

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.

A. *The Symbols of the Corps*

1. 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,



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.

2. 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 letters “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.

B. The Nashville District

1. 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.

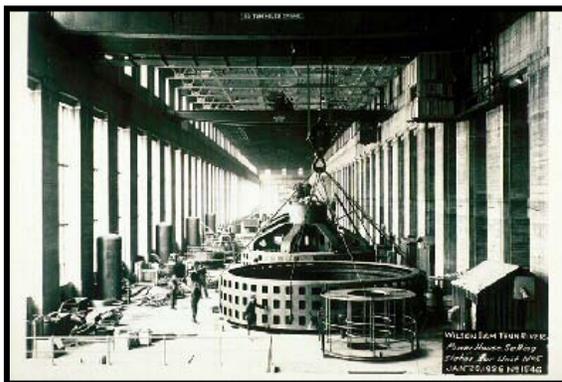
The work produced a great improvement, but had to be suspended in 1839. The financial squeeze of the crash of 1837 had caused a nationwide depression. Very little work was done from 1839 until the close of the Civil War. By this time the improvements made by McKnight had deteriorated, making navigation 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 B. 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.

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.

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.



A tow enters the chamber at Cheatham Lock.

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.

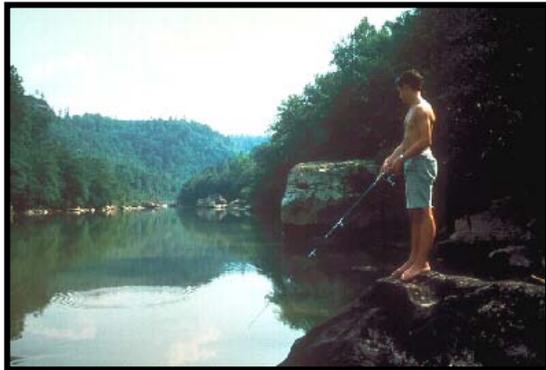
Reference

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

2. 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.

J. 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..

Power production consists of three units with a total 135,000 kilowatt capacity and an average annual energy output of 351,000,000 kilowatt-hours.

At normal pool elevation, 648 feet above mean sea level, Center Hill Lake covers 18,220 acres; at maximum elevation, 685 feet above mean sea level, it has a surface area of 23,060 acres. The total storage capacity is 2,092,000 acre-feet. The lake extends 64 miles up the Caney Fork River and has a shoreline 370 miles long. The drainage area encompasses 2,174 square miles.

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 is 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.

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.

3. 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.

C. 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.

D. 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. 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), Aquatic Plant Control, General Regulatory Functions, and National Emergency Preparedness Programs. 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

Navigation Branch

Natural Resources Management Branch

Readiness Branch

Regulatory Branch

Hydropower Branch

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.

Navigation Branch

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.

Hydropower Branch

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.

-The operation of the Electronics Service Section, which provides electrical test and maintenance services for all major power plant and switchyard equipment, both for Nashville and Detroit Districts.

-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.

Natural Resources Management Branch

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) Operations Maintenance Business Information Links (OMBIL), and other 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 and the Volunteer Clearinghouse and Take Pride in America Program for HQUSACE.

-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 Managers for recreation line items; reviews the natural resources management and recreation features of the annual ABS 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.

Readiness Branch

Responsible for managing, planning, organizing, and operating the District's programs pertaining to natural disasters, national emergencies, acts of terrorism, and response to hazardous substance spills.

Acts as primary advisor to the District Commander and District staff on U.S. Army Corps of Engineers (USACE) emergency preparedness and response, recovery missions and Global War On Terrorism (GWOT) activities. Advises the District Commander on program requirements for improving the readiness posture and executing operational responsibilities.

Coordinates and supervises staff response in support of USACE Readiness Program within the District. Provides staff guidance and assistance for accomplishing management responsibilities in accordance with policies and objectives established by higher headquarters.

Develops District response requirements and ensures effective integration of district support operations. Reviews Department of Defense (DoD), and other federal, state, and local emergency response agencies policies, regulations, directives, and plans.

Represents the District Commander on committees at meetings, conferences, and workshops to develop emergency policies, and determines support requirements and services to be provided to the District, as required.

Maintains the District Emergency Operations Center (EOC) and alternate EOC in a high state of readiness for

immediate response to emergency situations.

Serves as District point-of-contact (POC) during duty and non-duty hours for all aspects of Emergency Management activities, including receiving USACE emergency action messages; receiving requests/mission assignments from the U.S. Army Corps of Engineers, Great Lakes and Ohio River Division (CELRD), the Federal Emergency Management Agency (FEMA), the U.S. Coast Guard (USCG), the Environmental Protection Agency (EPA), and other federal, state, and local agencies; requesting CONUS Military Support to Civil Authorities; and initiating requests for intra-divisional assistance for personnel, supplies, equipment, and other logistical services.

Provides recommendations to the District Commander for monitoring and assessing the performance, progress, command objectives, and mission trends of the district readiness program.

