7 - Pesticide Management of the US TEAM Manual and ER 200-2-3 Environmental Compliance Policies.

Projects are required to submit a record of all herbicide applications done during the prior year and an annual pest control plan for the coming year. This is submitted to Operations Section in January of each year. As part of the projects hazard communication program, Safety Data Sheets (SDS's) are required to be kept on file for products used by employees or by control companies in our buildings. A copy of the company charter should also be kept on file.

References

- ER and EP 1130-2-540, Chapter 3 - Pest Control Program for Civil Works Projects
- Project Operational Management Plan, Part I
- ER 1130-2-500, Chapter 14 - Aquatic Plant Control Program
- ER 200-2-3- Environmental Compliance Policies, 1 Sep 2019
- County Extension Agent or U.S. Department of Agriculture requirements for pesticide applicators.
- US TEAM Manual - Section 7 - Pesticide Management
- LRN Firewood Policy, 20 Feb 2017
- LRN HAB Response Plan, Dec 2021
- State list of invasive plant species

Training Requirements

- Become familiar with types of pesticide use at your project and become familiar with the requirements for pesticide applicator certification.
- Become familiar with the referenced materials concerning the basic fundamentals described in the text.
- Learn to identify the common problem insect pests and aquatic plant species at your project and in the District.
- Understand the principles of IPM.

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6. Special Skills

1. Surveying

Surveying is the science and art of making the measurements necessary to determine the relative positions of points above, on, or beneath the surface of the earth or to establish such points. Throughout the history of civilization, it has been found necessary to divide land and mark boundaries.

There are many types of surveys. As a park ranger, you will primarily be involved with property surveying. This type establishes property corners, boundary lines, and areas of parcels of land. It is also known as land, boundary, or cadastral surveying. In your work, you will be faced with numerous decisions involving project boundaries. Thus, a working knowledge of property surveying and is essential.

Your work also may involve topographic and construction surveying. Topographic surveying is the process of determining the locations of natural and cultural features and finding the elevations of points. It is used in site planning and mapping. Construction surveys provide the points and elevations necessary for building structures and facilities.

The Nashville District has recently made a concerted effort to resurvey portions of project boundary lines in areas where the line is not clearly established or to determine encroachments. LRN's Engineering Division has the capability to perform more complex surveying and are licensed professionals who have the equipment and expertise to perform both topographic and cadastral surveys.

Overview

Plane surveying (surveying on a flat, horizontal reference surface) consists of five measurements: horizontal angles, horizontal distances, vertical angles, vertical distances, and slope distances:

• Horizontal and vertical angles are measured (or laid out) with a transit or theodolite. For rough measurements, a compass may be used for horizontal angles, and a clinometer may be used for vertical angles.

• Horizontal distances are measured by taping, stadia, or use of an electronic distance measuring instrument. For rough measurements of horizontal distances, pacing or using an odometer may be satisfactory.

• Vertical distances may be determined by using the level and level rod, graduated tape (buildings, shafts, etc.), or trigonometric leveling method. In trigonometric leveling, the vertical angle and slope distance are applied to the proper formula in order to find the vertical distance.

• Slope distance measurements are usually inclined sights using the stadia method or electronic distance measuring equipment. Slope length is usually reduced to horizontal and vertical distances.

You will need both study and practical experience to develop basic skills in surveying. Complete descriptions of surveying equipment and techniques can be found in a current textbook on the subject. The following areas of surveying are important in ranger work:

• *Stadia Method* - This is a means of measuring distances quickly and efficiently with a rod and transit, theodolite, or level. In an instrument equipped for stadia work, the telescope reticule has two additional horizontal cross wires which are equidistantly spaced from the center one. When sighting through most instruments, the interval between these two additional cross wires gives a vertical intercept of one foot on a rod one hundred feet away. Thus, the distance can be read to the nearest foot on a rod graduated in hundredths of a foot. Except for long shots, ordinary level rods can be used for stadia work.

• *Leveling* - Leveling is the process used to determine and establish elevations of points, to determine differences in elevation between points, and to determine grades in construction surveys. Differential leveling with the level and level rod is the method most commonly used. It is used frequently to determine the extent of flowage easement lands. Stadia leveling (a form of trigonometric leveling) with the transit or theodolite can be used for more rapid leveling in variable terrain when moderate precision is sufficient.

• *Horizontal Distances* - For precise measurements of horizontal distance, such as determining property lines, the steel tape or electronic distance measuring instrument is used. Stadia measurements are used in topographical surveys.

• *Directions of Lines* - In surveying, the direction of a line in the horizontal plane is determined by measuring the horizontal angle between it and a known reference line. The sight along the reference line to a known point is called a backsight, and the sight along the line whose direction is to be measured or laid out is known as a foresight. (These terms are also used in differential leveling to describe shots on points of known and unknown elevation.) The directions of property lines are expressed as bearings. The bearing of a property line is the acute angle between the line and the true or grid north-south meridian, measured from north or south toward due east or west, e.g., N 29° 30’25" E, S 15°20’10" W, etc. Therefore, any line will fall within either the northeast, northwest, southeast, or southwest quadrant.

• *Vertical Angles* - The horizontal plane through the point of observation usually serves as the reference line for vertical angles. Angles above this plane are called plus angles or angles of elevation; angles below it are called minus angles or angles of depression.

• *Traverses* - A traverse is a series of consecutive lines whose lengths and directions have been measured. Traverses may be either open or closed; in a closed traverse, the lines either return to the starting point to form a polygon or close on a known reference line of equal or greater precision than that of the beginning. Property line surveys are closed traverses.

References

- *Elementary Surveying*, Sixth Ed., Russell C. Brinker and Paul R. Wolf, Harper and Row, New York, 1977.
- *Surveying*, Harry Bouchard, Rev. by Francis H. Moffitt, International Textbooks, Scranton, 1961.
- EM 1110-1-1002 Surveying Markers and Monumentation
- EM 1110-1-1005 Control and Topographic Surveying
- *Finding Boundaries and Elevations,* Presentation by LRN Park Ranger Danielle Knowles, Nov 2022

Training Requirements

- Be able to set up the level and determine the elevations of points by differential leveling.
- Be able to set up the transit or theodolite and measure or lay out horizontal and vertical angles.
- Be able to measure horizontal distances using the stadia method and steel tape. If your lake has an electronic distance meter, you should become familiar with its operation. You also should determine the length of your pace so that you can use pacing to make rough measurements of horizontal distance.
- Review your project's boundary line management plan for the method (i.e., pins, monuments, signs, and painted hack marks and blazes) to mark the project boundaries at your lake.

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2. Photography

Photography is an important aspect of ranger work. Slides, prints, digital images, and video recordings are useful means of documenting field conditions, new facilities and management programs, public meetings, recreational use, incidents, accidents, etc. They are used in the project interpretive program, as evidence in court proceedings, and in official briefings. High quality images are also required for publications such as brochure maps or the public website.

The photographic equipment commonly used by rangers includes a digital camera and/or a smart phone. Rangers should use the government issued digital cameras provided to them, or government cell phones when available. The use of personal cell phones for capturing images as part of your official duties should be at a last resort. If a case goes to court and your personal phone has been used to capture images, it could subpoenaed to be used as evidence in court proceedings. Images on digital cameras are typically saved to a memory card and can be uploaded/transferred to a computer for easy editing and use. At field sites, this may sometimes require use of an air-gap computer to complete the transfer.

You should strive to photograph and film the features, facilities, management activities, and public use of your lake. Make a special effort to obtain scenic shots, stressing features unique to your lake. Include visitors in pictures of recreational facilities whenever possible, but be sure that they are observing good safety practices such as wearing PFD's when water skiing or riding in boats. The visitors should be the central element of the picture, and their faces should be clearly visible if possible. If children are in the photo, photo releases will be needed by parents or legal guardians.

Note: Follow guidelines for security to include air-gap computers if using cameras with Bluetooth or wi-fi capabilities because of security requirements. Digital image files may also be attached to email messages and can be used for a variety of purposes to depict actual field conditions. Keep in mind however, that because of some of the attributes of digital cameras and the images they produce, these tools have limitations. For instance, because the digital image can easily be manipulated by computer applications, courtroom judges often do not give a printed digital image as much legal weight as other types of photos which are more difficult with which to tamper. It is important to note that government photos should not be photoshopped or edited to display false information. Editing for color correction or simple adjustments (for example to submit it for Photo of the Week competition) is allowable, but significant edits that alter the integrity of an image will not be allowed. Image size is also very important. High-resolution photos (300dpi) are preferred. Try to not alter image size or crop it to reduce its size as that sometimes prevents the photo from being able to be used in high-resolution publications such as district brochures, newsletters and calendars.

The use of video via phone or video recorder is somewhat more complex and may require some practice. The lens allows zooming in for a close-up or fading to a more distant shot. The term, "panning," refers to moving the camera smoothly in an arc from subject to subject. The camcorder also records sound. When filming, be cognizant of background noise if not using a lapel microphone. Be aware of the noise distractions produced by rushing water if near the tailwater, cars passing by on the highway, etc.

If the field office doesn't possess a government-issued video recorder for use and the project requires higher production than a cell phone can provide, field staff should coordinate with the district CIO/G6 Visual Information Specialists or the District Public Affairs Office for further assistance.

Shots of park ranger activities are always in demand, particularly those involving interaction with members of the public. Be sure that the ranger's uniform is correct and complete, including the hat if outdoors. When taking a profile shot, use the left side so that the Corps of Engineers shoulder patch will be visible. Sunglasses should be removed.

Photography Tips

- Do not 'over filter' your photo. You can adjust the lighting and exposure but avoid adding any filter.
- Try to avoid cropping photos to abnormal shape
- Take multiple shots so you have options to choose from
- Send your favorite photos to the Public Affairs Office to use for Photo of the Week or to share on the district's social media platforms.

Reference

- *Kodak Pocket Guide to 35mm Photography*, Simon and Schuster, New York, 1983

Training Requirements

- You will accompany other rangers on various photographic assignments, including aerial photography or updating recreation.gov. You should become proficient with the photographic equipment available at the project.
- Review the *Smartphone Photography Guide* and the *Introduction to Photography* guide.

Click here to open Evaluation 14 to print.

3. Maps and Geographic Information

Reading maps, interpreting aerial photographs, and using geospatial technologies is an essential skill to the ranger. They are also some of the greatest tools that a Park Ranger can have to manage the natural resources of the project effectively and efficiently. Your geospatial toolset (maps, aerial photography, ArcGIS, Google Earth, and GPS units) provides the means of obtaining the exact locations of objects and activities. They provide the means of determining the exact locations of objects and activities. They may also be used to scale or calculate the distances between points and the surface areas of parcels, tracts, compartments, parks, etc. Patrolling by boat, vehicle, and foot requires the use of both maps and photographs for maximum efficiency. You can determine topography, cultural and natural features, and property boundaries through the use of the proper maps.

You must become totally familiar with the maps maintained at the Resource Manager's Office as your duties will include assignments such as locating property lines, investigating trespasses, processing permit and outgrant applications, and siting recreational facilities.

Survey Maps

Survey (property line) maps depict the project boundaries. These maps provide the bearing and distance of each property line and identify each property corner by government tract number and consecutive order within that tract. The shoreline and other major elevation contours are also shown.

Segment Maps

Project segment maps depict project property lines and the tracts of land as they existed when they were severed (partially acquired) by the federal government prior to impoundment. Each tract is identified by a number (e.g., E-536, G-705, 1105, etc.). The original owners and the amount of land acquired from each of them are listed on a tract register printed on each segment map.

Although property lines are shown, bearings and distances are not provided on these acquisition maps. Land use maps are segment maps which show significant real estate outgrants (e.g., road and utility line easements, commercial concessions, quasi- public group camps, state and municipal parks, state wildlife management areas, barge terminals, etc.).

Topographical Maps

Topographical quadrangle maps published by the U.S. Geological Service show elevation contours (usually in twenty- foot intervals), cultural and natural features, urban areas (pink shading), and vegetative cover (green shading for wooded areas and white for cleared areas). They are called quadrangles because they cover seven and one-half minutes of latitude and seven and one-half minutes of longitude. These maps are available in digital format through the USGS and can be used in a GIS through the use of a Web Mapping Service in ArcGIS.

Pre-impoundment topographical maps prepared by the Corps for some of the projects provide views of the lake bottom. These maps may be helpful in fish attractor work, and they are prized by anglers.

Navigation Charts

Navigation charts show commercial navigation channels, stream mileage, aids to navigation (buoys, lights, and day marks) bridges, powerlines, submarine crossings, port facilities, locks and dams, etc. on the inland waterway system. In addition to boat operation, navigation charts are used in processing applications for Department of the Army Permits for work in navigable waters.

Tax Maps

County tax maps and subdivision plats are helpful in locating adjoining private property owners and processing applications for outgrants and permits. The state of Tennessee has most of the county's property information (including current owner) available online on the State Comptroller's website. For the counties not listed, they provide the individual counties tax record website (including Davidson and Montgomery) This is very helpful in locating adjoining private property owners and processing applications for outgrants and permits. Some counties in Kentucky provide a similar service, but most counties will require you to visit the PVA office. Check with the county property assessor and register of deeds.

Aerial Photographs

Aerial photographs are accurate pictorial representations of both the natural and cultural features of the earth's surface. In cultivated regions, the first impression of the observer is that of a surface covered with a checkerboard pattern. In heavily forested areas, the first impression is of a region carpeted with vegetation. Regardless of climate, vegetation, location, or human activity, aerial photographs can impart much information about the terrain and suitability of an area for various management practices.

Geographic Information Systems (GIS)

A GIS is an integrated collection of computer software and data used to view and manage information about locations, analyze geographic relationships, and model spatial processes. A GIS provides a framework for gathering and organizing spatial data and related information so that it can be displayed and analyzed. Each feature, or spatial object, is characterized as a point, line, or polygon. Information about map features is stored in a related table.

GIS is an important tool for a park ranger because it allows one to look at a specific feature, a single campsite for example, and derive information about that feature based on its location and relationship to other elements within a defined area. Examples could be the proximity and distances to other campsites, as well as other site description information such as slope, elevation, presence of roads, soil characteristics, and vegetation type. GIS also combines feature data with background reference maps, such as topographic maps, segment maps, aerial photographs, and digital elevation models (DEMs) to visualize areas of interest.

There are numerous training opportunities at your disposal. Environmental Systems Research Institute (ESRI) who is the creator of the software that is commonly used as a GIS (ArcGIS) has on-line Virtual Campus courses that can be taken for free through the USACE Enterprise License Agreement. These courses can be arranged through your Geospatial Data Coordinator located in the district office. Additional courses are available through the Prospect training courses (Purple Book). By developing a good working knowledge of GIS technologies, you can advance your knowledge of the project and provide project management recommendations to upper management that are backed with data filled maps.

Global Positioning System (GPS) Units

The GPS is a system of satellites used for determining positions upon the earth. These orbiting satellites transmit signals that allow a GPS receiver anywhere on earth to calculate its own location through triangulation. The system is used in navigation, mapping, surveying, and other applications where precise positioning is necessary.

As a park ranger, a GPS unit is a helpful tool, as it can collect locations across the project for input into a GIS. Some applications for GPS/GIS include marking a trail, gathering points of boundary line markers, collecting information on a tree vandalism site, or marking the locations of permits. The data that is collected with a GPS can be highly accurate and useful once it is post-processed. Many of the mapping grade GPS units at the project level are capable of centimeter grade accuracy. This allows a park ranger to provide highly accurate data for input into a GIS and assist in making highly informed decisions on project operations. This high accuracy data can also provide significant cost savings to the government on various service and construction contracts as well.

Flex Viewer

The Flex Viewer is an ArcGIS system that allows park rangers the ability to create maps for a variety of applications, including trail marking, shoreline permits, and recreation activities. This system is the primary tool you will use when creating a map for any Real Estate instrument, including shoreline licenses, easements, and leases. When using this program, it is essential to have shown all the necessary information on your map. The project boundary line, tract number, aerial image, and a correct image are required to accurately portray to Real Estate what exactly is proposed or existing in the field. Creating a map using this program is a requirement of the training program.

Training Requirements

- Demonstrate your ability to read the maps and aerial photographs maintained in the Resource Manager's Office. You will satisfactorily complete work assignments involving the use of various maps and aerial photographs, including creating a map for a Real Estate instrument using the Flex Viewer.
- You should visit the web sites of the county property assessor and register of deeds and examine the maps and related data which are available for your project area.
- Learn basic data collection functions with the GPS equipment available at your lake.

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4. Interpretive Services

The park ranger as an interpreter is a teacher in the purest sense of the word. He or she works with people who are at leisure in the special places of beauty and solitude which have been established for their use. The interpreter seeks to translate vividly the language of the earth and of the earth's inhabitants. In the recreation field, interpretation is the process of taking foreign concepts about our environment (natural or man-made) and making them meaningful to someone not familiar with those concepts. For example, we could describe the water related public fatalities in technical terms that are meaningful only to statisticians. Or, we could describe them so the general public can relate to them using props, activities, or pictures. The more you relate a subject to your audience the more likely they will understand it.

The goals of the USACE Interpretive Services and Outreach Program, as defined by EP 1130-2-434, are:

1. Achieve management objectives using interpretive programs or services.

2. Provide environmental education to foster voluntary stewardship of natural, cultural, and created resources

3. Incorporate Corps Civil Works and military missions and accomplishments into interpretive programming and messages.

4. Improve visitor and employee safety using interpretation techniques/services.

5. Use outreach to accomplish Interpretive Services and Outreach Program goals, including interpreting Corps missions, promoting stewardship, saving lives, and solving management problems. As part of the interpretive process, encourage interest in math and science, including career interest.

6. Enhance the visitors' experience and enjoyment by anticipating their needs and providing interpretive resources to meet those needs.

Since it was published in 1957, Freeman Tilden's book, Interpreting Our Heritage, has served as the definitive expression of the philosophy of visitor education and interpretation. Tilden defines interpretation as "an educational activity which aims to reveal meanings and relationships through the use of original objects by firsthand experience and by illustrative media rather than simply to communicate factual information." Tilden further states that an interpretive effort is based on the following principles of interpretation:

1. All interpretive efforts must relate to a visitor's personality, experience or interests. Talk with your visitors before a program to find out their interests, beliefs in what the Corps does, etc., and use the information that you gain to relate your program to the visitors.

2. Information does not equal interpretation. Interpretation is revelation based on information. The main difference between information and interpretation is how the information is presented.

3. Interpretation is an art which combines many arts regardless of subject material. Any art is to some degree teachable. You might use acting, puppets, artwork, photos, props, storytelling or other artistic skills in developing your interpretive program or service.

4. Interpretation does not equal instruction, but rather provocation. Ask provocative questions like, "Why do you think we purposely burn the prairies?" instead of just giving reasons managers use prescribed burns for prairie management.

5. Interpretation should aim to present a whole rather than a part. In general, all interpretation for your project should illustrate one main interpretive theme and related sub-themes. Interpretation should be sure to interpret to visitors:

- Who you are (who is the Corps of Engineers?)
- What you do (flood control, resource mgt., etc.)
- Why you do it (benefits to communities, people, the environment).

6. Interpretation for children must be designed specifically for children, and not simply a dilution of programs and information for adults. Interpretive programs for children need to be fun, hands-on, and provide "edutainment," but with a clear theme or purpose in mind. Analogies and examples need to be geared for children as well.