Develops District All Hazards Plan, including natural disasters, oil and hazardous material spills, post flood response plan, pandemic, continuity of government; evaluating and conducting training exercise/programs; and participating in exercises.

Manages the District program for inspection of completed civil works local flood and non-federal flood control works and continuing authority projects. Ensures District scheduling of inspection is timely and reporting to CELRD is performed in accordance with existing policies and procedures.

Regulatory Branch

Responsible for the protection and preservation of the waters of the United States. Evaluates applications for DA permits for work in the waters of the United States, and takes appropriate action in cases of unauthorized activities. Serves as the regulatory program manager and primary advisor to the District Commander regarding regulatory issues within the District. Work is accomplished through Eastern and Western Regulatory Sections with field offices in Lenoir City, Tennessee, and Decatur, Alabama.

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 whole, 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 protection 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.

Oversees maintenance work, heavy equipment operations, and preventive maintenance inspections and repairs.

Oversees the administration and inspection of service and/or maintenance contracts associated with a field site (locks, dams, power plants, flood control/water supply structures, pumping plants, and natural resources).

Ensures all activities, including contracts, conform to applicable environmental laws and regulations. Ensures environmental compliance through the application of the TEAM Guide and the ERGO.

References

- LRN 10-1-3 Organization and Functions
- Nashville District Mission Statement and Functions

Training Requirement

- Complete District Office Two-Week Rotational Assignment

E. 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	CPOC - Civilian Personnel Operations Center
ACTEDS - Army Civilian Training Education and Development System	CPR - Cardiopulmonary Resuscitation
ASAP - As soon as possible	DA - Department of the Army
AWOL - Absent without leave	DOD - Department of Defense
BMP - Best Management Practices	DDE - Deputy District Engineer. Military officer second in command of the district
BPA - Blanket Purchase Agreement	DE - District Engineer, a.k.a. the District Commander, a military officer charged with the responsibility of directing the activities of the Nashville District
CATT - Coach, Assist and Train Teams	EC - Engineer Circular
CEFMS - Corps of Engineers Financial Management System	EEO - Equal Employment Opportunity
CELRD - The Great Lakes and Ohio River Division (Cincinnati, Ohio)	EM - Engineer Manual
CELRN - Lakes and River Division, Nashville District (Formerly CEORN, Ohio River Division, Nashville District)	ENG Form - Engineering Form
CELRN-OP-R - Lakes and River Division, Nashville District, Operations Division, Natural Resources Management Branch	EOC - Emergency Operations Center
CFR - Code of Federal Regulations	EP - Engineer Pamphlet
CISM - Critical Incident Stress Management	ER - Engineer Regulation
CO - Contract Officer (also KO) <i>or</i> Construction-Operations Division (see OP)	ERGO - Environmental Review Guide for Operations (replaced by TEAM)
CPAC - Civilian Personnel Advisory Center	ES-BEST - Environment-Stewardship Budget Evaluation System
	F&A - Finance and Accounting Branch
	FAR - Federal Acquisition Regulation

FEMA - Federal Emergency Management Agency	OM - Operations Manager (formerly OPM, Operations Project Manager)
FERS - Federal Employees Retirement System	OMBIL - Operations and Management Business Information Links
GIS - Geographic Information System	OMP - Operational Management Plan
GSA - General Services Administration	OP - Operations Division, (formerly CO, Construction-Operations Division)
IDP - Individual Development Plan	ORN - see LRN
IG - Inspector General	PCS - Permanent change of station
IMO - Information Management Office	PFD - Personal flotation device
ISOP - Interpretive Services and Outreach Program	PMP - Project Mobilization Plan
LAN - Local Area Network	PPSP - Project Physical Security Plan
LRD - Great Lakes and Ohio River Division	PR&C - Purchase Request and Commitment
LRN - Nashville District (formerly ORN)	PUA - Public Use Area
LWOP - Leave without pay	PWC - Personal Water Craft
MOA - Memorandum of Agreement	Rec-BEST - Recreation Budget Evaluation System
MOU - Memorandum of Understanding	REMIS - Real Estate Management Information System
MP - Master Plan	RLAT - Recreation Leadership Advisory Team
NEDR - Nashville Engineer District Regulation	RUDA - Recreation Unit Day Availability
NLT - Not later than	Section 10 - Section of the Rivers and Harbors Act of 1899 concerning obstruction or alteration of navigable waters of the United States
NPDES - National Pollutant Discharge Elimination System	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
NRMS - Natural Resources Management System	SF - Standard Form
NRRS™ - National Recreation Reservation Service	SMP - Shoreline Management Plan
O&M - Operations and Maintenance	
OCE - Office of the Chief of Engineers (Washington, DC)	
OFA - Oracle Financial Analyzer	

SOP - Standard (or *standing*) operating procedure

TAPES - Total Army Performance Evaluation System

TDY - Temporary duty

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:

BAR/R - Lake Barkley

CHE/R - Cheatham Lake

OLD/R - Old Hickory Lake

JPP/R - J. Percy Priest Lake

COR/R - Cordell Hull Lake

CEN/R - Center Hill Lake

DAL/R - Dale Hollow Lake

WOL/R - Lake Cumberland
("WOL" refers to Wolf Creek Dam,
which impounds Lake Cumberland.)