Interpretive Themes

If one principle of interpretation is to present a whole rather than a part, then a central theme must be developed to focus the various parts of a presentation into that whole. The theme should tell the story of the whole message and easily relate to the lives of the visitors in the audience. Determination of the theme whether natural, historical, cultural (archaeological and historical remains), operational (flood control, hydropower production, etc), or recreational, is based on management objectives and the resources which are being featured.

Two principles are important in developing a theme. First, never simply identify an object. If nothing else of interest can be said about a tree, do not mention it in the program. Secondly, do not attempt to interpret everything. Many subjects are too involved to be covered completely in a short presentation. Select relevant examples instead to illustrate and develop your theme.

Interpretive Techniques

Personal Services - A program which involves direct interpersonal contact between the interpreter and visitors is considered the ideal interpretive method. Personal services can be tailored to the needs of individuals or groups and take advantage of unexpected and unusual opportunities. The personality and uniform of the interpreter can enhance the appeal of the message and effectiveness of communication. The interpreter can obtain feedback directly from the audience in order to determine if his or her message is clear and relevant. Eye contact between the interpreter and audience is essential. The following types of personal service can be effective in informing the visitor:

Talks - Rangers are called upon to speak to many different groups on a variety of topics. The interpreter can use group reaction to stimulate individual interest and encourage desired attitudes.

Guided Walks - This method capitalizes on the ability of project resources in their normal environs to stimulate interest and enhance understanding. Visitors can use all of their senses. Guided walks include nature walks, tours of the dam and power plant, etc.

Campfire Programs - A campfire program can be a uniquely satisfying experience enhanced by the enjoyment of song, the romance of the campfire, and the simple, informal, relaxing mood of the surroundings. It offers an excellent opportunity to encourage appreciation and concern for natural resources.

Demonstrations - Demonstrations are especially effective because they offer first- hand experience with real objects and locales. Topics for demonstrations include safety equipment for boats, knot tying, simple rescue techniques (use of life jugs, etc.), wildlife management practices, etc.

Other types of personal service include *boat tours*, *information booths* at fairs or outdoor shows, *living history programs*, etc.

Multimedia

Virtual Programming - Many video productions are available from public agencies, educational institutions, and corporations at no charge. The films should be current, not too long, and pertinent to an interpretive theme.

Audio Messages - If the minimum text required to convey a message is so long that few visitors would read it, a recording might convey the message more successfully. An audio device also provides the opportunity to enhance an interpretive message with personality, dramatic impact, historic recordings, and natural sounds. Audio devices would be appropriate at points of interest, such as an overlook, lock wall, or visitor center.

Visitor Center Exhibits - The visitor center should introduce the visitor to the lake and its resources and provide information on recreational opportunities, rules and regulations. Exhibits in the visitor center should make a strong, lasting visual impression. A fossil, a mounted animal in its natural "habitat," or a historical photograph can tell much and suggest even more. Pictures, maps, and diagrams in an exhibit can effectively present ideas as long as they do not require long verbal explanations or complex graphic treatment.

Interactive exhibits, which enlighten through physical participation by the visitor are particularly effective. The security and extensive facilities of the visitor center make the use of audio devices especially practical. Sound strengthens the impact of the message of an interpretive exhibit. The exhibits in the newer visitor centers in the Nashville District have been designed and installed by private contractors.

Signs, Markers, Bulletin Boards, and Wayside Exhibits - The message should relate to what is actually being seen by the visitor: the dam, wildlife management practices, geology of the area, historic structure, etc. Markers serve merely to mark a significant site or object, such as a tree label.

Self-Guiding Trails and Tours - Visitors may use self-guiding trails or tour routes at their own pace, and with as much interpretation as they wish. Self-guiding trails and tours may use either stake-and- leaflet or text-in-place media. Self-guiding interpretive trails should not connect with hiking, horse, or bike trails.

Written Messages and Publications - One of the most valuable and necessary tools of interpretation is the written word. Publications inform visitors before and during their visits to the lake. Some publications (e.g., well-illustrated lake brochures) serve as souvenirs as well as sources of information. Publications which are important in a lake interpretive program include:

- Lake maps
- Literature on environmental awareness
- Announcements of special events
- Checklists of flora and fauna
- Newspaper articles
- Special information brochures (such as hunting maps, water safety information, etc.)

Environmental Study Areas - Environmental study areas are intended to support and stimulate environmental education programs in natural settings for schools, scouts, adjacent landowners, and other groups. These areas should be rich in educational resources that interpret the environment by illustrating natural, historical, or cultural relationships. Ideally, teachers and park rangers should work together to plan the development and use of an environmental study area.

References

- *A Guide to Planning and Conducting Environmental Study Area Workshops*, National Education Association, Washington, 1972
- *Interpretive Skills for Environmental Communicators*, John W. Hanna, Texas A&M University, College Station, 1972
- *Man and His Environment - An Introduction to Using Environmental Study Areas*, National Education Association, Washington, 1970
- *Interpreting Our Heritage*, Freeman Tilden, The University of North Carolina Press, Chapel Hill, 1967
- *Interpreting the Environment*, Grant W. Sharpe, John Wiley and Sons, New York, 1976
- *USACE Water Safety Resource Guide- 2021*
- EP 1130-2-434, Interpretive Services and Outreach Program, 10 May 1994
- ER & EP 1130-2-550, Chapter 4- ISOP

Training Requirements

- Review Chapter 24, Interpretive Services and Natural Resources Communications, Part II, Project Operational Management Plan.
- Review EP 1130-2-434, Interpretive Services and Outreach Program
- Plan, organize, and conduct both an on-site and an off-site interpretive program.

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7. Outdoor Recreation Management

1. Facilities Management

A primary management goal of the Nashville District is to operate and maintain the lakes for the continued enhancement of their primary and secondary benefits. Since most District lakes are located in or near heavily populated and developing areas and receive heavy public use, it is vitally important that the objectives of outdoor recreation management are aimed at the conservation and protection of resources. Plans and programs are implemented for protecting and rehabilitating existing facilities and also for identifying needs for additional facilities and encouraging their development through existing authorities. Existing facilities, areas, and programs are regularly evaluated for operational efficiency to determine if closure, consolidation, modification, or cancellation is warranted.

The Corps of Engineers has a great responsibility for providing a variety of recreational facilities to the visiting public. We must not only be efficient in the operation of these facilities but must also plan, budget, construct, and maintain the facilities to the highest standards possible.

We must be people managers as well as facilities managers. We must know and understand the needs and desires of visitors to better serve them. As a park ranger, you have a unique opportunity to observe recreational facilities during periods of peak usage and receive feedback directly from visitors. Your input in the process of site locating, constructing, operating, and maintaining recreational facilities is invaluable.

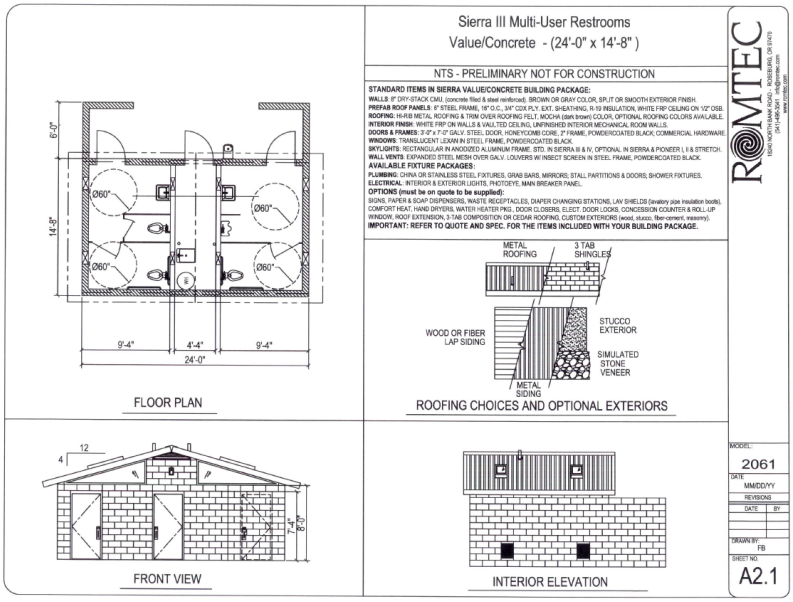
Universally Accessible Facilities

We are responsible under Section 504 of the Rehabilitation Act to provide access to all of our programs or activities. On 31 October 2008, the Department of Defense adopted the combined "American with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines" published by the U.S. Access Board as its "Standards" for accessibility. Specifically, ABA Chapters 1 and 2, and Chapters 3 through 10 are the Corps accessibility standards. This is not meant to imply that every facility must be accessible, though that is the ideal. Some of the facilities for a particular activity must be in compliance with the adopted standards.

As an example, not every picnic or camping site has to meet the standards, but some of the sites must. It is always desirable to avoid creating obstacles such as steps wherever possible. New facilities should be designed and installed to be in compliance with the standards and older facilities should be retrofitted to the extent practicable. The District Accessibility Coordinator can be contacted for more information or advice.

Plans and Drawings

Before a structure or facility can be constructed or fabricated, there must be a means of communicating certain essential information about it. Information such as dimensions, configuration, grade, finished appearance, necessary materials, and construction details must be communicated through proper plans or drawings. Your career will require you to develop skills in interpreting, preparing, and updating various plans and drawings.



You must be able to work with diagrams ranging from simple sketches to complex blueprints.

As-built site plans depict the structures and facilities developed at Corps multipurpose recreation areas. These plan views show utility lines (underground and overhead) as well as roads, sidewalks, buildings, fences, campsites, picnic sites, playgrounds, beaches, launching ramps, parking lots, etc. The as-built plan for an area must be updated within ninety days of changes due to maintenance or construction activities. The original copies of these plans for every lake are maintained at the respective Resource Manager's Office.

You also must be able to prepare and interpret plans and drawings of structures and facilities in Corps recreation areas. Because most construction, renovation, and maintenance work are now accomplished by contracting, the preparation of precise plans, drawings, and specifications is essential in achieving good, finished products. Proper interpretation of diagrams and specifications is required in quality assurance work.

Signs

The Sign Standards Manual (EP 310-1-6a & b) sets the guidelines and requirements to assist USACE communicate clearly and professionally across the nation. This manual includes design methodology and visual standards for identification, directional, information, instruction and safety signs. It also contains guidelines for sign legends, specifications for material and fabrication methods, standards for sign placement, and establishes a comprehensive maintenance program. You should become familiar with this manual and work with your project sign manager to conduct inventories, develop sign orders, and replace and install new signage across the project.

Working with the facilities management staff at your project is critical to having a successful sign program. While smaller signs can be installed with help from staff, some of the larger directional and entrance signs may need to be installed with help from your requirements contractor. The facility manager will have knowledge of where underground utilities are located and can avoid costly/dangerous sign installation.

References

- Project Master Plan and Operational Management Plan
- EM 1110-1-400, Recreation Facility and Customer Services Standards, 1 Nov 2004
- EM-385-1-1, Safety and Health Requirements
- EP 310-1-6a & b, Sign Standards Manual

Training Requirements

- Spend one week under the direction of the project Facility Manager and accomplish the following:
  - Assist the Facility Manager in observing sites, structures, and facilities for peeling paint, deterioration, damage from misuse or vandalism, and unsafe objects or conditions.
  - Learn the proper procedures for storage of materials, supplies, and equipment. You may be assigned to check the storage of various materials at the maintenance area or a construction site. You should become familiar with regulations for storage contained in EM 385-1-1.
  - Become familiar with the maintenance of roads, trails, grounds, buoys, and sanitary facilities (including sewage treatment plants).
  - Demonstrate the ability to interpret the plans and specifications of a structure at your lake (e.g., comfort station, bathhouse, maintenance building, etc.) in respect to dimensions and construction details.
  - When the opportunity presents itself, you should prepare a plan or drawing and appropriate specifications for work to be accomplished in a recreation area.
  - When appropriate, you should assist in updating an as-built site plan of a multipurpose recreation area.
- Become familiar with the American with Disabilities Act and Architectural Barriers Act Accessibility Guidelines published by the U.S. Access Board.
- Become familiar with the Sign Standards Manual and assist the project sign manager as needed.

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2. Public Use Data

The monitoring of project visitation is vital to the overall operation of recreational facilities. Planning, funding, and staffing requirements are, in part, justified by visitation figures. Public use data can also be used to indicate the economic impact of recreation for the area surrounding a lake. Recreation at Corps lakes is more than fun and games. It also is an important part of the local economy. Businesses can see the investment opportunities when thousands of people are drawn every day to an area. Restaurants spring up, along with hotels, resorts, boat marinas, and sporting goods stores. Soon, word spreads through the region of the lake's pleasures and more people begin to visit.

Traffic counters are the primary means for collecting project visitation.

As a park ranger, your responsibilities in monitoring project visitation consist of physically collecting vehicle counts in recreation areas, conducting recreation use surveys to update the Visitation Estimation and Reporting System (VERS) program.

Counting vehicles which enter Corps recreation areas, quasi-public group camps, and commercial concessions is the primary method of obtaining raw data used to compute project visitation. Traffic counters, which may be one of several types; infrared breakbeam counters, inductive loop types, TRAFx (magnetometer), or pneumatic hose types; are used to count vehicles that enter our various Project Site Areas (PSAs).

Infrared Breakbeam counters an optical- grade laser beam generated from the device, reflected back by a remote reflector to a sensor on the device. When the sensor's signal is interrupted by an object blocking the laser emission (usually a vehicle), the counter registers a count on a digital meter. The inductive loop counter uses a wire loop buried in the roadway which detects the magnetic disturbance as a vehicle passes over it and registers a count on the meter. The pneumatic hose counter, which is being phased out, uses a sealed rubber hose on the road surface which delivers a pulse of air to an electrical contact in the counter as a vehicle runs over the hose. This system is less expensive but more troublesome, as the hoses require frequent replacement.

The TRAFx Vehicle Meter is a magnetometer, which is a device which detects large steel objects such as cars and trucks. It has many adjustments, and the default settings do not result in accurate counts for typical recreation area traffic. All types of counters record vehicle counts on battery-powered meters.

Recreation use surveys usually are conducted at Corps lakes once every five years. These traffic-stop interviews at representative areas on the project are scheduled to increase the chances of obtaining an accurate sample according to time, day of the week, and season. The Engineer Research Development Center (ERDC) in Vicksburg, Mississippi has developed a computer program that allows the data to be entered at the site by the surveyor.

The surveys provide information about the types of vehicles crossing the meter, number of people per vehicle, length of stay, and types of visitor activities. This information is then used to generate "load factors" for that particular type of site. The load factors are applied to future readings from that site and other similar sites to estimate recreational use.

At the end of each month, the traffic counters are read, and the data collected is entered into the online VERS program. This data should be collected by the 5th of each month and entered by the 7th of each month. When the raw visitation data has been entered, the VERS system applies statistical factors entered from the recreation use survey and calculates the project visitation. The resulting report on visitation and distribution of recreational use may then be used by project personnel.

The visitation report expresses monthly and year-to-date visitation in terms of "visits," "visitor hours," and "visitor days." A visit is defined as a visit by one individual to a recreation development or area for recreational purposes. A visitor hour is defined as the presence of one or more persons on an area of land or water for the purpose of engaging in one or more recreational activities during continuous, intermittent, or simultaneous periods of time aggregating 60 minutes. A visitor hour equals one-twelfth of a visitor day. Monthly visitation reports are kept on file at the project office. Monthly visitation reports are kept on file at the project office and are available through the VERS Online Tool.

VERS "On The Go" Mobile App is a new addition to the VERS Program. The app is only accessible on a government issued smart phone. Purebred and Microsoft Teams must be downloaded on your device before accessing the app. Both can be downloaded by contacting CIO-G6 and requesting the software download. Once downloaded the app allows the user numerous capabilities which include live system access in the field, more than one user may enter readings, no double entry, as well as the ability to view previous month/year readings to help determine issues with meters all while in the field. The app can be reached at https://gateway.erdc.dren.mil/nrm/vers/.

References

- ER 1130-2-550, Chapter 13 - Recreation Use Surveys
- ER 1130-2-550, Chapter 12 - Natural Resources Management System
- EP 1130-2-550, Chapter 13 – Recreation Use Surveys
- VERS Online Tool
- VERS Modernization Guidebook - Jan 2021

Training Requirements

- You should become familiar with all the duties connected with recording visitation to your project. Upon completion of the training period, you should be able to read and perform minor repairs on all types of traffic counters, e.g., change batteries, hoses, counters, program TRAFx counters.
- You should become familiar with the information that is contained on the monthly project visitation report and be able to track visitation trends. You should be able to define the terms "visit," "visitor hour," and "visitor day."
- You should assist the project VERS coordinator in compiling the monthly visitation data, inputting the data into the VERS Online Tool and retrieving the project visitation report.

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3. Administration of Recreation Use Fee Areas

Public laws provide that each federal agency developing, administering, or providing specialized site facilities, equipment, or services related to outdoor recreation will provide for the collection of special recreation use fees for those facilities furnished at federal expense. Currently, entrance or admission fees to Corps recreation areas are not allowed, although use fees may be charged for use of campsites, launching ramps, swimming beaches, or reserving picnic shelters in these areas. According to EC 1130-2-550, the goals of the recreation use fee program are:

a. To recover a portion of the cost of administering, operating, maintaining and improving specialized recreation facilities, services, or supplies;

b. To distribute public use more effectively, in turn preserving resources and reduce overcrowding;

c. To support the national economy through the provision of quality recreational experiences;

d. To control facility use to deter incidences of vandalism and other disruptive behavior; and,

e. To foster a responsible user ethic among recreation users.

Campgrounds

The Nashville District initiated the fee program in 1971 at two campgrounds. The program has progressed from roving rangers who collected fees and issued user permits to the present system of live-in contract park attendants and volunteers who collect fees, prepare remittances, issue permits, take reservations, and control access.

The fee structure at the twenty-five fee campgrounds operated by the Nashville District is set by conducting biennial fee comparability studies that survey other campsite prices at other federally owned, state managed and private campgrounds. Sites range from basic sites that offer amenities such as a picnic table and grill up to fully improved “impact” sites that offer electrical, water, and sewer hookups and direct access to the lake.

Not only are the obvious benefits of revenues realized from the fee areas, but the presence of park attendants in these areas has greatly reduced the number of incidents of vandalism, rowdyism, and overuse/overcrowding. Campsite reservations are currently handled through the Recreation One Stop (R1S) system, accessed through Recreation.gov. Reservations, venue details and descriptions on Recreation.gov are made possible by 12 Federal Participating Partners: Bureau of Land Management, Bureau of Reclamation, Bureau of Engraving and Printing, Federal Highway Administration, National Archives & Records Administration, National Oceanic & Atmospheric Administration, National Park Service, Smithsonian Institution, Tennessee Valley Authority, Fish and Wildlife Service, US Army Corps of Engineers and US Forest Service.

This allows customers to access reservations for a variety of recreation facilities by calling a central toll-free number (1-877-444-6777), the R1S app, or at www.recreation.gov/.

Desktop PCs are now used at district fee campgrounds to facilitate the R1S campground management system. With this computerized campground management system, park attendants can check-in/check-out campers, accept walk-in reservations, sell passes and other point-of-sale transactions, pull on-site and incoming/departure reports, and create deposits. Most of the campgrounds within LRN are managed by contracted park attendants. All contract documents are due to the OPS-O POC by November 1.

Day Use

Historically, Day Use areas have been managed by using a cash register when manned by a volunteer or park attendant and utilizing an Iron Ranger honor vault to accept cash when the booth is unattended. In 2022, most of the day use areas in the Nashville District that charge use fees began using Ventek™ cashless fee machines. These machines use either a cell phone or hardline internet connection to allow visitors to purchase a $5.00 use fee or temporary annual pass that must be redeemed during booth hours or at the project visitor center.

Special Use Fees & America the Beautiful Passes

The Water Resource Reform and Development Act of 2014 granted USACE the authority to establish and collect fees for Special Use Permits and the provision of outdoor recreation equipment associated with activities that require Special Use Permits. WRRDA 2014 further authorized USACE the ability to participate in the America the Beautiful Program which is an interagency pass that includes the National Park Service, the Bureau of Land Management, the United States Fish and Wildlife Service, the United States Forest Service, and the Bureau of Reclamation. Special use fees include:

Special Activity Permits- a permit may be issued for the specific use of project resources that are small and recurring in nature. Examples include small fishing tournaments, backcountry use, small weddings, etc.

Special Facility Permits- a fee that can be charged for the use of specialized recreation facilities, including picnic shelters, amphitheaters, etc.

Special Event Permits- A permit may be issued for an organized use of project resources for a specific purpose and limited duration. This includes large fishing tournaments, poker runs, festivals, etc.

Annual Passes

There are several passes available for the public to purchase or be issued. The USACE Annual Pass allows visitors free access into any Corps operated day-use facility for a period of 12 months after purchase. In 2016, USACE began issuing and selling the America the Beautiful passes, an interagency pass that allows free access into day use areas and some of them offering 50% discounts for camping fees. There are several visitors who use the Golden Age and Golden Access Passports, and they are eligible for the same discounts.

References

- EC 1130-2-550, Chapter 9 - Recreation Use Fees
- Enterprise Standard (ES) – 13040: USACE Recreation Fee Program
- R1S Operating Procedures Manual
- America the Beautiful Pass Standard Operating Procedure
- LRN Fee Machine (Ventek) SOP, 1 Aug 2022

Training Requirements

- As a park ranger, you may be selected to serve as recreational fee cashier or alternate fee cashier. These employees are responsible for the precise, efficient administration of the program according to regulations. If you are not selected to serve as primary recreation fee cashier, you will be asked to work with the recreational fee cashier for at least one week to learn how the program is administered at your lake, including spending time in a campground fee booth to become more familiar with the park attendants' duties and responsibilities. You should be especially familiar with the procedures for transmitting funds through R1S. You should also have a working knowledge of R1S equipment and procedures.
- You will review the Ventek SOP and have a working knowledge of the automated cashless fee machine's equipment and procedures.
- The America the Beautiful pass program should be reviewed, and you should become well-versed in the various passes. You should be able to answer visitor questions on the various passes and be able to issue AtB passes at the project office.
- You will assist in the preparation of the annual close-out report on the use fee program at the end of the fiscal year

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8. Natural Resources Management

1. Fisheries Management

Fisheries management is the science of producing sustained yields of fish for recreational and commercial uses. State fish and wildlife agencies have the primary responsibility for fisheries management at Corps lakes. However, as a park ranger, your role in this area is important. You need a working knowledge of the fundamentals of fisheries management in order to cooperate with professional fishery biologists. You should be able to provide knowledgeable answers to the public about fish populations and fishing at your lake. Specifics of the fisheries management plan for your lake are contained in the Project Operational Management Plan, Part I, Chapter 4, "Fisheries Management." Refer also to ER & EP 1130-2-540, Chapter 2, "Natural Resources Stewardship".

Background

Section 2 of the Forest Cover Act (PL 86-717) provides authority for the Corps to manage project lands and waters for any or all conservation purposes, including fish and wildlife conservation. Lakes in the Nashville District vary widely in the amount of cover and the types of fisheries supported. When the older lakes were impounded, recreation was not an authorized project purpose, and fisheries management was not considered in project design as it is today. Prior to impoundment, virtually all trees and structures were routinely removed from the area to be covered with water, greatly reducing the available fish cover. On the newer lakes, J. Percy Priest, Laurel River, and Martins Fork, many trees were left in place to provide fish cover except where they might interfere with navigation or other project uses.

Almost any new lake, with or without cover treatment, offers excellent fishing for the first few years. Nutrition levels and invertebrate populations in the former fertile bottomlands are generally high, supporting a tremendous surge in the numbers and size of fish. As the lake ages, fishing declines. Although this is a natural phenomenon, proper management practices, including leaving more cover initially, will prevent a drastic decline in fishing success.

Management at older lakes which have passed their peak should be directed towards enhancing habitat and water quality and maintaining the proper ratio of the various species. This is not an easy task because of the large size of the lakes, other project purposes, increased fishing pressure, and other types of recreation. Increased development adjacent to public property and in the watersheds of the lakes also affects fishing by the consequent degradation of water quality.

The establishment of native aquatic plants can improve a fishery by providing cover and food. The introduction of certain exotic species, such as Eurasian milfoil or hydrilla, can initially enhance a fishery and improve fishing success, but the disadvantages of uncontrolled proliferation of these noxious plants often outweigh their advantages in the long term. These plants can block access to formerly fishable embayments and can lead to overpopulation and stunting of game fish. Large populations of aquatic plants can hasten lake eutrophication and cause periods of insufficient dissolved oxygen for fish when the plants die and decompose.

Stocking and Regulation

Early fisheries management consisted of stocking and regulation. If fishing was poor, the perceived solution was to restock the fish and close the season until they had reached spawning size. Insufficient consideration was given to whether the habitat could still support the fish and there was little knowledge of life histories of the various species. Consequently, this method often did not solve the problem of declining fish populations.

Every lake has a carrying capacity expressed by the pounds of fish per acre it can support. A lake may have a high carrying capacity but be considered a poor sport fishing lake because rough (non- game) fish are overabundant compared to game fish. Most of the game fish sought by anglers are predators at the top of the food chain and are much less abundant than prey species. If a lake is at its carrying capacity, stocking alone may be useless in achieving any long-term change.

Regulations can be an effective tool when supported by accurate data and knowledge. Most regulations are designed to prevent over-harvesting and generally restrict fishing methods. Sport fishing is usually limited to the “hook-and-line” method. Since this is inefficient as a harvesting method, it can help prevent over- harvesting. Size limits are a form of regulation most useful when applied to large predatory or newly introduced species. Creel limits are another form of regulation commonly used. Generally, creel or size limits are not placed on pan and rough fish species. Similar to the limitations of stocking, closed fishing seasons are usually useful only in specific situations. Research now indicates that there is a basic need for greater harvesting of many species rather than restricting fishing.

The role of commercial fishing in relation to sport fishing and in the overall picture of fisheries management in lakes is under study. A number of studies have shown that properly regulated and controlled commercial fishing has little or no detrimental effect on game fish. In fact, commercial fishing is generally aimed at harvesting large, non-game species, which are too big for use by predators and which compete for food and cover with more desirable species of game fish. Commercial fishing thus has the potential to be used as a tool in the overall management of game fisheries.

Population Manipulation

Population manipulation involves managing fish populations in such a manner as to provide maximum numbers of fish of desirable size and species. Game fish production may be improved by the introduction of desirable forage species. This was the case with the introduction of the threadfin shad into Dale Hollow Lake and the alewife in Old Hickory Lake. Introductions of striped bass (rockfish) and muskellunge (muskie) have generated fishing opportunities in Nashville District lakes. Both species are very desirable predators, because they can prey on rough fish that are too large for bass, walleye, etc. to consume.

Habitat and Water Quality

Pollution adversely affects habitat. It occurs in many forms and has a wide range of effects on aquatic life. Pollution can vary from siltation, which alters or destroys the environment needed by fish and the organisms on which they feed, to certain industrial wastes or misused pesticides that directly kill aquatic life. Many fish kills go unnoticed or unreported and the number of fish killed by incidents of pollution is probably much higher than reported. An important factor not reflected by statistics is the alteration or destruction of habitat with no noticeable mortality. This includes destroying foods fish eat, interfering with reproduction cycles or requirements, reducing growth rates, or simply causing fish to move out of an area.

Oxygen depletion occurs quite commonly in fertile waters. Decomposition of organic matter may consume more oxygen than is produced, resulting in fish dying of suffocation. Seldom are all fish killed, but often bass and other larger fish have the highest mortality. Mortality in fish is also caused by parasites, diseases, and sudden temperature changes. Parasites and disease organisms are present in all natural bodies of water, and under conditions such as overcrowding, an epidemic may develop, resulting in a large fish kill. Severe winters or prolonged droughts may also significantly impact fish populations, particularly certain sensitive species.

Proper land use in the watershed is vitally important to the recreational and overall environmental quality of lakes. Overgrazing, uncontrolled burning, improper cultivation, poor timber management, and urban development all detrimentally affect fish and wildlife resources. The Corps of Engineers is involved in monitoring, combating, and eliminating pollution. One important function of a park ranger is to provide early warning that a pollution problem affecting the lake may exist. Sources of pollution such as sewage, industrial wastes, mine drainage, siltation, and oil or hazardous waste spills can result in severe degradation of the lakes and adjoining public lands.

Spawning and Lake Levels

Because pool fluctuations hinder spawning in most species of fish, the district (Engineering Division, Hydrology and Hydraulics Branch) cooperates with state fish and wildlife agencies to stabilize lake levels during spawning periods. Spawning periods are determined by water temperature. Your duties as a park ranger include sampling the lake temperature.

References

- Project Operational Management Plan, Part I, Chapter 4, "Fisheries Management."
- ER 1130-2-540, Chapter 2, Natural Resources Stewardship.
- EP 1130-2-540, Chapter 2, Natural Resources Stewardship.
- Public Law 86-717 "Forest Cover Act", Section 2

Training Requirements

- Become familiar with the referenced material.
- Learn to identify the common species of game, rough, and forage fish in your lake.
- You should also become familiar with the common types of fishing rigs and lures. Use this knowledge to create and input a weekly fishing report.
- Learn about the state fishing regulations at your lake, as well as past, current, and planned fisheries management programs (e.g., stocking, creel studies, cove rotenone studies, electro-fishing, etc.). You should become acquainted with the state personnel responsible for fisheries management and enforcement at your lake.
- If possible, assist the District's Water Quality personnel with collecting samples and conducting studies of the water quality at your project.

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2. Wildlife Management

This section is an introduction to some of the basic principles of wildlife biology upon which wildlife management is based. It is not intended to teach management techniques, nor to discuss in detail specific management programs for game or non- game animals. Detailed information on management programs at your lake is contained in Part I of the Project Operational Management Plan. You also should consult the reference materials on this subject kept in the Resource Manager's Office.

Youth hunts can be an effective tool for managing wildlife populations.

Resources and Conservation

Wildlife is a renewable natural resource. It can be harvested, will reproduce, and can be maintained indefinitely through sound management. The use of wildlife does not necessarily involve consumptive use through hunting, any more than its conservation implies complete protection. In wildlife management, there are often excellent reasons for complete protection at one time, and equally good reasons for harvesting at other times or places.

Ecological Approaches

No living thing exists on its own; each individual organism is a part of a community of living things. Such a community, occupying a particular area, is a biotic community, which when taken in combination with the non-living parts of the environment—rock, soil, water, air, and sunlight—forms an ecosystem. All living things are interrelated and depend upon each other to maintain the proper balance. To maintain the population of any game or non-game species, the wildlife manager must consider all parts of the ecosystem to which it belongs.

Wildlife Populations

The wildlife population is the basic unit for management. It is defined as the sum total of animals of the same species inhabiting a common geographical area. Populations have various characteristics which apply to the entire group but are not characteristics of the individuals that compose the population. For example, the population has a life history in that it grows, differentiates, and maintains itself as does the organism, while group

characteristics, such as density, birth rate, death rate, and age ratio, apply only to the population. (Although an individual is born, dies, and has an age, it does not have a birth rate, death rate, or an age ratio.) These attributes are carefully measured by wildlife biologists to determine the success of management practices.

Wildlife Habitat

The most effective way to manage wildlife is to manage habitat. Such management may range from complete protection of the habitat to keep it suitable for a certain species, to making drastic habitat modifications to produce or maintain wildlife populations. In each habitat, there is a limitation to the number of animals of any one species that can be maintained. This limitation is known as the carrying capacity of the habitat.

Each species has adapted to various combinations of factors in a given environment. The adaptations of each species suit it to a particular place in the environment and preclude its presence in other situations. When the proper combination of factors exists to permit a species to occupy an area, the numbers which can be supported in that area are determined by the amount and distribution of food and cover in relation to the mobility of the animal. For example, a bird can use an area in which the necessary requirements are widely dispersed, while a mouse must have the essential elements within a small space. Food and cover are basic requirements but are not enough. The kind, distribution, quantity and quality of food and cover, as well as climate, predators, interspecies competition, and surrounding conditions are all important and may vary from one season to another.

Habitat Improvement

Improving the habitat by increasing food and cover is a basic management technique that provides positive results. Wildlife food resources can be improved by manipulation of the habitat to provide greater production of natural foods. Where successional stages of plants are needed to provide food, the use of fire, timber harvests, or other methods of disturbing the natural vegetation will often produce good results. Fire in a forest will improve shrubs for deer; disturbance of grasslands will allow the invasion of weedy species that attract quail. Allowing fence rows to grow up will provide food and cover for quail, rabbit, and other small game and non-game species. Forest management practices such as establishing wildlife clearings, favoring mast bearing and den trees, and creating a wide range of forest age classes have significant potential to improve wildlife habitat on the public lands surrounding the district lakes.

Supplemental feeding of hay or grain in order to carry a population through a critical period should be discouraged because of its potentially undesirable effects. For example, if a population of deer is fed to carry it through the winter, an artificially high population can return to the summer range to produce an unusually large number of fawns. More deer would then require more supplemental feeding the next winter. Should this feeding be reduced or stopped, mortality would follow immediately. This mortality would be more severe than it would have been naturally because the higher population would have further exhausted any natural foods previously available. Long-term damage to the habitat may also occur as a result of overpopulation.

In general, the factors which affect wildlife food also affect cover. The amount of cover available is especially influenced by seasonal changes, natural plant succession, weather, soil conditions, and various disasters. Consideration should be given not only to the amount of cover needed, but also to its distribution and location in relation to feeding and watering areas.

Corps of Engineers Involvement in Wildlife Management

The states have the primary responsibility for management of wildlife. The Corps has issued outgrants to the state wildlife agencies for wildlife management programs on public property at the district lakes. The U.S. Fish and Wildlife Service also operates Cross Creeks National Refuge, primarily for waterfowl management purposes, on Lake Barkley. The Corps cooperates with state and other federal agencies to maximize wildlife benefits on public property. This can include joint identification of areas suitable for forest management, native plant species plantings, grain crops, etc.

In some areas not outgranted to the state for wildlife management purposes, lease agreements with local farmers are used to help create and/or maintain habitat diversity. Many of the bottomland areas farmed prior to creation of the lakes have reverted to brush, vines, and dense undergrowth. While this type of habitat provides useful cover and food, a diversity of habitat conditions is crucial to optimizing conditions for a variety of wildlife species. Farming activities, such as hay or row crops or carefully controlled livestock grazing, can be used to convert some of these areas to early successional stages favored by rabbits, deer, quail, doves, rodents, raptors, and other animals. Farming activities should be managed for the proper association with cover and water. Lease agreements often include leaving a portion of the crop in the field for wildlife food and leaving wooded fence rows or other travel corridors for wildlife. Edge effects can be maximized by proper planning and coordination with the lessee.

At some lakes, wildlife food plots are planted on a limited basis such as along trails, within environmental study areas, powerline right-of-ways, and other small or inaccessible areas not suitable for farming operations.

Generally, wildlife management is thought of as improving conditions for wildlife. However, there are cases in which animals may cause damage, health and safety hazards, or nuisance situations. Examples are rodents burrowing into the earth fill portions of dams, skunks frequenting heavily used campgrounds, geese defecating on swimming beaches, and vultures plucking roofing on power houses and caulking in lock walls. Correcting these problems in the most environmentally sensitive and acceptable way is a management challenge.

The Nashville District has a cooperative agreement with the U.S. Department of Agriculture, Wildlife Services to provide abatement services as needed. This agency has the expertise, equipment, and legal authority necessary for this work. Requests for animal abatement services are coordinated through, and approved by, the District Pest Control Coordinator.

References

- Project Operational Management Plan, Part I
- U.S. Army Corps of Engineers Wildlife Resources Management Manual, Waterways Experiment Station (WES), Vicksburg, Mississippi
- *Wildlife Management Techniques*, Robert H. Giles, Jr., Ed., The Wildlife Society, Edwards Brothers, Ann Arbor, Michigan, 1969

Training Requirements

- Become familiar with the portions of the Project Operational Management Plan, Part I, pertaining to wildlife management.
- Become familiar with ER 1130-2-540, Environmental Stewardship Operations and Maintenance Policies.
- You should become acquainted with the state and federal wildlife management and enforcement personnel assigned to your lake.
- Become knowledgeable of the laws and regulations regulating hunting at your lake. Learn about wildlife studies or stocking programs in the area.
- If applicable, review the outgrants to state and federal agencies for wildlife management programs at your lake. Visit the sites of intensive habitat improvement practices carried out by other agencies.
- Visit the site of any wildlife management work by the Resource Manager at your lake.

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3. Forest Management

Forestry is the science of managing and using, for human benefit, the natural resources that are associated with forest lands. Forest management is the practical application of scientific, economic, and social principles to the management of forest land for specified objectives.

The objectives of the forest management programs at the Nashville District lakes are primarily social rather than economic. The main objectives are to increase the value of public land for recreation and wildlife, to provide watershed protection for the control of surface run-off and siltation, and to promote natural ecological conditions by following accepted conservation practices.

Public land around the lakes will not be used for sustained yield timber production because the aesthetic, ecological, and recreational values alone exceed that which can justify timber management. However, older lakes such as Dale Hollow, with extensive acreage that is almost totally forested, are now arriving at a successional stage that is less productive. Some timber harvesting may be necessary to improve the forest stands and promote a greater diversity of plants and wildlife.

Management of Forest Lands

Forested lands may be managed for a variety of purposes, with one dominant use (most often timber production). Often, forest lands are managed for several uses simultaneously, sometimes literally on every acre, but more often with different uses assigned to particular sections of an area. Forests which are primarily managed for timber production can also accommodate watershed protection, wildlife, and recreational uses. Sometimes one properly administered use complements another. Some uses are incompatible, however, and the less important use becomes subordinate to the others. For example, grazing often is not compatible with timber or recreational use.

Goals of Forestry Management

The basic goal of any forestry management program is to keep forest lands productive. Sustained productivity may be thought of in two senses: as continuity of growth and continuity of yield or harvest. Growth and yield are not the same thing, although they appear to be similar. For example, a tract of immature but currently unmerchantable timber may be well cared for and attaining excellent growth. The land is certainly productively employed and in this sense is being managed for sustained productivity. Since the timber is immature, its major harvest is in the future and the tract is not currently yielding a sustained cut or harvest related to its growth.

In contrast, a forest area that contains a range of age or size classes may be managed as a unit to yield a sustained flow of harvested products as well as being maintained in a state of continuous productivity from a growth standpoint.

The Role of the Corps of Engineers in Forestry Management

ER 1130-2-540 requires the preparation of a forest management plan in Part I of the Operational Management Plan for each lake. The forested lands around lakes in the Nashville District have historically been managed in a custodial manner with timber cutting limited to that for operational requirements. Except for protection from fire, insects and disease, the forested tracts have been essentially left alone since acquisition.

Recent administrative emphasis on better management of public natural resources has caused the Nashville District to rethink this approach to management. Forest management plans are being developed that may include timber harvesting to better comply with Public Law 86-717, The Forest Cover Act, which requires multiple use, sustained yield management of forest lands to the extent practicable and compatible with other uses of the lakes. The Nashville District has entered into memorandums of agreement with the States of Kentucky and Tennessee for a joint cooperative effort in managing forest lands. The Operational Management Plans (Part I) of some of the lakes in the district prescribe sustained yield forest management.

Forestry Fundamentals

- *Dendrology* is the identification and systematic classification of trees. It is important that you be able to identify tree species for discussion and planning for forest management. Many species can be identified by means of a guide containing leaf drawings or photos. Such guides are available from the U.S. Forest Service and state forestry agencies. *A Field Guide to Trees and Shrubs*, one of the Peterson Field Guide Series, by George A. Petrides, is an excellent reference. A copy can be found at each Resource Manager's office. Tree identification keys, such as *Summer Key to Tennessee Trees* by Shanks and Sharp, which uses leaf characteristics, and *Fruit Key and Twig Key to Trees and Shrubs* by W. M. Harlow, which employs fruit and twig characteristics, can be useful for more difficult identifications.
- *Silviculture* is the branch of forestry dealing with the development and care of forests. Silvicultural practices with which the park ranger will be involved include regeneration reforestation; cultural practices to improve the forests for wildlife habitat, recreation and aesthetics; and practices to ensure stand vigor. Part I of the Project OMP gives the specific silvicultural practices to be carried out at the lake.
- *Timber cruising* is the process of preparing an inventory of a forest stand to determine the quantity of forest products that can be derived from the stand. The information obtained from a cruise may include data on tree quality, site quality, age of the stand, species composition, growth rate, and other special use information. A timber cruise on public land may be required for timber or fire trespass, timber sales, or resource inventory.

The measurement of the individual tree is the basis for all cruising. Depending on the size of the area and the forest products, the cruise may be made using the point sampling, plot, or strip method, or one hundred percent of the timber may be cruised. The timber should be tallied as a specific product, such as saw timber, pulpwood, cordwood, etc.

Cruising one hundred percent of the timber would be appropriate for a timber trespass on a small area, while sampling should be used on large areas to save time and labor. Consult the Forestry Handbook in your project library for a discussion of sampling methods and determining sampling errors.

- *Tree size* is measured as diameter at breast height (DBH). This height is assumed to be four and one-half feet above the ground. Heights may be taken to the top of the tree or to a merchantable top diameter for volume computation. Measurements are usually tallied to the nearest five feet or sixteen- foot log length. The Abney hand level, a level with a scale for measuring the vertical angle above or below the horizontal plane, and one hundred foot measuring tape are usually used in determining tree height. Merchantable top diameters for different timber products are as follows:
    - lumber - 8 to 10 inches
    - posts and props - 3 inches
    - pulpwood - 4 inches
    - fuelwood - 2 inches

There are numerous tables called *log rules* showing the board-foot volume for many combinations of log diameters and lengths. The three most commonly used are the Scribner Log Rule, Doyle Log Rule, and International 1/4-Inch Rule. The federal government uses the International 1/4-inch Rule in timber sales.

Trespasses and Vandalism

"Tree vandalism" is the term given to the increasing problem of adjacent landowners who cut or poison trees on public lands in order to obtain a view of the lake from their property and/or enhance the value of the property. Prevention efforts through surveillance, communications with adjacent landowners and real estate agents, and public information are important in reducing the number of these incidents. Once discovered, however, park rangers should follow LRN's Plant Vandalism and Valuation SOP. You must work quickly to contact the landowner, obtain as much information as possible, do a thorough inventory of the damaged or destroyed trees, and coordinate with the appropriate person in the Operations Section to develop a valuation of the damaged property and work towards restoration or legal action. It is imperative that you take good notes, document all conversations with the adjacent landowner/contractor, and take pictures of the affected area and trees. Many tree vandalisms are resolved by developing restitution agreements that involve replanting trees or payment for the damages. However, if your case results in a citation and goes to court, your notes and documents become critical evidence for the Federal Magistrate to consider.


Tree vandalisms should be documented thoroughly with pictures and field notes

The trunk formula method is used to estimate the damages from the tree vandalism. The trunk formula method is one of the methods outlined in the Ninth Edition of the Guide for Plant Appraisal. This guide is the culmination of more than seventy-five years of developing tree evaluation methods. It is accepted by the American Association of Nurserymen, American Society of Consulting Arborists, Associated Landscape Contractors of America, and National Arborist Association. State and urban foresters, arborists, and agricultural extension agents support the Guide as the best reference for assessing the value of trees. The trunk formula method is used when the plant is too large to be readily replaced. This value uses the cost of replacing the largest locally available plant and adjusting it for the size difference, condition, and location of the appraised tree. Specifically, this method involves establishing a tree's basic price per cross sectional square inch (suggested from the Southeastern United States Tree Species Rating Guide). The cost is then adjusted for the tree's species, location, and condition.

References

- ER 1130-2-540, Environmental Stewardship Operations and Maintenance Policies.
- Part I, Project Operational Management Plan
- *Forestry Handbook*, Society of American Foresters, Publication No. SAF 84-01, Karl F. Wenger, Ed., John Wiley and Sons, New York, 1984
- *Guide for Plant Appraisal, 9th Edition, International Society of Arbiculture, 2000*
- *Field Guide to Native Oak Species of Eastern North America*, John Stein, Denise Binion, and Robert Acciavatti, Morgantown, West Virginia, 2003
- *A Field Guide to the Trees and Shrubs*, George A. Petrides, Houghton Mifflin, Boston, 1972
- LRN Plant Vandalism and Valuation SOP, 1 Nov 2001
- *The All Season Pocket Guide to Identifying Common Tennessee Trees*, Michael D. Williams, UT Extension, PB1756
- *Common Trees of Kentucky*, University of Kentucky, Department of Forestry and Natural Resources

Training Requirements

- Read and be knowledgeable of the forest management portions of ER 1130-2-540 and Part I of the Project Operational Management Plan. You should get acquainted with the state forestry personnel in the area.
- Be able to identify the common tree species found around the lake.
- Participate in the planning and execution of a firewood sale, if one occurs during the training period.
- Become familiar with tree valuation methodology.
- Be familiar with the LRN Plant Vandalism SOP and, if possible, participate in the surveying and recording of a tree vandalism case if one occurs during the training period.

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4. Soils and Geology

The physical characteristics of the soil can often determine if a site is suitable for a particular management activity. As a park ranger, you should be familiar with soil characteristics such as texture, depth, drainage, etc. The soil types found at each lake are given in the Project Master Plan and Operational Management Plan, Part I. Detailed soils maps also are available from the Natural Resources Conservation Service and geospatial soil data is available for download or through web mapping services to be used in ArcGIS (https://datagateway.nrcs.usda.gov/).

Soils may be classed as one of two major categories: residual or transported. Residual soils are those that have remained in place, overlying the rocks from which they are derived. Transported soils, on the other hand, have been removed from their places of origin and deposited elsewhere. If a slice were cut through an area having residual soil, and through one having transported soil, and the two slices compared, the following typically could be seen:

The residual soil would start at the surface with a thin layer, or horizon, of organic material. The topsoil, a dark layer with abundant organic material would follow next. As the cut continued downward towards the underlying rock, the subsoil would be found. This layer would contain fewer organisms, and plants would not grow as well there. Often clay and occasional rock fragments would be found in the subsoil. Then there would be a grading into the "parent" material at the bottom. The weathered rock and partly weathered soil from which the soil layers above were formed would be found in this layer. Comparison would show that the minerals present in the soil are the same as those present in the underlying bedrock. No line of separation between the soil and the rock would be present.

A cross sectional view of transported soil would clearly show that there was no relationship between the first layer of topsoil and the underlying layers and rock. The minerals would be different in the transported soil, and there would be a sharp line separating this layer from the next one. In this case, the soil simply rests where it has been deposited.

Soils are transported by the same forces that erode rocks—water, wind, and ice. Materials transported and deposited by water on the surface are called alluvial materials and those transported and deposited by wind are termed aeolian materials. Ice-transported materials may be called glacial materials.

Erosion

Soil erosion results from two independent processes: detachment of soil particles and transportation of soil particles. The splash of raindrops and surface flow are the principal causative agents in this region. Water derives its power to erode from the velocity imparted by gravity.

Running water is a powerful natural force for cutting into the earth's surface and transporting the loosened materials. It is important to note that the maximum diameter of the individual rock fragments which a stream can move varies as the square of its velocity. For example, if the velocity of a stream is doubled, the diameter of the fragments which it can

move increases fourfold; or if the velocity is tripled, the diameter of the fragments which it can move increases nine times. In general, the same rule holds true for the cutting power of a stream. This explains the vastly greater erosion caused by swift flowing streams than by slow moving ones under normal conditions. It also explains why exceptional floods cause tremendous destruction.

Siltation

Siltation, a by-product of soil erosion in the watershed, not only represents the costly loss of topsoil, but it also degrades water quality and reduces the life and operating efficiency of a lake for flood control, navigation, and recreation purposes. Sedimentation increases the cost of filtering and treating water supplies. Good watershed management practices are extremely important in retarding the siltation of lakes and streams.

Soil Conservation

Soil conservation is the protection of the fertile topsoil from erosion by wind and water and the replacement of essential nutrients in the soil. The best control of soil erosion is prevention. Prevention is accomplished by the maintenance of adequate vegetative cover, either naturally or artificially established. Such protective cover will increase the rate of infiltration and percolation, decrease the velocity of surface run-off, and stabilize the soil in place.

Where soil erosion is occurring, the first step is to stop the cause (overgrazing, burning, overuse by the public, improper road and trail construction, unauthorized off-road vehicle activity, wave action, etc.). Then natural re-vegetation can be supplemented by seeding and planting. Excessive surface run-off can be retarded by protective mulching, contour furrows, diversion channels, terraces, check dams, and ponds. Bank erosion can be retarded by the placement of riprap. Many of the local NRCS offices can refer you to projects that have been completed in the watershed of your respective project to create riparian buffers and implementing Best Management Practices (BMPs) to help protect the natural resources. There are numerous examples at the various lake projects of erosion control projects that have been completed to minimize further erosional processes. You should inquire with each project as to how these projects come to fruition and how they functioned since completion.

Karst Topography

Through the years and many fluvial processes, the Cumberland River basin is peppered with areas of karst topography that has presented many challenges to the development of flood risk management projects across the Nashville District. Karst primarily occurs when voids are created in the subsequent bedrock features of the underlying strata, thus causing the formation of sinkholes, karst depressions, sinking streams, and voids or caves. This dissolution of limestone and transport of sediment can cause numerous issues in the development of flood risk management projects. Karst has been the primary cause of recent rehabilitation projects at Wolf Creek Dam and Center Hill Dam.

References

- *Guide to the Practical Use of Soil Surveys*, U.S. Department of Agriculture, Natural Resources Conservation Service, in cooperation with University of Florida Soil Science Department
- *From the Ground Down, An Introduction to Soil Surveys*, U.S. Department of Agriculture, Natural Resources Conservation Service, Columbia, Missouri, 1988
- *Soil Erosion by Water*, Agriculture Information Bulletin No. 513, U.S. Department of Agriculture, Natural Resources Conservation Service, 1987 (Revised 1990)
- *Soil Erosion by Wind*, Agriculture Information Bulletin No. 555, U.S. Department of Agriculture, Natural Resources Conservation Service, 1989
- *Handbook for Collegiate Soils Contest*, Southeast Region, Richard J. Barnhisel and Wilbur W. Frye, Ed., Department of Agronomy, University of Kentucky
- *4-H Land Judging Guide*, Dr. Paul Denton, University of Tennessee, 1991

Training Requirements

- Become familiar with the basic soil types found around your lake and their main physical characteristics, especially those that are limiting factors for recreational development.
- You should visit the local U.S. Natural Resources Conservation Service Office and become familiar with their programs and resources.
- During your project tour to Center Hill and/or Lake Cumberland become familiar with the rehab work and the role karst topography played.

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5. Watersheds

In temperate zones, about thirty per cent of the total annual precipitation over land generally leaves as run-off. Transpiration by plants and evaporation (and in some watersheds, deep seepage) account for the remainder. At any given time, some water is stored in the soil mass and in underlying aquifers (water-bearing rocks). The run-off resulting from a single storm varies greatly (partly because of variations in the amount of the stored water) and is dependent upon the deficit in soil moisture, the infiltration rate (how rapidly water can enter the soil surface), and the rate at which the water percolates downward after it enters surface pores.

Run-off, infiltration, and percolation are greatly affected by the surface conditions in the area. Bare or eroded land is much more conducive to increased run- off than forested land. Vegetation intercepts rainfall and allows much of it to evaporate before it reaches the ground. There are thousands of root channels per acre under a forest. Such channels, plus numerous smaller ones left by decaying roots and the burrowing activity of animals, greatly increase infiltration and percolation rates. Transpiration by plants decreases the stored soil moisture, which in turn increases the infiltration rate.

After rainfall, water that is not absorbed into the soil drains from the land through streams that increase in size and eventually discharge into the ocean. Each rill, brook, creek, or river receives the water from the area of land surface that slopes down toward its channel. Channels occupy the lowest elevations of the landscape. The ridge or rim of land that separates an area that drains into one stream from an area that drains into another stream is called a *divide*. The area enclosed by the divide is called the *watershed* or *drainage basin*. For example, in the United States the most prominent divide is the Continental Divide, which separates the streams that flow toward the Pacific Ocean or the Gulf of California from those that flow toward the Atlantic Ocean or the Gulf of Mexico. Every stream in each system has a divide and a watershed.

Drainage Patterns

The streams in any watershed form a pattern or network, which is determined by the underlying rock and the geological history of the area.

- *Dendritic* or leaflike drainage patterns are found in areas where rocks are fairly flat-lying and composed of generally uniform materials.
- Rectangular patterns are typical of areas of tilted, fractured rock strata. Streams follow the zones of weakness created by fracturing.
- *Trellis* patterns develop in areas of tilted strata where some strata are more resistant to erosion than others. The streams follow the bands of less resistant rock.
- *Annular* or radial patterns are found on volcanoes; the streams radiate outward from a central zone in this drainage pattern.

The Erosion Cycle

A valley, once formed in a landscape with sufficient slope, goes through a fairly definite series of changes in its profile. A young valley has a "V-shaped" cross section, and its floor is scarcely wider than the channel of the stream it contains, because downcutting is dominant over valley widening. A mature valley has a more broadly flaring cross section and a flat floor, indicating the effect of valley widening by the lateral cutting action of the stream. Valley widening is now dominant over downcutting. The stream meanders extensively upon its floodplain in a mature valley.

Instead of considering only one valley and its cycle of erosion, it is more important to consider an entire area drained by numerous valleys. In an area as a whole, valleys can be enlarged only at the expense of the interstream divides. If given enough time, stream erosion will reduce even a great area of land to a featureless plain. In the young stage of the stream erosion cycle, divides are broad and flat-topped. In the mature stage, the divides are reduced to a series of low rolling hills, and the area in general has a very subdued relief.

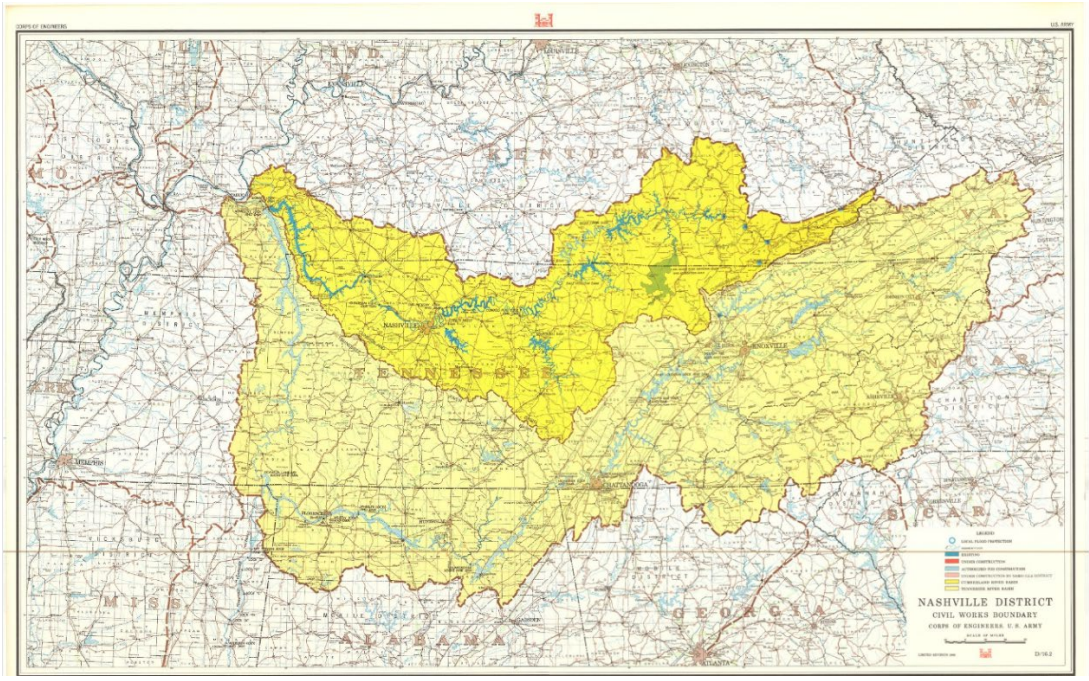
At each successive stage of the cycle, there is an appreciable decrease in stream erosion. In the old stage, for example, it may take more time to erode the last few feet of relief than it did to remove all of the land that went before.

Watershed Surveillance

In addition to managing public property, the staff at each lake is responsible for an area which generally includes the drainage basin of that lake plus additional river channel (and tributaries) downstream of the dam. The boundaries of these areas of responsibility were fixed to take advantage of cultural features and political divisions. Including the portion of the river channel below the dam in each area increases efficiency by reducing transit time required for patrol. The Project Operational Management Plan, Part I, Chapter 10, has a written description and a map of the area of responsibility for the lake. Each Resource Manager's Office also has a wall map which delineates all the areas of responsibility in the district. Rangers are responsible for maintaining surveillance of the watershed in their area of responsibility. This includes conducting occasional aerial surveys. When patrolling the watershed, you should check for:

- unauthorized activities under Sections 10 and 13 (Refuse Act) of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act,
- uncontrolled sediment run-off,
- acid mine drainage,
- discharges or spills of raw sewage, oil, or other pollutants,
- unauthorized gravel dredging or other disturbance of streams,
- fish kills,
- and flooding.

Report violations which adversely affect the lake but are not under Corps of Engineers proprietary jurisdiction to the appropriate state water pollution control or wildlife agency.



Nashville District Boundary Map

Reference

- Project Operational Management Plan, Part I

Training Requirements

- Become familiar with the Project Operational Management Plan, Part I, Chapter 10, "Basin Surveillance."
- Know the watershed boundaries of the Nashville District and the Great Lakes and Ohio River Division.
- Know the area of responsibility for your lake and patrol the watershed. If possible, you should participate in an aerial survey of the watershed.
- You should have a general knowledge of the state water pollution control regulations and be acquainted with the state personnel responsible for your area.

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6. Limnology

Limnology is commonly defined as the study of the biological, chemical, and physical features of inland waters. The term "inland waters" includes all types of bodies of water: running or standing, fresh or salt, or of other physiochemical make- up which are wholly or almost completely surrounded by land.

Temperature

Many limnologists regard temperature as the single most important factor in the aquatic environment. It regulates the metabolism of poikilothermic (cold- blooded) animals, and it determines, in part, the species that can live in a particular body of water, and their seasonal behaviors within that body of water.

Heating of a body of water is principally caused by absorption of solar radiation, and cooling is due largely to losses to the air by conduction. The specific heat of water is among the highest of all substances. This means that it takes a larger number of calories to raise the temperature of water one degree Celsius than the same volume of most other substances. This heat capacity of water has important physical and biological implications. It buffers the aquatic environment against rapid and wide temperature fluctuations. In comparison to the terrestrial environment, temperatures vary less throughout the year in the aquatic environment, and seasonal heating and cooling lag.

Lake Seasons

The density of water varies with temperature; it reaches maximum density at 4 degrees Celsius (39.2 degrees Fahrenheit) and is less dense at both higher and lower temperatures. This property is why ice floats; its temperature is 0 degrees C (32 degrees F.). The water with the greatest density will always be found at the greatest depths in a body of water. This fact brings about seasonal variations in thermal structure and dynamics in lakes.

The deep, flood control lakes in the Nashville District are classified as warm monomictic (one mixing or overturn). This type of lake is characterized by temperatures of 4 degrees C. or greater at any depth, winter circulation (overturn), and summer thermal stratification. Stratification in these lakes in the district generally occurs from mid-spring through mid-fall.

Strong spring winds may cause the entire lake to circulate and heat as a unit for a while. At some point, however, circulation of warmer water into deeper regions by the wind will be unable to keep up with the rate of solar heating.

Eventually this leads to two lake layers with very different densities (resulting from the increased temperature of the upper layer), which resist mixing by the wind. This thermal stratification is also called summer stagnation. When a lake stratifies, the following zones are formed:

- *Epilimnion* - the uppermost layer which is warm and uniform in temperature.
- *Thermocline* - the plane where the maximum rate of temperature decrease occurs in the lake. The zone of rapid temperature decrease which includes gradients on both sides of the thermocline is called the metalimnion.

- *Hypolimnion* - the bottom layer, which is also somewhat uniform in temperature and doesn't mix with the epilimnion. It may become depleted of oxygen and may be high in carbon dioxide in the summer.

About mid-fall, the surface water begins to lose heat faster than it can absorb it. As cooling takes place, differences in density are reduced, and the cooler, more oxygenated layer of water sinks. Convection currents cause mixing from top to bottom and the lake again becomes nearly uniform in temperature throughout. This is winter overturn.

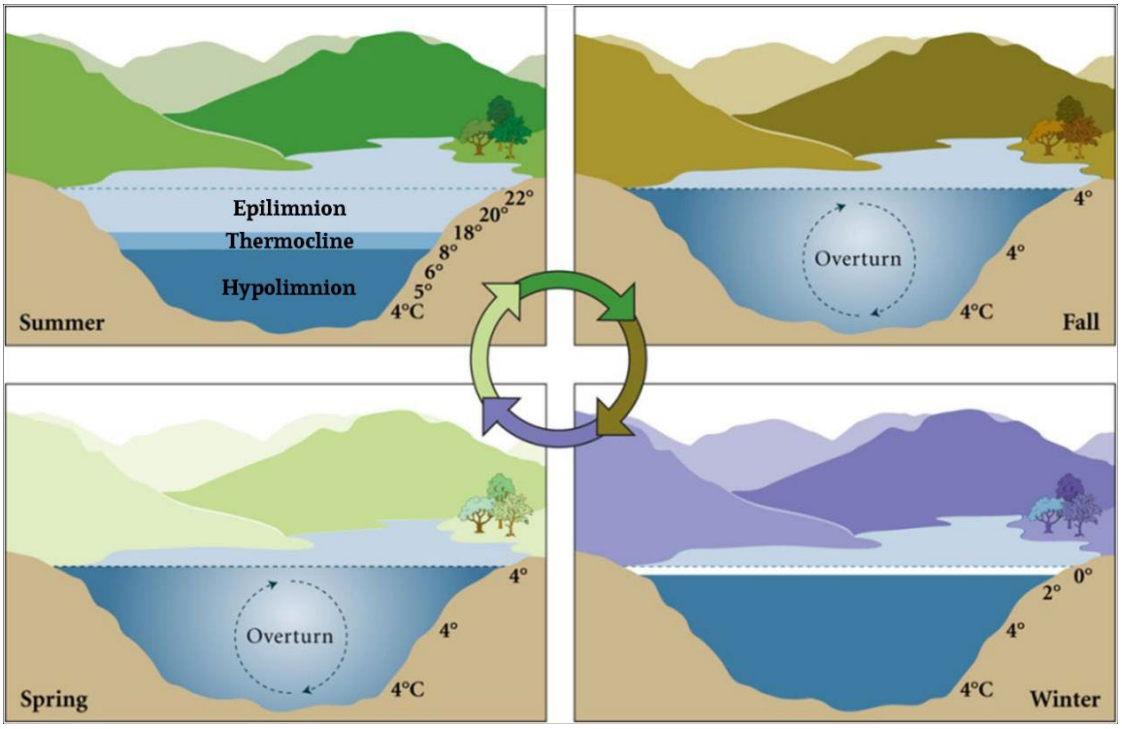

Illustration of seasonal thermal stratification and mixing (from Thermal Stratification in Lakes (M. Young, 2004, Baylor College of Medicine, Center for Educational Outreach)).

Water Movement

A lake is almost always in motion to some degree; this motion may be generated by both internal and external forces. There are two major types of water movement in a lake: arrhythmic and rhythmic. The arrhythmic type is often called "current." This unidirectional movement may be caused by differential heat distribution within the lake, flows of stream water through the lake (due to natural stream flows or upstream releases for flood control, hydropower, or other project purposes), and winds. The density of the stream water determines the depth at which it passes through a lake.

The rhythmic type of movement is of two major kinds: traveling surface waves and standing waves. The traveling surface wave is caused by wind. Except for surf in shallow areas and whitecaps, the surface wave has no actual horizontal movement of water in open areas. Particles of water move in vertical circular orbits.

In a standing wave, the lake surface swings back and forth in a steadily decreasing oscillation. Usually, the amplitude of a standing wave is only a few inches, but standing waves several feet tall have been reported on some larger lakes (such as the Great Lakes).

This type of wave causes a much greater horizontal displacement of water than a traveling surface wave. The particles of water do not travel in a circular orbit but advance and return in the same path. Standing waves form primarily when sustained winds or sudden, localized changes in atmospheric pressure create surface depressions. Causes can also include earthquakes, landslides, and sudden inflows of great quantities of water at one end of the lake. In a stratified lake, internal standing waves may also exist as thermal layers oscillate in respect to one another. A wave of this type is not apparent at the surface and is set up when the wind piles up water at one end of lake and displaces the lower thermal layers.

Life Zones

There are several life zones in a lake, each supporting more or less distinct and characteristic life forms. The *limnetic* zone is located in open water and includes both the *trophogenic* zone of effective light penetration and an unlighted *tropholytic* zone. Much of the lake's supply of plankton thrives in the trophogenic portion of the limnetic zone. The tropholytic zone is characterized by organisms which can live in a low-oxygen environment.

The *littoral* zone extends from the shore to the limit of the rooted plants. It may extend completely across a very shallow lake or be a narrow band around the margin of a deep lake. The water depth, bottom type, available nutrients, light penetration, wave action, and fluctuation are factors in determining the extent of the littoral zone in a deep lake. There are three distinct associations of vegetation in this zone. These are the zone of emergent vegetation, the zone of floating leaf plants, and the zone of submersed vegetation.

The bottom zone or *benthic* community encompasses the lake bottom from the shoreline to the deepest water in the lake. The benthos (bottom dwelling organisms) vary greatly from the rich littoral bottom to the infertile *profundal* (deep) bottom where there is no light, little oxygen, and a high concentration of carbon dioxide.

Trophic States

Lakes with abundant essential nutrients, very low levels of dissolved oxygen in the hypolimnion, and heavy growths of planktonic algae are classified as *eutrophic*. *Oligotrophic* lakes are deficient in nutrients, less productive biologically, and generally have greater distribution of dissolved oxygen. They are typically deep, clear, and have poorly developed littoral zones. The intermediate stage between these two extremes is termed *mesotrophic*.

Eutrophication, the increase in available nutrients in an aquatic habitat, can be greatly accelerated by human activities, e.g., increased siltation due to construction, discharges from wastewater treatment plants and industrial sources, run-off from farmland (silt, fertilizer, leachate from animal waste), and drainage from urban areas.

Reference

- *Ecology of Inland Waters and Estuaries*, Second Edition, George K. Reid and Richard D. Wood, D. Van Nostrand Company, New York, 1976

Training Requirements

- Be able to describe the major lake strata and the process of winter lake overturn. You should determine the trophic state of your lake and whether it undergoes seasonal variations (stratifies and overturns).
- You will be assigned to sample the lake temperature.

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9. Environmental Management

The U.S. Army Corps of Engineers has a legal and ethical responsibility for stewardship on lands it manages. This includes protecting and conserving our country's natural and historic heritage. Toxic, hazardous, and improperly managed wastes of all types, if not properly stored and disposed, can create havoc with the intricate fabric of nature. Careless activities related to waste management can adversely affect the natural habitats of plants and animals, as well as cause immediate and long-term effects to human health. Polluted soil and water destroys or alters living plants that produce the oxygen we breathe and help maintain a healthful climate for humans. In the past, human and commercial waste materials were sometimes carelessly tossed aside, hidden in the forests, or dumped in the water supply. There is a commitment now to rectify past errors and prevent additional damage from being done in the future.

Environmental Compliance means conforming to environmental laws, regulations, standards, and other requirements. In recent years, environmental concerns have led to a significant increase in the number and scope of compliance imperatives across all global regulatory environments. Because of ever-increasing environmental responsibilities, it is imperative that all project facilities be operated and maintained in an environmentally sound manner. The need to institute a sound environmental program is very clear if we are to follow all laws and regulations. The consequences of not complying can be significant, with penalties that may be civilly or criminally imposed. The on-site manager is personally liable and ultimately responsible for compliance. Environ- mental issues must be a primary concern in all decisions affecting overall project management.

The Environmental Compliance Assessment Program was initiated by the Corps as a comprehensive self-evaluation and program management system for achieving, maintaining, and monitoring compliance with applicable environmental laws and regulations at Corps facilities and operating projects. The acronym, ERGO (Environmental Review Guide for Operations), has become synonymous with the assessment process. It was the original Corps-specific tool used in the early 1990's to conduct annual environmental compliance assessments.

The current US TEAM (The Environ- mental Assessment and Management) Guide or manual was developed by a DoD working group chaired by Corps Headquarters and the Air Force to come up with a comprehensive compliance checklist. The first edition of the US TEAM Guide was published in November 1994 and replaced the original ERGO Manual. The additional Corps requirements were then included as an ERGO supplement to the US TEAM Guide. State manuals include specific regulations that go beyond, or are in addition to, the DoD and Corps regulations. The US TEAM Manual, Corps ERGO Supplement, and State Manuals can be accessed through the FedCenter.gov website http://www.fedcenter.gov/ and are also located on the Compliance and Processes Tracking Application (CP Track) https://cptrack.usace.army.mil. This site has numerous other compliance guides and information.

The compliance manuals are proactive guides to environmental compliance and protection for USACE Civil Works projects and facilities. They are also self- evaluation tools, as well as a comprehensive resource for internal and external assessments. The purpose of the ERGO program is to provide guidelines to Corps employees to assure that potential problems with environmental protection and compliance issues are identified and resolved promptly.

The US TEAM/ERGO manuals are the primary tools for conducting environmental evaluations at Corps- administered projects and facilities. These manuals compile applicable federal regulations, Engineer Regulations (ERs), Good Management Practices (GMPs), and risk management issues; and consolidates the information into checklists. A checklist is provided for each of the 13 environmental compliance sections into which the manual is divided. The section checklists are the heart of the compliance manuals and the criteria for conducting environmental compliance assessments at Corps projects. The ERGO process is a tool to help identify problem areas associated with environmental compliance on projects and facilities.

Ongoing environmental compliance evaluations help prevent or reduce potential environmental liabilities by ensuring projects and facilities are in compliance with specific environmental laws, thereby protecting public health, worker health and safety, and the environment. Corps facilities are required to perform internal and external assessments. External assessments are conducted on a minimum cycle of every five years and include major outgrants. Internal assessments are done annually; except for the year the external is done. Real Estate major compliance inspections serve as the internal assessments for major outgrants.

Both External and Internal Assessments are required to be entered into the CP TRACK system in October each year. Each lake's Environmental Protection Specialist (Ranger) usually acts as the project's Environmental Compliance Coordinator (ECC). The project ECC can enter Internal Assessments, but External Assessments (done every five years) must be entered by the District ECC. Data is also entered to update CP TRACK reports for RCRA (Resource Conservation and Recovery Act) Generator Status, Storage Tanks, Wastewater, and Water Quality.

Compliance issues are discussed on the next page by grouping them in the appropriate manual section. This should help one understand how the TEAM/ERGO manuals are organized and to know which topic area of environmental regulations apply.

Protocol Number	Protocol Description	Assessment Objectives
1	Air Emissions Management	Evaluate compliance with all applicable regulations associated with air pollution emissions from stationary and mobile sources.
2	Cultural Resources Management	Evaluate compliance with all plans and programs for the protection and management of cultural resources, including historic and prehistoric properties.
3	Hazardous Materials Management	Assess the storage and handling of chemicals and the spill contingency and response requirements related to hazardous materials. Verify that project personnel are adequately trained and familiar with hazardous material handling and emergency response procedures.
4	Hazardous Waste Management	Assess the storage and handling of chemicals and the spill contingency and response requirements related to hazardous wastes. Verify that project personnel are adequately trained and familiar with hazardous waste handling and emergency response procedures.
5	Natural Resources Management	Evaluate compliance with all permits, plans and programs for the protection of natural resources and endangered and threatened species.
6	Other Environmental Issues	Evaluate compliance with appropriate regulations concerning the National Environmental Policy Act (NEPA) process, environmental noise, pollution prevention, and program management.
7	Pesticide Management	Assess the storage and handling of pesticides and the spill contingency and response requirements related to pesticides.
8	Petroleum, Oil, and Lubricant (POL) Management	Assess the storage, handling, and disposal of petroleum-based products and the spill contingency and response requirements related to petroleum products. Verify that project personnel are adequately trained and familiar with applicable handling, spill prevention, and emergency response procedures.
9	Solid Waste Management	Evaluate the collection, storage, disposal and resource recovery of solid wastes generated at the project.
10	Storage Tank Management	Review essential regulatory items concerning underground storage tanks (USTs), including tank emissions, structural concerns, monitoring and recordkeeping requirements.
11	Toxic Substances Management	Assess the management of toxic materials, including asbestos, lead-based paint, radon, and polychlorinated biphenyls (PCBs).
12	Wastewater Management	Evaluate the regulations, responsibilities and compliance requirements associated with wastewater and stormwater discharge at the project facilities.
13	Water Quality Management	Evaluate compliance with all rules, regulations and requirements associated with quality of the potable water supply system.

Section 1 - *Air Emissions Management* includes the regulations, responsibilities, and compliance requirements associated with air pollution emissions from stationary and mobile sources. The District has no incinerators or other emitting equipment that would be affected by these regulations. Most activity is limited to handling chlorinated fluorocarbon (CFC) refrigerants, controlling fumes from indoor welding areas, and occasional use of volatile organic compound (CFC) solvents. Refrigerants must be removed by a certified individual before the disposal of A/C equipment, refrigerators, etc.

Section 2 - *Cultural Resources*, **Section 5** - *Natural Resources*, and **Section 6** - *Other Environmental Issues* are only briefly discussed in most assessments. The first two are covered in other sections of the training manual and OMP's. *Other Environmental Issues* mentions the NEPA process, environmental noise, and program management. These are primarily programmatic subjects where regulatory compliance is not typically an issue.

Section 3 - *Hazardous Materials Management* is one of the more important sections and is dealt with frequently. This Protocol primarily addresses the proper storage and handling of hazardous chemicals, and the spill contingency, response planning and implementation requirements related to hazardous materials. This section addresses proper handling, storage, segregation, and labeling of hazardous chemical products. All chemical products should be properly segregated, stored and labeled. The District emphasizes purchasing chemicals on an as- needed basis (and not stockpiling) to minimize the storage of hazardous materials as a good pollution prevention strategy. Employees should be familiar with the District Standard Operating Procedure (SOP) - Identifying, Minimizing, Reporting, and Disposing of Hazardous Waste, dated 30 June 2006. This SOP provides guidance for Operations Division personnel for identifying, managing, handling, storing, transporting, reporting, and disposing of hazardous waste in accordance with requirements of RCRA and Department of Transportation (DOT) regulations. The SOP outlines procedures for minimizing hazards and the safe handling of the inventory of products kept on hand.

The Occupational Safety and Health Act (OSHA) requires that facilities have a hazard communications (hazcom) or worker right-to-know program. This involves keeping Safety Data Sheets (SDS) for all chemical products, keeping an inventory listing of products, implementing proper labeling and storage, a written hazcom plan, and annual training for employees. Employees should be able to read and understand SDS' for chemicals with which they come in contact during work activities.

Section 4 - *Hazardous Waste Management* is closely related to Section 3. It applies to the proper generation, storage, treatment, and disposal of hazardous waste. Disposal and transportation of hazardous wastes are covered by EPA and DOT regulations. A hazardous waste manifest is required for all shipments. Typically, the project ECC and one person from each lock or hydropower project attend biannual training in filling out manifests and packaging requirements for shipments. The Corps is the generator of wastes from its facilities and must sign the manifests. RCRA was implemented to control the management of hazardous waste from cradle-to-grave (from generation to ultimate disposal).

NRM projects rarely dispose of hazardous waste since most work is done by contractors and no significant quantities of products are stored. Common disposals in the mid-1990's from locks and power plants were drums of mixed paint waste and used solvents (waste flammable liquids). Many of the outdoor painted metal surfaces on locks and dams have a lead-based paint undercoating, and repainting work can result in disposing of waste paint chips and blasting media. Other disposals in recent years are from asbestos and PCB (polychlorinated biphenyl) containing equipment. Occasionally, a drum or container may appear on the shoreline or be abandoned on Corps property. If this occurs, the project may

be required to have its contents tested to determine if it contains a hazardous waste. Sometimes the label can identify the manufacturer or owner of the product, and he/she can be contacted to remove it.

District facilities strive to maintain status as "Conditionally Exempt Small Quantity Generators" (CESQG) which means facilities can generate no more than 100 kilograms (220 lbs.) of hazardous waste per month and not accumulate more than 1,000 kilograms of hazardous waste on site at any one time. One hundred kilograms is equivalent to less than half of a 55-gallon drum. Most locks and power plants have an EPA identification number that is required on a manifest. Projects that have shipped wastes, or have a number, submit a Waste Stream Report (WSR) to the state each year by 1 March. Due to the record keeping and disposal requirements, projects try to avoid accumulating any hazardous wastes.

Section 7 - *Pesticide Management* identifies compliance requirements involving the use, storage, handling, and disposal of pesticides, herbicides, and fungicides. Assessments include reviewing pesticide management records and inspecting pesticide storage and usage areas. Detailed discussion of this topic is covered under the Pest Control chapter of the training manual.

Section 8 - *Petroleum, Oil, and Lubricant Management* addresses the proper storage, transportation, disposal, utilization, and handling requirements related to petroleum-based fuels, oils, and lubricants (POL). This section addresses spill prevention plans, POL storage in containers other than tanks, and used oil. Oil and fuel are often stored at facilities in five-gallon or smaller capacity containers for equipment and boat usage. These small containers are typically stored in a paint and oil storage building (for flammables) that has secondary containment, signage, and is located over fifty feet from the next closest building.

Several facilities collect their old oil for recycling. It must be kept in drums or containers marked "Used Oil" (NOT waste oil). Used oil is a special waste and not subject to the DOT requirements and does not count against generator status. Projects should retain receipts for pickups as a good management practice and as a record of disposal. Power plants occasionally dispose of large quantities when changing out transformer oil. Some locks change out oil from large gear cases, and this is often pumped out on-site and not collected or stored.

Section 9 - *Solid Waste Management* addresses the collection, storage and disposal of solid waste, such as non- hazardous trash, rubbish, garbage, etc. generated by the facility's operations and activities. Projects use commercial dumpster services or have access to county recycling centers where solid waste can be properly disposed. Occasionally, roll-off dumpsters are used to dispose of construction and similar waste. Solid waste in temporary scrap yard areas should not be allowed to accumulate over a period of time or allowed to be mixed with other waste. Scrap metal is usually accumulated for the USACE Logistics Activity (ULS) Nashville Delivery Point to auction and dispose.

Section 10 - *Storage Tank Management* covers compliance issues involving the storage of hazardous materials, petroleum products, or hazardous waste in aboveground storage tanks (AST) or underground storage tanks (UST). Power plants and commercial marinas are the only District facilities that require a Spill Prevention Control and Countermeasures

(SPCC) plan prepared and signed by a registered engineer. NRM offices and locks do have a basic spill plan referred to as a contingency and action (CAP) plan. Power plants have oil tanks and transformers that hold over 1,000 gallons, plus emergency generator fuel tanks (those without a small station power generator). Marinas often have more than one fuel tank that holds several thousand gallons. For regulatory purposes, fuel tanks are divided into UST and AST. Below ground tanks require more monitoring and leak detection equipment, but do not require an SPCC plan unless one exceeds 42,000 gallons capacity. Above ground tanks require secondary containment or double- walled tanks without extensive monitoring, and an SPCC plan is required for tanks exceeding 1,320 gallons. All NRM offices either removed or filled in their USTs in the late 1980's before the more stringent tank requirements came into effect. No District Corps managed facilities currently own a regulated UST.

Section 11 - *Toxic Substances Management* addresses compliance issues associated with the management of miscellaneous toxic materials, including: PCB's, asbestos, radon, and lead-based paint. PCBs are disposed similar to hazardous wastes using a manifest, but additional information is required. Most transformers were disposed or refitted in the early 1990's, and none are kept in storage. A few items of in-service equipment (oil circuit breakers and bushings) at power plants contain PCB's. Occasionally a PCB containing item area is discovered and when replaced has to be transported and disposed properly.

Asbestos is contained in materials in some older buildings and has to be disposed as rehabilitation or demolition is accomplished. Certain items in power houses contain asbestos—wiring insula- tion, cable trays, ceiling/floor tiles, etc. Most is non-friable and clearly marked. Asbestos is transported using an asbestos waste shipping record with specific information. Most older recreation buildings have been tested for the presence of asbestos and lead-based paint. Abatement and disposal have been required prior to some buildings being replaced. Asbestos is an inhalation hazard and is handled to prevent it from becoming airborne.

Lead paint chip wastes not generated in residential buildings are also covered under RCRA, and the waste counts toward generator status. However, there are new products used with paint removal that bond with the lead making it insoluble so it can be disposed as non-hazardous waste. Most lead waste generated in the District is from repainting of the large metal structures around the dams and power houses (spillway gates, bulkheads, taildeck cranes, etc.).

Corps employee occupied buildings were tested for the presence of radon in 1989. Only two structures tested positive for this colorless and odorless gas with radioactive properties. Others have been retested since then. Abatement usually involves venting foundation areas or placing plastic over bare earth crawl spaces. Radon is more of a concern in residential housing and buildings occupied twenty-four hours a day.

Section 12 - *Wastewater Management* addresses the regulations, responsibilities, and compliance requirements associated with wastewater discharge. Wastewater discharge can include sanitary or industrial wastewater, and stormwater runoff. The National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In most cases, the NPDES permit program is administered by authorized states.

Each powerhouse has an NPDES permit for the sumps, cooling water discharges, pressure washing of the outside concrete decks, etc. A few recreation areas and one power plant still have small package plants (extended aeration) that treat sewage. Many recreation areas have subsurface sand filter systems that have an outfall line. The ones that never had a history of flows (due to the seasonal nature of use) have been blocked and the NPDES permits discontinued to save the expense of monthly monitoring and permit fees.

Wastewater management compliance involves keeping active permits renewed, submitting monthly monitoring reports where required, and complying with permit conditions and parameters. Most power plants submit an annual operating report to the state. Permits are usually issued for five-year terms.

Section 13 - *Water Quality Management* addresses the regulations, responsibilities, and compliance requirements associated with the potable water supply system. All District Corps facilities (except for one remote recreation area) have municipal or public utility water supplies. This eliminates the compliance concerns associated with operating a public water supply system. Many Corps facilities are at the end of the municipal lines, sometimes creating a problem with insufficient circulation and chlorine residual. Testing in some cases has revealed that some municipal supplies have slight variances with established constituent levels. Where this is the case, bottled water is often used for consumption purposes.

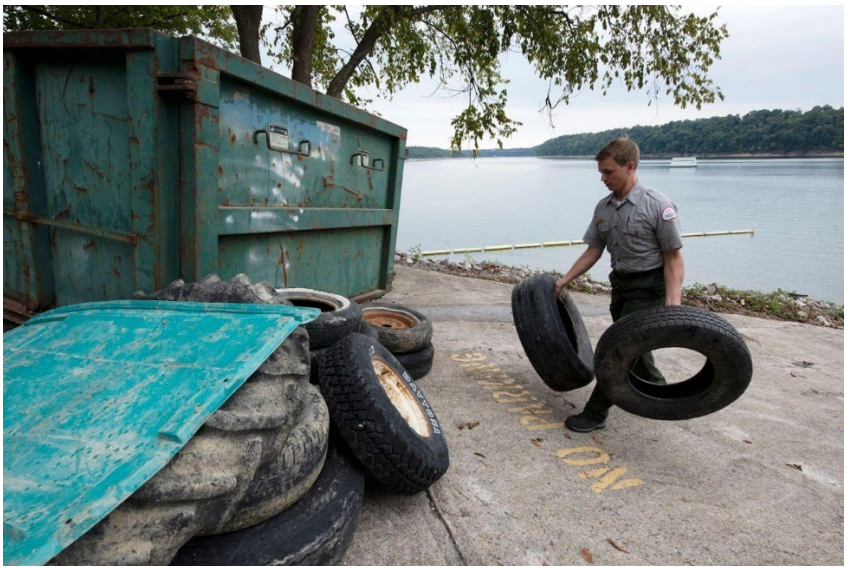
Environmental Operating Principles

The United States Army Corps of Engineers Environmental Operating Principles were developed to ensure that Corps of Engineers missions include totally integrated sustainable environ- mental practices. The principles provided corporate direction to ensure the workforce recognized the Corps of Engineers role in, and responsibility for: sustainable use, stewardship, and restoration of natural resources across the Nation and through the international reach of its support missions. In 2012, the USACE reaffirmed its commitment to the environment by formalizing a set of seven "Environmental Operating Principles" (EOPs) applicable to all its decisions and programs. These reinvigorated principles foster unity of purpose on environmental issues, reflect a new tone and direction for dialogue on environmental matters, and ensure that employees consider conservation, environ- mental preservation and restoration in all USACE activities. All Corps employees should become familiar with the EOPs and incorporate them into work program.

Since EOPs were introduced in 2002, they have instilled environmental stewardship across business practices from recycling and reduced energy use at Corps and customer facilities, to a fuller consideration of the environmental impacts of Corps actions and meaningful collaboration within the larger environmental community. The "reinvigorated" principles are more concise, have a clearer format and include an increased emphasis on the proactive nature of each principle.

The 2012 revised Environmental Operating Principles are:

- Foster sustainability as a way of life throughout the organization.
- Proactively consider environmental consequences of all Corps activities and act accordingly.
- Create mutually supporting economic and environmentally sustainable solutions.
- Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps, which may impact human and natural environments.
- Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.
- Leverage scientific, economic and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner.
- Employ an open, transparent process that respects views of individuals and groups interested in Corps activities.



References

- ER and EP 1130-2-540, Environmental Stewardship Operations and Maintenance Policies
- Project Operational Management Plan: Chapter 18, Security and Emergency Operations; Chapter 23, Historic Properties Management; Chapter 26, Environmental Management
- District Policy - Standard Operating Procedure (SOP) - Identifying, Minimizing, Reporting, and Disposing of Hazardous Waste, dated 30 June 2006
- The Environmental Assessment and Management (TEAM) Guide, the Environmental Review Guide for Operations (ERGO) Corps Supplement, and State Compliance Assessment Manuals
- FedCenter.gov Compliance Guides

Training Requirements

- Read the most recent External Assessment(s) for project facilities.
- Locate MSDS & SDS notebook file and pick a product and matching SDS to review.
- Know the location of spill materials and different types used to cleanup small spills.
- Review the DOT Emergency Response Guidebook and match a material ID and guide number.
- Learn how to access TEAM/ERGO manuals on FedCenter.gov website. The ECC (Environmental Protection Specialist ranger) can demonstrate this for you.
- As time permits, accompany the team in conducting the annual ERGO assessment or external assessment at a marina.
- Know spill reporting procedures—see project spill plan.

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10.Permit/Outgrant Management

As a park ranger, you will be the initial contact for individuals who wish to make private exclusive use of public property or perform work in streams or wetlands in the drainage basin of your lake. You must become familiar with the authorities, regulations, and administrative procedures for all the various types of outgrants and permits. Procedures for processing applications and conducting inspections vary slightly at each lake according to workload and staffing.

You will be involved with three general categories of permits and outgrants: shoreline use permits, real estate outgrants, and Department of the Army (Regulatory) permits.

Regular dock permit inspections are conducted at lakes which have shoreline management programs.

Shoreline Use Permits

Shoreline use permits are issued primarily for private moorage and mowing privileges. They grant no real estate interest in public property and may be revoked in the public interest, under emergency circumstances, or for noncompliance with permit conditions. The term of these permits is five years. Specific policies and guidelines for administering shoreline use permits at a lake are contained in the Project Shoreline Management Plan. The Shoreline Management Plan is designed to clearly set forth what privileges are and are not permitted on public property and are prepared for each Corps project where private shoreline use is allowed. Lakes with shoreline use permits include Old Hickory, Barkley, Cumberland, Cheatham, and Center Hill. (No new docks or mowing privileges will be approved at Lake Cumberland or Center Hill Lake.) These plans will be reviewed at least once every five years and revised as necessary.

Real Estate Outgrants

Real estate outgrants are required for activities on public property that involve structures, changes in landforms, commercial activities, agricultural use, and private or quasi-private recreational development. Leases, licenses, easements, and consents to easement are types of real estate outgrants.

A *lease* grants a substantial interest in real property, subject to all laws and terms set forth in the instrument. Commercial marinas, state parks, group camps, private yacht clubs, and hay and grazing areas are covered under this type of outgrant. Leases for hay and grazing operations normally have five-year terms; leases for recreational development are issued for substantially longer terms.

A *license* is a more restricted outgrant designated for a single specific use. The licensee has no basic interest in real property, and the term is usually five years. These outgrants may be issued for residential water pipelines, water withdrawal pipelines (for outdoor non-potable use such as irrigation), electric lines, security lights, steps, marine railways, etc. on public property. Also, long-term licenses (twenty- five years) are issued to state wildlife agencies for management activities on public property at district lakes.

Easements grant rights-of-way for public roads and utility lines. Easements for utility lines usually are issued for twenty- year terms. The easements for roads have longer terms.

Consents to easement may be granted in areas where the federal government has acquired a flowage easement (the right to flood as necessary) but not the fee simple title to the property. Flowage easement conditions usually allow for the area to be cleared of obstructions and that the Corps must approve any proposed structures or changes in existing drainage patterns (including fills) prior to construction. These outgrants may be issued to authorize steps, fences, camping pads, non-habitable structures, minor roads, etc., as long as they can't be damaged by temporary flooding or interfere with the project purposes. Consents to easement are issued for indefinite terms.

Department of the Army Permits

Department of the Army (DA) Permits are issued pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. Approval under Section 10 is required for the construction of any structure in or over any navigable waters of the United States, the excavation from or depositing of material in such waters, or the accomplishment of any other work affecting the course, location, condition, or capacity of these waters. Navigable waters in the Tennessee and Cumberland River Basins are described in Public Notice ORNOR-F-86-23, dated 8 May 1986. Section 404 regulates the direct discharge of dredged or fill material into any waters of the United States including wetlands. Both laws apply to private as well as public property. Depending on the location and extent of activity, either a nationwide, regional, or individual permit may be required.

A *nationwide permit* is a form of a general DA permit which may authorize activities throughout the nation. Nationwide permits are designed to allow certain activities to occur with little, if any, delay or paperwork. Nationwide permits are valid only if the conditions applicable to the nationwide permits are met. A proposed activity that does not meet with a condition does not necessarily mean that it cannot be authorized but rather that the activity may only be authorized by an individual or regional permit. Several of the nationwide permits require notification to the district commander prior to commencement of the authorized activity.

A *regional permit* is a form of a general DA permit which may authorize a specific activity only within the geographical limits of an Engineer District. They are similar to nationwide permits but are limited to the Nashville District and may have some notification or reporting requirements.

Individual (or Standard) permits are required for more extensive activities which are not covered by nationwide or regional permits. Applicants must submit a formal application which includes plans of the proposed work.

Activities on public property which require a DA permit may also require a real estate outgrant if the work involves a structure or fill (e.g., construction of a barge terminal or causeway). The review times for nationwide permits and individual permits have strict timelines for review (60 days and 120 days respectively), which start on the day that the project receives the application. It is important to process these requests as soon as possible and route them to Regulatory Division.

Application Procedures

Usually, the first step in the shoreline use permit/license process consists of an on-site meeting between the park ranger and applicant. During this meeting, you should review the proposed work and advise the applicant on applicable laws, regulations, and policies. If appropriate, provide the proper application forms to the applicant and show him or her how to complete them. Keep a record of the meeting in case unauthorized activity occurs at the site later. A photo of the area is encouraged.

Shoreline use permits are processed at the Resource Manager's Office. When a complete application (ENG Form 4264-R or computer-generated ENG Form 4264-R- E with all required plans) is received and initially approved, a fee letter is sent to the applicant, who is instructed to remit payment for the permit directly to the Resource Manager's Office. Licenses are executed by the Real Estate Division, Management and Disposal Branch (RE-M). While RE-M maintains general oversight of the program, you may be responsible for the many steps of the process including billing and payment collection. Payment can be made by personal check, money order, or credit card. When this fee is paid, final approval is granted, and a copy of the permit or license is sent to the individual. License information is transmitted to the Real Estate Division, Management and Disposal Branch, for entering into the Real Estate Management Information System (REMIS). A copy is also filed at the Resource Manager's Office. Lakes with large volumes of shoreline use permits employ computer databases for record keeping, sorting, and generating mailing lists and labels.

Applications for real estate outgrants are submitted to the Resource Manager. Plans are required for activities that involve structures or changes in landforms on public property. Applications for shoreline use permits, real estate outgrants, and Department of the Army Permits must include appropriate plans or drawings that depict the proposed work. Plans and specifications are also required for improvements within the leased area of a commercial marina. You will work with diagrams which range in complexity from a simple sketch of a private boat dock to extensive, professionally prepared plans and specifications which provide multiple views of a proposed structure. You must be able to evaluate these plans and drawings for completeness, accuracy, and consistent with regulations and lake policy.

Competitive bidding (ORN-FL 16, Bid Form) is required for hay and/or grazing leases unless the applicant has the only practical means of access to the property. A Notice of Availability (NOA) will be issued from RE-M and they will award the lease to the highest bidder. If the applicant has sole access or is a first generation decedent from the original landowner, however, competitive bids are not required.

If everything is satisfactory with the application for a hay and grazing lease, the Resource Manager will sign the application and forward it to Operations Section for further review. The application will then be sent to Real Estate Division, Management and Disposal Branch for final processing. This includes invoicing the applicant for the required fee.

Applicants for other non-recreational outgrants are required to submit a completed Standard Form 299 (SF-299)

Information on applying for individual DA Permits can be found at https://www.lrn.usace.army.mil/Missions/Regulatory/. In addition to the information required on ENG Form 4345, Application for Department of the Army Permit, and ENG Form 6082- Nationwide Permit Pre-Construction Notification, each application also must include a vicinity map and detailed plan and elevation views of the proposed work. (A cross section view may be added to or substituted for the elevation view as appropriate.) Applications are submitted to the appropriate Resource Manager, or in the case of an engineering firm or governmental agency that has widespread operations and applies frequently, directly to the Regulatory Branch. In either situation, the Resource Manager in whose area of responsibility the work is to occur provides a brief site evaluation and comments on the proposed work.

As a park ranger, you will be required to conduct preliminary site evaluations and provide other documentation necessary for processing DA permits. You should inspect the site of the proposed work and prepare a brief general description of the environmental and cultural features. Include appropriate comments and recommendations on possible benefits and/or negative impacts. Attach a copy of a navigation chart or topographic map marked to show the location of the work. Always designate the stream mile and bank (e.g., Cumberland River Mile 197.5L). If the activity is to take place on public or flowage easement property, attach a copy of the segment map marked to show the location. This will allow the Real Estate Division to review the application and process an outgrant if necessary. Photographs are helpful, particularly if unauthorized activity occurs later. The Resource Manager will review this information and forward it to Operations Section.

Fees

Section 4 of the 1944 Flood Control Act authorizes fees to cover administrative and inspection costs for five-year shoreline use permits. Currently these fees are $30 for private moorage and $10 for mowing. Fees for minor real estate outgrants are based on the appraised value of the public property plus an administrative charge. The Real Estate Division, Management and Disposal Branch, provides a current schedule of these fees. Fees for major real estate outgrants are based on fair market value except commercial marinas,

which are charged according to a graduated rental schedule. Public and quasi-public agencies pay nominal or no fees for real estate outgrants. The charge for an individual Department of the Army Permit depends on whether the activity is commercial or industrial ($100) or non-commercial ($10). No fees are charged for Department of the Army Permit transfers, Letters of Per- mission (a type of Individual or Standard Permit), permits to governmental agencies, nationwide permits, or regional permits.

Inspections

Floating facilities and mowing, landscaping, or trimming work authorized by shoreline use permit must be inspected at least once a year. In the course of normal operations, these permit sites are actually inspected more often. Park rangers also perform compliance inspections of minor outgrants at their lake. These inspections are scheduled each quarter so that all minor outgrants are inspected at least once during their five- year term. The Real Estate Division, Management and Disposal Branch furnishes several computer printouts to each lake to facilitate these inspections. Unsatisfactory conditions and administrative details are reported on ENG Form 3131, Report of Compliance Inspection. A ranger accompanies the compliance inspector from the Real Estate Division on inspections of major outgrants, such as commercial marinas, state parks, group camps, etc. Rangers also inspect activities authorized by DA Permits to assure compliance with plans and permit conditions.

Overview of Shoreline (Lakeshore) Management

Prior to 1972 private boat docks, residential mowing privileges, retaining walls, sidewalks, ramps, and other forms of private exclusive use were permitted on public property at some lakes in the Nashville District without limitations on the numbers of such activities. The enactment of the National Environmental Policy Act of 1969 (NEPA) led to action to address the already perceived need for a clear policy on use of public resources by adjoining property owners. There was concern that, if allowed to continue unrestricted, proliferating private alteration of shorelines would seriously detract from natural aesthetics and imply private use by a limited number of people fortunate enough to own adjoining property.

Nashville District personnel undertook a detailed study of the impacts of existing and potential private use at all lakes in the district during 1972 and 1973. This study concluded that problems related to ecology, aesthetics, pollution, and conservation of natural resources had reached serious proportions on some lakes, and that steps had to be taken to protect the recreational and natural values of district lakes for future users. As a result of this study, a new policy on private exclusive use of public shorelines was formulated and publicized. Four public meetings were held to provide information and seek comments.

District policy was established, and lakeshore management plans were first implemented for Barkley, Cheatham, Old Hickory, and Lake Cumberland in 1973. Their primary objective was to set forth guidance and policies on how to judiciously balance public and private use of the shorelines while protecting scenic, environmental, cultural, and other natural values. The plans allocated areas where private moorage and residential mowing or hand-clipping privileges were authorized and protected areas where such uses were prohibited. District

policy prohibited new permits or outgrants for these privileges at the other lakes in the district. Private use by adjoining property owners at these lakes was mainly restricted to water pipelines, agricultural leases, paths, and fire lanes on a case-by-case basis. Existing permits or outgrants in variance with the new policy were honored under the "grandfather" clause (allowed to remain in effect until sale or transfer of the adjacent property or removal of the nonconforming structure).

The Nashville District was a pioneer in the development of the Corps-wide lakeshore management program, which became effective through ER 1130-2-406 on 13 December 1974. This regulation required the preparation of a lakeshore management plan at each lake supporting private facilities or privileges and specified that no permits or outgrants for private exclusive use would be issued on new lakes or older lakes where no such privileges were granted previously. Lakeshore management plans have proved effective in providing consistent policies and guidelines on private use of public property for Resource Managers and the public alike. However, the process has not always been smooth:

In 1977-1978 a public involvement process was conducted in response to demands by adjoining property owners and local officials for expanded private use of the public shoreline of Cordell Hull Lake, particularly grazing, hay cutting, and clearing to the edge of the water. Following public meetings, citizens' advisory committees were convened to study the matter. As the lake had no existing private shoreline development, the lakeshore management regulation, ER 1130-2-406, did not require a formal lakeshore management plan, but a more detailed policy statement was prepared. The protection of the shoreline in the interest of the general public was upheld; however, certain adjoining landowners were granted leases for seasonal grazing where successional control was in the public interest. Guidelines were also established for intermittent tie-ups of small boats on the shoreline by handicapped adjoining property owners.

In 1978 the Corps ordered removal of several enclosed boathouses with living quarters from commercial marina areas on Center Hill Lake resulting in a lawsuit by the owners. The federal district court directed that a lakeshore management plan be prepared for the lake because of other existing private docks under the grandfather clause. The plan was published in 1979, and the boathouses which were the subject of the controversy ultimately were removed.

A major controversy on lakeshore use allocations arose at Old Hickory Lake in 1980. Private property owners adjacent to some of the protected shoreline areas formed an organization to overturn the existing allocation system and gain moorage and residential mowing privileges. Many realtors and several local officials joined in calling for increased private exclusive use of the public shoreline. The resulting controversy attracted a great deal of coverage by the news media and led to a lengthy process of public meetings and review by a citizens' advisory committee. Following an evaluation of the information gained through the public involvement process and a review of lakeshore management concepts and the existing plan, a new plan was formulated. After another public meeting, the plan took effect in February, 1983.

Although the shoreline allocations remained largely unchanged, the plan did allow certain previously ineligible adjoining property owners to mow the shoreline provided they complete satisfactory mitigation work (tree planting and rip-rapping).

These experiences have strengthened the program, as they have revealed strong and weak points which could be built upon or corrected. One of the major benefits was the development of a thorough and ongoing program of public involvement. Annual meetings are usually held at each lake to discuss all aspects of lake management. These meetings help the public to air concerns, make requests, or simply be informed, and they help the Resource Manager to stay abreast of community and regional concerns. In summary, the tremendous growth around the district lakes has shown that implementation of the district lakeshore management policy in 1973 was timely. The shoreline (lakeshore) management plan is an integral part of overall lake management at each lake supporting private exclusive use. It is now prepared as an appendix to Part II of the Project Operational Management Plan. With continual monitoring and adapting to changing needs, these plans form the basis for long-term management which will ensure protection of public resources entrusted to our care for the use and enjoyment of future generations.

References

- ER 1130-2-406, Shoreline Management at Civil Works Projects, 28 May 1999
- The Regulator's Handbook
- EP-1145-2-1, Regulatory Program Applicant Information
- Section 10, Cumberland River and Tributaries
- 33 CFR 320-330, Regulatory Programs of the Corps of Engineers.
- District shoreline management plans and transcripts of related public meetings
- Routing Process of Reports of Availability for Requests Involving Real Estate Actions on Fee Land. SOP #004, CELRN-OP
- Standing Operating Procedure (SOP)Shoreline License Processing Standing Operating Procedures (SOP), SOP #001, CELRN-OPS-O

Training Requirements

- Become familiar with the permits and outgrants described in this section and the correct procedures for processing applications.
- Perform a compliance inspection of a minor real estate outgrant.
- Accompany the compliance inspector from the Real Estate Division on an inspection of a major outgrant.
- Inspect work performed under a Department of the Army Permit.
- If assigned to a lake with private boat docks, your duties will require you to become proficient in inspecting these facilities and ensuring that all permit conditions are met. If not assigned to a lake with private docks, you should accompany another ranger on an inspection when you tour a lake with an active shoreline management program.

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11. Procurement and Supply

To adequately operate and maintain a water resources project, it is necessary to buy certain amounts of materials, supplies, parts, tools, and equipment, as well as obtain a wide variety of services. During any given period of time, it may be necessary to buy supplies ranging from a two-dollar part for a vehicle to several thousand dollars' worth of materials for a particular job. Services may range from simple plumbing repairs to a comprehensive contract for maintenance services costing over half a million dollars. The objectives of this section of the training manual are to familiarize you with the various methods that are available for the procurement of needed supplies and services and to define certain terms that are associated with the procurement process.

For any procurement of supplies or services, there are generally several methods available to accomplish the task. Each method has a specified set of procedures, processes, and limitations that must be considered prior to the actual purchase. Regardless of the procedure selected, the following limitations are generally applicable to all procurement methods:

- *Competition* - Currently obtaining competitive bids (prices) is mandatory for all purchases in excess of $10,000 for supplies or materials, $2,500 for services and $2,000 for construction activities. These three purchase limits are collectively known as the Micro Purchase Threshold. However, it is often prudent to get prices from more than one source (usually three or more). Obtaining prices from three or more sources of supply helps to ensure that the government will get goods and services at a fair and reasonable cost. It can be compared to shopping around town for the best deal on a new car. When possible, cardholders should vary purchasing between local businesses. This ensures multiple merchants are offered the opportunity to supply the needs of the government.

- *Wage Rates* - Federal law requires government contractors to pay wages that are commensurate with those being paid in the private sector employees within the area where the work is being performed. The Department of Labor provides wage determinations; they are required for the procurement of services over $2,500 and for construction work over $2,000.

- *Small Business* - The Federal Acquisition Regulation (FAR) requires that simplified purchases above the micro-purchase threshold and below $250,000 be set aside for small business. The purpose of this requirement is to improve opportunities for small and small disadvantaged business concerns to obtain a fair proportion of government contracts. Larger procurements over $250,000 may also be set aside for small business.

- *Purchase, Request and Commitment* - The first step in most procurement procedures is the completion and approval of a Purchase Request and Commitment (PR&C) in the Corps of Engineers Financial Management System (CEFMS) database. This electronic form describes the item to be purchased, the quantity, the cost, and the purpose for which the item is to be used. Some PR&Cs are approved at the field level (i.e., miscellaneous purchases the fall below the micro-purchase thresholds using the Government Purchase Gard (GPC), while others require approval at various district levels depending on the item and the method of procurement.

After consideration of the above requirements and limitations, the most appropriate procurement method is selected. The most commonly used methods and their limitations follow:

- Government Purchase Card (GPC)- This card is the preferred method of payment for purchases below the micro-purchase threshold and is generally used like any other bank-issued credit card. Certain field employees are issued VISA credit cards for the purchase of materials, supplies, and services within the micro-purchase thresholds mentioned above. Each individual and office has a monthly dollar limit on purchases.

- Blanket Purchase Agreement (BPA) - This method is similar to a charge account at a local hardware store. The supplier keeps an account (runs a tab) of purchases and submits a monthly invoice for payment. A BPA is a simplified method for procuring anticipated repetitive needs for materials and supplies over $10,000, services over $2,500 and construction in excess of $2,000. Certain personnel may place calls or orders for items, within the limits of their authority, to pre-authorized suppliers. The limitations are $1,000 or $2,500 for authorized field personnel and up to $50,000 for certain employees in the Contracting Division.

- Purchase Order Contract. This procurement tool is used to acquire construction, supplies and services above the Micro-Purchase Threshold but below the Simplified Acquisition Threshold (SAT) of $250,000. Purchase Order Contracts are issued from Contracting Division.

- Formal Contract Methods- All contracts in excess of $250,000 (except Commercial procurements where the KO will determine the number of days) must be announced (synopsized) in the System Award Management website (SAM.gov) for thirty days before advertising (issuance of a solicitation). Then they must be advertised for at least thirty days.

  - Sealed Bidding - a method of solicitation that is issued as an Invitation for Bid (IFB) Sealed Bidding awards a contract to the lowest responsive and responsible bidder. This method is normally used to award non-complex procurements for construction, materials, supplies, and equipment. Some service contracts also are awarded in this manner.

  - Competitive Negotiation - a method of solicitation that is issued as a Request for Proposals (RFP), in which a contract is awarded based on other factors as well as price. In this type of solicitation, the offerors (bidders) must submit a technical proposal as well as one for price. The technical proposal generally includes information about such things as the offeror's past performance, quality control plan, the number and type of personnel and equipment to be used, and the overall plan for performing the specified work. The proposals then are evaluated by an appointed panel that consists of personnel from both the field and district office. This panel evaluates the proposals in accordance with the solicitation and provide a summary report to the Contracting officer/Source Selection Authority (SSA). The Contracting officer/SSA will determine if there's a need to enter into discussions (negotiations) with the offerors in the competitive range or make award. The offerors then are permitted to change their proposals and submit a final proposal revision (FPR). The contract is awarded to the offeror whose overall proposal is determined to be the best value to the government, not necessarily to the one with the lowest price.

The following terms are commonly associated with procurement and supply activities:

- Contracting Officer (KO) - The Chief of Contracting and other selected employees of the Contracting Division, that have been appointed contracting officers by name. They are the only people authorized to execute contracts, modifications to contracts or to legally bind the government to a contract within their appointed authority.

- Contracting Officer's Representative (COR) - an individual appointed and authorized to represent the contracting officer in the administration of a particular contract. The authority delegated to a COR varies with each individual appointment, but it normally **does not** include the authority to:

    - waive any requirements of the contract provisions
    - award, agree to, or sign a modification to a contract
    - obligate payments
    - render a decision on a dispute
    - terminate a contract
    - approve final pay estimates
    - or make any commitments or change that affect price, quality, quantity, delivery or other terms and conditions of the contract.

- Hand Receipt Holder - the individual appointed to be responsible for government property.

- Receiving Agent - An individual appointed to sign receiving reports for goods and services received.

- FAR - the Federal Acquisition Regulation. This document governs the procurement activities of the U.S. Government.

- DFARS - The Defense Acquisition Regulation is the Department of Defense supplement to the FAR.

- AFARS - the Army supplement to the FAR.

- PIL - Procurement Instruction Letter.

- UAI – the U.S. Army Corps of Engineers Acquisition Instruction document

References

- FAR: https://www.acquisition.gov
- DFARS: https://www.acquisition.gov/dfars
- AFARS: https://spcs3.kc.army.mil/asaalt/procurement/AFARS/Home.aspx
- UAI: https://cops.usace.army.mil/sites/CT/P/UAI_UDG/Forms/AllItems.aspx
- HQ CECT Policy Division: https://cops.usace.army.mil/sites/CT/P/default.aspx
- Competition in Contracting Act (CICA)
- ER 700-1-1 USACE Supply Policies and Procedures, 30 April 2015

Training Requirements

- Complete an orientation by Contracting Division personnel during your one-week tour of the Nashville District Office.
- Participate in the procurement of needed supplies at the project and perform the following:
  - Completely and correctly fill out a PR&C in CEFMS.
  - Select the preferred method of procurement.
  - If applicable, make the actual purchase.
  - Review necessary property accounting procedures.
  - Review receiving and payment procedures as applicable.
- Be able to describe the significance of the limitations associated with purchases over $2,000, $10,000 and $250,000 as pertains to method of procurement, competition, and wage rates.
- Study the appointment letters of a COR, ordering officer, and responsible employee.

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12. Requirements Contract Administration

Because of decreasing budgets, Resource Managers have had to rely increasingly on contracting to accomplish Operations and Maintenance (O&M) work. As a result, more and more time is consumed in the proper administration and inspection of these contracts. Throughout the years various types of contracts have been used at the lakes in the district. However, with increases in the contract workload and gains in administrative experience, Indefinite Delivery Type contracts – specifically the Requirements Type, has emerged as the primary means of accomplishing O&M work. The Requirements Contract is a type of Indefinite Delivery contract that provides for the accomplishment of a wide variety of work. They are also flexible in that they allow adjustments in the quantities of services to be accomplished. The objective of this section of your training manual is to familiarize you with the Requirements Type Contract and the activities involved in its day-to-day administration.

Requirements Type Contract are normally a competitively negotiated procurement and are awarded for one year with four one-year renewal options. These options permit the renewal of the contract at the government's option, which results in continuity of services and precludes the necessity of advertising and awarding a new contract each year. The services provided in the contract can be divided primarily into two types:

- Routine Work - frequent, recurring maintenance work items. The cost of these items are referred to as "firm fixed price". This means the cost to perform a particular task is set for the year and isn't subject to change. Examples of Routine Work Contract Line Items are: $15 to clean a picnic shelter, $200 per mowing of a picnic area, or $0.25 per linear foot of pavement striping. The Task Order is the mechanism in which these services are ordered. When a Task Order is issued for routine work, the contractor is required to provide all necessary management, personnel, materials, supplies, parts, tools, equipment, vehicles, and transportation to accomplish the job in accordance with the specifications contained in the contract.
- Non-Routine Work - those jobs that do not occur on a routine basis, such as campsite renovations, erecting a prefabricated picnic shelter, or significant repairs or improvements to infrastructure. This work is also firm fixed price but is normally based on an hourly rate rather than per job basis like that of Routine Services. Examples of Non-Routine Contract Line Items are: $25 per hour for a carpenter, $20 per hour for a painter, $12 per hour for a laborer, $65 per hour for a bulldozer and operator, and $50 per

hour for a dump truck and driver. Like Routine Work Items, the Task Order is the mechanism in which Non-Routine work is ordered. The cost of a Non-Routine Task Order is based on an agreement, reached between the government and the contractor for the number of hours of equipment and labor required to accomplish the specified job. Since our Requirement Type Contracts contain no line items for supplies and materials, the government provides all the concrete, lumber, electrical and plumbing supplies etc. necessary for the contractor to accomplish the job.

Contract Administration

Contract administration is defined by individual roles and responsibilities. Only the Contracting Officer (abbreviated as KO), has the authority to add, delete, change, or modify any part of a contract. Since the KO normally resides in the District Office, they will assign a field employee as the Contracting Officer's Representative (COR). The COR is the KO's eyes and ears regarding daily administration of the contract. Unless you are the COR on a contract, you should reframe from engaging with the contractor or their employees regarding contract work. **Do not direct a contractor or their employee to do any task or job. Any questions you receive should be directed to the COR.**

The following paragraphs summarize each of these basic steps from the decision to perform the work to its completion:

Routine Task Orders

The unit of measure for the cost of performing Routine Work like mowing, cleaning and janitorial, is for the entire task or job. Therefore, the cost to mow a recreation area is a predetermined set price, the same is true for the cost to empty a trashcan, clean a shower house, pick up litter throughout a recreation area etc. When a Task Order is completed for service over a specified period of time, the exact cost of those service can be easily calculated by multiplying the fixed cost to perform the task, by the number of times in which the task is to be performed. Task Orders are prepared on DD Form 1155 and are approved by the Contracting Officer. **Neither routine nor non-routine work can begin prior to Approval, Obligation and Certification of the Purchase Request and Commitment (PR&C) and the issuance of the Task Order.**

Non-Routine Work Orders

The process for accomplishing Non-Routine work is different from Routine Work. Once the task to be accomplished is defined, then the COR will evaluate whether or not the work is within the scope of the contract. If it is determined to be within scope, the government will draft a Scope of Work (SOW) describing the task to be accomplished. See "Non Routine Work" above for examples. Once the work is described, an Independent Government Estimate (IGE) is developed. Since the price per unit is already set, the challenge is in determining which Contract Line Items (CLINS) are applicable and how many hours are required to accomplish the task. Once the government completes the SOW, PR&C and IGE, the COR (or Lake Manager) submits it to the KO, who sends a Request for Proposal (RFP) to the contractor. The contractor develops their own estimate. If the two proposals are in agreement, the Task Order is issued for the work to begin. If they are in disagreement, the KO, COR and Contractor negotiate in an attempt to arrive at an agreeable price. If an

agreement is reached, a record of negotiations is documented, and the Task Order is issued. If an agreement can't be reached, and it is determined that the contractor has failed to negotiate in good faith, the government may seek procurement for that service by other means. Task Orders for Non-Routine Construction work are limited to $35,000.00.

Property Accounting

As previously discussed, the government is responsible for providing the materials necessary to complete non- routine work. Upon issuance of a Task Order, these materials are turned over to the contractor using a Property Control Receipt, ENG Form 4900. The form lists all government furnished items (GFI) and the specific purpose for which they are to be used (e.g., five gallons of exterior latex paint for painting the comfort station at Defeated Creek Campground). It is signed by the Hand Receipt Holder (or designee) and the contractor. Property control receipts are filed and can be used to account for any unused property returned by the contractor.

Quality Control and Quality Assurance

Before the contractor performs any work, two important programs must be established to ensure that the final product will be of acceptable quality. The contractor establishes a quality control (QC) program which is described in their Quality Control Plan and must be approved by the COR. The Corps initiates a quality assurance (QA) program that is part of the written Quality Assurance Surveillance Plan (QASP). Among other things, this plan addresses the standards by which the contractor's performance will be evaluated and includes the inspection types to be used. All records of inspections by both the Corps and the contractor are kept on file.

Contract Discrepancy Reports

If the contractor fails to perform according to the standards set forth in the contract, the COR will coordinate with the KO to issue a Contract Discrepancy Report (CDR). This report completely describes the deficiency and requires the contractor to explain, in writing, why performance was not satisfactory and how recurrence of the problem will be prevented. Records of discrepancies are the basis for development of contractor evaluations and for deductions from the contractor's payments for unsatisfactory performance.

Payments

Normally, the contractor submits a monthly invoice for work completed; invoices for non-routine work, however, may be submitted on completion of the job. After reviewing inspection records and any other performance reports, the receiving agent signs the receiving report portion of the DD Form 1155, verifying that the services ordered have been inspected, received, and accepted. If it is necessary to deduct an amount from the contractor's payment due to unsatisfactory performance, the new total is shown, and an explanation of the deduction is included. An electronic receiving report is completed in CEFMS and the Finance and Accounting Center in Millington, Tennessee processes payment to the contractor.

References

- Project Requirements Contract
- Contract Quality Assurance Surveillance Plan
- ER 715-1-19, Service and Supply Contractor Performance Evaluations, 5 July 1999
- USACE Acquisition Instruction, 30 Nov 2021
- Training Manual, Administration of O&M Contracts
- Training Manual, O&M Contracts-Advanced

Recommended Course

- ULA sponsored course, "Administration of O&M Contracts, Basic"

Training Requirements

- Complete an orientation by the project COR.
- Spend one week with the project Park Contract Representative; during this assignment you should:
  - Identify a needed non-routine maintenance item,
  - Develop a Scope of Work,
  - Prepare the government estimate and list of GFI.
  - Participate in discussions between the COR and the contractor.
  - Participate in the acquisition and transfer of GFI.
  - Inspect both routine and non-routine work.
- Learn the difference between routine and non-routine work and between quality control (QC) vs. quality assurance (QA); be able to describe the basic steps involved in having a service performed under a requirements contract.

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13. Partnerships and Volunteers

Partnerships are the combination of two or more groups that work together to accomplish a common goal. They are advantageous to both groups since the partnership pools limited resources and manpower together. The agreement allows the partnership to accomplish a goal or project that neither group could complete on their own. They give agencies the option to keep additional areas maintained through the use of volunteers that reduce some burdens of maintenance. An example could be a volunteer group providing manpower while the government supplies the equipment to complete a wildlife viewing area or maintain a small campground.

Partnerships have become an essential tool to the Corps of Engineers. They assist the Corps in maintaining and improving the environmental and recreational facilities available to the public. The Corps may partner with organizations, state governments, and others to complete projects or provide additional services to the public. Demonstrating our commitment to partnerships, USACE headquarters has provided more than 1.15 million dollars of seed money from 2004 to 2011 to match partners' contributions. In response, partners contributed volunteer hours, professional services, materials, supplies, and equipment usage valued at more than 4.5 million dollars to help accomplish these projects. Examples of these partnerships include annual fishing rodeos, improved access for boaters, and the upkeep of primitive camping sites.

Volunteer event at Cheatham Resource Office

There are three main types of partnerships available to the Corps. The first is a challenge partnership where a non-federal agency or group provides services to the Government to help maintain or improve a government-maintained facility. The next is a cooperating agreement with a non-profit group to provide services such as interpretation at a park. Lastly, contribution programs allow the Government to receive funds or services from a federal agency or other agency to maintain a project but the donating agency is not the project sponsor. There are also several other types of partnerships which can be found on the NRM gateway website. They include memorandums of agreements, memorandums of understanding, and cooperative agreements for law enforcement and fire protection services.

While partnerships are a vital tool to the Corps, there are restrictions on how projects can be completed. A partnership is a mutually beneficial program and does not provide the sponsor with any special access or concessions for the Corps. Also, the Corps may not advertise or endorse the sponsor helping to complete a project but may show that certain groups helped to complete the project on a plaque or other commemorative display. By doing this, the Corps helps to maintain a positive community presence and allows for many different groups to volunteer their expertise or time without giving favor to one group.

One of the most common partnerships that you will see at the project level is the local Friends Group which are in place across the Nashville District and USACE as a whole. These groups are established through the Cooperating Associations Program. These groups typically function as 501(c)(3) non-profit organizations (defined as a particular nonprofit organization that has been approved by the Internal Revenue Service as a tax-exempt, charitable organization) providing valuable resources to promote water safety and environmental stewardship initiatives at our reservoir projects. Friends' groups may also work with local businesses and the recreating public to provide additional activities at the project each year. They can also partner with other non-profit groups to apply for grants that allow for additional recreational opportunities to come to fruition in fiscally challenging times within USACE budget lines. The local USACE liaison to the Friends group can provide you with an overview of the history of the group with the project.

Although partnerships may seem complicated, the NRM gateway provides many valuable tools simplifying the partnership process. This includes steps on beginning a new partnership as well as a list of partnerships that others have completed. These tools and stories from past partnerships provide invaluable lessons and could be used as templates for future partnerships. The link to the gateway website is provided in the references section below.

Volunteers

Volunteers play a critical role in accomplishing recreation and NRM missions. Volunteers can serve as park and campground hosts, staff visitor centers, conduct programs, restore fish and wildlife habitat, maintain park trails and facilities, and more. Lake clean-ups, National Public Lands Day events, and Eagle Scout service projects are some of the most common larger volunteer events that occurs on our projects. As budgets continue to decrease, the reliance on volunteers for help will play a major role in USACE's operating procedures moving forward. One of your duties you may be assigned is the project volunteer coordinator. If so, you should become familiar with www.volunteer.gov which is an interagency website used by many federal agencies to recruit volunteers.

References

- ER 1130-2-500, Chapter 12, Challenge-cost sharing program
- Implementation Guidance for Section 1047 (d) Services of Volunteers, of the WRRDA of 2014, PL 113-121
- U.S. Army Corps of Engineers Natural Resources Management Gateway, Partnerships: http://corpslakes.usace.army.mil/partners/partners.cfm
- U.S. Army Corps of Engineers Natural Resources Education Foundation: https://www.corpsfoundation.org/

Training Requirements

- Become familiar with the referenced materials concerning the basic fundamentals described in the text.
- Be able to describe different types of partnerships and their uses.
- Describe how to initiate a partnership with a different agency or group.
- Work with the project volunteer coordinator to accomplish a volunteer project. It can be NPLD, a cleanup, a boy/girl scout work day, etc.

Click here to open Evaluation 30 to print.

RANGER TRAINING PROGRAM

EVALUATION FORM

"Vehicle Operation"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates knowledge of ER 56-2-1, EM 385-1-1 Section 18, and the GSA- Guide to Your GSA Fleet Vehicle.

(2) Trainee will complete the defensive driving and trailer towing trainings.

(3) Trainee will demonstrate knowledge of basic vehicle inspection (fluid levels, tire pressure, lights) and inspect assigned vehicle for Visitor Assistance compliance.

(4) Trainee completes credit card transactions and ENG Form 3662 correctly.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of driving policies			
Complete Defensive Driving & Trailer Towing training			
Vehicle inspection			
Complete required forms correctly			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Radio Operation"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates knowledge of the project's radio systems.

(2) Trainee demonstrates ability to use the project's local and repeater system.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Set up and use project radio system			
Use proper radio procedures			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Boat Operation"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will receive comprehensive motorboat training and reach an adequate level of proficiency in the operation of a motorboat.

(2) Trainee will complete the three-day Motorboat Operator's Course and obtain a license.

(3) Trainee demonstrates knowledge of state boating safety laws and LRD Boat Patrol Manual.

(4) Trainee will complete a vessel inspection using the LRD checklist form.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Receive motorboat training			
Attend boating course, obtain license			
Knowledge of state boating laws & LRD Manual			
Complete a vessel inspection using LRD form.			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Computer Applications"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee successfully completes the OPSEC Level 1 training requirement.

(2) Trainee is familiar Windows concepts.

(3) Trainee shows proficiency with computer applications including Microsoft WORD, EXCEL, ACCESS, POWERPOINT, OUTLOOK, etc.

(4) Trainee shows familiarity with CEFMS.

(5) Trainee demonstrates ability to use the local area network to share files and access printers.

(6) Trainee will become familiar with the NRM Gateway and enroll/update on the NRM Smartbook

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Completes OPSEC Level 1 Training			
Familiar with WINDOWS			
Knowledge and use of computer applications			
Familiar with CEFMS			
Uses local area network			
Familiar with NRM Gateway			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Public Relations"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Become familiar with AR 25-50 and CELRN Policy- Use of Internet Capabilities (Social Media).

(2) Trainee demonstrates writing ability by preparing a general information letter to the public, a news release, and a memorandum in accordance with AR 25-50.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Knowledge of Public Relations Policies			
Preparing a general info letter, news release or memo			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Standards of Conduct"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee maintains a well-groomed appearance while wearing the uniform correctly in accordance with ER 1130-2-550, Chapter 8 and the LRD & LRN Appearance Policies.

(2) Trainee demonstrates punctuality in work hours and appointments.

(3) Trainee demonstrates knowledge of standards of conduct found in the DOD Employees Guide to the Standards of Conduct.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Personal appearance			
Punctuality			
Demonstrates knowledge of DoD Guide			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Emergency Management"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates knowledge of project plans, including Emergency Action Plan and the All Hazards Plan (OPLAN).

(2) Trainee demonstrates knowledge of the project spill plan.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of OMP and EAP			
Demonstrate knowledge of project spill plan.			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Crime Prevention and Physical Security"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates knowledge of the Project Physical Security Plan

(2) As directed by the supervisor, Trainee will conduct a security inspection of a project facility and report any security problems or deficiencies.

(3) Trainee will demonstrate procedure to be taken in event of a bomb threat.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrates knowledge of the PPSP			
Conducts security inspection of a project facility			
Demonstrates procedure taken in the event of a bomb threat			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Visitor Assistance"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will complete 36-hour OCE sponsored visitor assistance course.

(2) Trainee will attend a session of the U.S. Magistrate's Court petty offense docket to observe courtroom procedure.

(3) Trainee demonstrates knowledge of CFR Title 36, Rules and Regulations.

(4) Trainee will be instructed on when to issue and how to complete citations including warnings.

(5) Trainee will participate in the development of a cooperative law enforcement contract.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Complete visitor assistance training			
Understand importance of courtroom demeanor, case development			
Demonstrate knowledge of CFR Title 36			
Understand procedures for issuing citations including warnings			
Participate in law enforcement contract			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Safety"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will become familiar with requirements of EM 385-1-1, Safety and Health Requirements Manual.

(2) Trainee will complete a brief incident report and, if possible, a "Mishap Report" in ENGLink.

(3) Trainee will complete First Aid and CPR training.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Understands requirements of EM 385-1-1			
BIR and Mishap Report			
Complete First Aid and CPR course			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Fire Prevention and Control"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates knowledge of the sections of the Project Operational Management Plan pertaining to wildfire protection and wildfire trespass.

(2) Trainee demonstrates proper use of fire fighting equipment (fire extinguisher, fire flapper, water backpack, fire rake) at a safety meeting.

(3) Trainee will become familiar with National Wildfire Coordinating Group PMS 461 guide.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of OMP sections on wildfire			
Demonstrate proper use of fire fighting equipment			
Demonstrate knowledge of PMS 461			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Pest Control"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates knowledge of project pesticide use and the applicator certification process.

(2) Trainee will understand the principles of IPM and the referenced materials.

(3) Trainee demonstrates ability to identify problem pests and aquatic plant species in the District.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of IPM			
Demonstrate knowledge of pesticide use and applicator certification process			
Identify problem invasive species			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Surveying"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates ability to set up level properly and determine the elevations of points by differential leveling.

(2) Trainee demonstrates ability to set up the transit or theodolite and measure or lay out horizontal and vertical angles.

(3) Trainee demonstrates ability to measure horizontal distances using stadia and steel tape.

(4) Trainee should be able to describe the system of marking the project's boundaries.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Determine elevations of points by leveling			
Measure horizontal and vertical angles			
Measure horizontal distances			
Demonstrate knowledge of lake's boundary marking			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Photography"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate proficiency in use of project photographic equipment and/or using their government issued smartphone.

(2) The Trainee will review the Smartphone Photography Guide and the Introduction to Photography Guide.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate proficiency with photographic equipment			
Review photography guides			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Maps and Geographic Information"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate ability to interpret maps and aerial photographs maintained at the Resource Managers Office.

(2) Trainee will be able to create a map used in an official Real Estate document (license, lease, etc.).

(3) Trainee will demonstrate familiarity with the GIS system and GPS equipment available at the Resource Managers Office.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate ability to interpret maps and aerial photographs			
Create a map for a Real Estate instrument			
Demonstrate proficiency with GIS/GPS			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Interpretive Services"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate knowledge of portion of Project Operational Management Plan pertaining to interpretive services and EP 1130-2-434.

(2) Trainee will plan and conduct an on-site and an off-site interpretive program.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Knowledge of OMP section on interpretive services and EP 1130-2-434			
Conduct on-site/off-site programs			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Facilities Management"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will spend one week working with the project Facility Manager and assist in observing sites, structures and facilities for damage or deterioration and unsafe objects or conditions.

(2) Trainee will learn proper procedures for storage of materials, supplies, and equipment.

(3) Trainee will become familiar with maintenance of roads, trails, grounds, signs, buoys, and sanitary facilities.

(4) Trainee demonstrates knowledge of the "American with Disabilities Act and Architectural Barriers Act Accessibility Guidelines."

(5) Trainee demonstrates ability to develop and interprety plans and drawings of structures.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Work with facility manager			
Familiar with storage procedures			
Familiar with facility maintenance procedures			
Familiar with ADA/ABA Guidelines			
Demonstrate ability to develop and interpret plans and drawings			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Public Use Data"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will read and maintain several project meters for at least one month.

(2) Trainee will assist the project visitation coordinator in compiling and inputting monthly visitation data into the VERS program and generating the project visitation report.

(3) Trainee will identify information contained in the VERS report and be able to define "visits," "visitor hours," and "visitor days."

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Read and maintain traffic meters			
Assist visitation coordinator			
Define visitation terms			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Administration of Recreation Use Fee Areas"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will spend one week working with the project fee cashier, assisting with all aspects of the fee program including spending time in a fee booth with a contracted park attendant.

(2) Trainee will read and demonstrate knowledge of EC 1130-2-550 Chapter 9, the America the Beautiful Pass SOP, and the cashless fee machine SOP.

(3) Trainee will assist in preparation of the annual use fee closeout report.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Assist recreation use fee cashier			
Demonstrate knowledge of applicable regulations and policies			
Assist in preparation of closeout report			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Fisheries Management"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate knowledge of the Project Operational Management Plan section pertaining to fisheries management and ER1130-2-540.

(2) Trainee will demonstrate ability to identify common species of game, rough, and forage fish found in the lake.

(3) Trainee will prepare a weekly fishing report.

(4) Trainee will be familiar with state fishing regulations and fisheries management programs at the lake.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of OMP and ER 1130-2-540			
Identify common fish species			
Create weekly fishing report			
Familiar with state regulations and programs			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Wildlife Management"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate knowledge of the Project Operational Management Plan section pertaining to wildlife management and ER 1130-2-540.

(2) Trainee will be familiar with state hunting regulations and wildlife management programs at the lake.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of OMP and ER 1130-2-540			
Familiar with state regulations and programs			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Forest Management"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates knowledge of the sections of the Project Operational Management Plan and ER 1130-2-540 pertaining to forest management.

(2) Trainee demonstrates ability to identify common tree species around the lake.

(3) Trainee demonstrates knowledge of tree valuation methodology.

(4) Trainee demonstrates knowledge of the LRN Plant Vandalism and Valuation SOP.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of OMP and ER 1130-2-540			
Identify common tree species			
Familiar with tree valuation methodology			
Familiar with LRN Plant Vandalism SOP			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Soils and Geology"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate knowledge of the basic soil types found around the lake and the main physical characteristics.

(2) Trainee will demonstrate knowledge of soil characteristics which would limit recreational development at the lake.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of basic soil types			
Demonstrate knowledge of soil characteristics which limit recreational development			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Watersheds"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate knowledge of the watershed boundaries of the Nashville District and the Great Lakes and Rivers Division.

(2) Trainee will demonstrate knowledge of the section of the Project Operational Management Plan pertaining to basin surveillance.

(3) Trainee demonstrates knowledge of the area of responsibility for the lake and patrol the watershed.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of watershed boundaries			
Demonstrate knowledge of OMP, basin surveillance			
Demonstrates knowledge of area of responsibility			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Limnology"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will be able to define the major lake strata and describe the mechanics of lake overturn.

(2) Trainee will determine the trophic state and seasonal variation pattern of the lake.

(3) Trainee will demonstrate lake temperature sampling according to standard procedure.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Define and describe lake strata/turnover			
Determine trophic state and lake season			
Demonstrate lake temperature sampling			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Environmental Management"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will become familiar with the DOT Emergency Response Guidebook and US TEAM Manual.

(2) Trainee demonstrates knowledge of MSDS and SDS sheets and reviews a matching product.

(3) Trainee demonstrates knowledge of known historical and cultural resource areas at the lake.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrates knowledge of the DOT guidebook and TEAM manual			
MSDS and SDS sheet review and exercise.			
Demonstrates knowledge of known historical and cultural sites.			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Permit/Outgrant Management"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate knowledge of different types of permits and outgrants, and procedures for processing applications.

(2) Trainee will conduct a compliance inspection of a minor real estate outgrant.

(3) Trainee will accompany a real estate compliance inspector on an inspection of a major real estate outgrant.

(4) Trainee will inspect work performed under a Department of the Army Permit and prepare a record of his or her observations.

(5) Trainee will conduct (or observe) an inspection of a private boat dock.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Knowledge of permit/outgrant types and processing procedures			
Conduct minor compliance inspection			
Observe major compliance inspection			
Inspect and document DA Permit work			
Inspect (or observe) private boat dock			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Procurement and Supply"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee completes an orientation by Contracting Division personnel during District Office orientation.

(2) Trainee will participate in procurement of needed supplies for the project and perform the following:

  (a) Complete a PR&C in CEFMS.

  (b) Select preferred method of procurement.

  (c) Make the actual purchase.

  (d) Review necessary property accounting procedures.

  (e) Review receiving and payment procedures.

(3) Trainee will describe the significance of the limitations associated with purchases over $2,000, $10,000, and $250,000.

(4) Trainee will review appointment letters of a COR, ordering officer, and responsible employee.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Contract Division orientation			
Understands basic procurement procedures			
Understands procurement limitations			
Knowledge of appointment authorities			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Requirements Contract Administration"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will complete an orientation by the project COR.

(2) Trainee will spend one week with the project Park Contract Representative and:

- (a) Identify and develop a work order for a needed non routine item.
- (b) Prepare a government estimate and list of GFI.
- (c) Participate in discussions between the COR and the contractor.
- (d) Participate in the acquisition and transfer of GFI.
- (e) Inspect both routine and non-routine work.

(3) Trainee will demonstrate knowledge of the following:

- (a) Routine and non-routine work
- (b) Quality control and quality assurance
- (c) The basic steps involved in having a service performed under a requirements contract

EVALUATION	Excellent	Satisfactory	Unsatisfactory
COR orientation			
Temporary assignment with PCR			
Demonstrates knowledge of contract terms and procedures			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Partnerships and Volunteers"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate familiarity with ER 1130-2-500, Chapter 12 "Challenge Cost Sharing Program and the referenced Volunteer program guidance.

(2) Trainee will demonstrate familiarity with the different types of partnerships and their uses.

(3) Trainee will demonstrate knowledge of how to initiate partnerships with different agencies or groups.

(4) Trainee will coordinate a volunteer project (NPLD, shoreline cleanup, work day, etc).

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrates knowledge of ER 1130-2-500			
Demonstrates knowledge of types of partnerships			
Demonstrates knowledge of implementing partnerships			
Coordinate a volunteer project			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, OPS-O**