LAU/R - Laurel River Lake

MAR/R - Martins Fork

F. 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 natural resources and park 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 includes two parts: (1) Natural Resources Management and (2) Park Management. Objective and implementation plans based on management strategies consistent with authorized project purposes, approved resource use objectives, and land use designations have been established for each part. Part I of the OMP is based on a total ecosystem or compartment approach to management of natural resources and includes compartment descriptions, management objectives, and implementation plans. Part II of the OMP is composed of descriptions, management objectives, and implementation plans for a variety of programs, such as visitor assistance and shoreline management.

Operational Management Plans for Nashville District Projects are organized in the following format:

INTRODUCTION

1. Introduction
2. Staffing and Organization

PART ONE - NATURAL RESOURCES MANAGEMENT

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

PART TWO - PARK MANAGEMENT

13. General Management Objectives - Park Management
14. Public Safety
15. Employee, Contractor, and Volunteer Occupational Health and Safety
16. Sign Management
17. Public Assistance (Law Enforcement)
18. Security and Emergency Operations

19. Managing Public Access
20. Administration of Outgranted Areas
21. Operation and Maintenance Practices
22. Administration of Use Fee Areas
23. Historic Properties Management
24. Interpretive Services and Natural Resources Communications
25. Trails and Primitive Camping Management
26. Environmental Management
27. Volunteer Services
28. Cooperation with Other Agencies and Organizations
29. Contract Administration
30. Administrative Facilities Management
31. In-Service Training
32. Restricted Areas for Hazardous Waters
33. Public Use Data Collection
34. Reserved
35. Five-Year Program

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 Chief of Natural Resources Management Branch. 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.

References

- ER 1130-2-540, Environmental Stewardship Operations and Maintenance Policies
- Project Operational Management Plan

G. *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:

1. 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.

2. Follows a systematic, interdisciplinary approach to problem solving.

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

4. 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.

5. 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.

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

7. 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.

8. Ensures, to the best of its ability, that options for managing natural resources are kept open for future generations.
9. Undertakes early and continuing interchange of views with local, state, and federal agencies, with affected individuals, and with interested public groups.
10. Encourages broad public participation in defining environmental quality objectives and elicits public expression of needs and expectations.
11. Provides government agencies and the public with timely information on the social, economic, and environmental considerations involved before making recommendations.
12. 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).
13. 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.
14. Periodically reviews, with interested publics, the operation and maintenance of completed projects to ensure that environmental quality exists consistent with project purposes.
15. Formulates actions to improve environmental quality where necessary.

H. 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.**

You must become thoroughly familiar with ORNR 56-1-3 (Guide to Interagency Fleet Management System Vehicles) which contains specific instructions for vehicle operation and maintenance, as well as procedures for reporting motor vehicle accidents. Make sure that a copy of this regulation is in your assigned vehicle at all times.

You must become thoroughly familiar with the EM 385-1-1, Section 18. You must possess a valid in-state driver's license to operate a government vehicle rated less than one ton. 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.

You must also pass an online defensive driving course. The course may be accessed by going to the following

website: www.safetyserve.com/gsafleet. Once on the site click on the “New Student” tab then select “Defensive Driver Course” (bottom left under applications access). Next, type in **071200967568300** for the customer number and enter your email address. Finally, select “New Student” again and follow the prompts to begin the course. Once you have your certificate, please provide a copy to your supervisor so s/he can forward it to the safety office.

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. 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!



A park ranger's vehicle is his/her rolling office.

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.

Routine service station purchases, such as gas and oil, will be made by use of a government vehicle fleet credit card. Refer to ORNR 56-1-3 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 (see Section III, Subsection J, Procurement & Supply, of this manual). 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 log book containing Standard Form 91 (Operator's Report of Motor Vehicle Accident) and ENG Form 3662 (Administrative Vehicle Operational Record). Instructions for the proper completion of ENG 3662 are given in Appendix B of ORNR 56-1-3.

References

- ORNR 56-1-3, Guide to Interagency Fleet Management System Vehicles
- EM 385-1-1, Section 18

Training Requirements

- Complete the defensive driving course.
- Demonstrate safe driving abilities and habits.
- Be familiar with ORNR 56-1-3.
- 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.
- Know how to fill out national credit card tickets correctly.
- Know how to complete ENG Form 3662 correctly.

[Click here to open Evaluation 1 to print.](#)

2. Radio Operation

Each park ranger should be completely familiar with the communications equipment available. You should know how to make necessary operational adjustments to the equipment and be well versed in the proper manner of communicating over radio systems. You should become familiar with the Radio Operator's Handbook for the Nashville District.

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 will have frequencies for the Tennessee Wildlife Resources Agency (TWRA) Region II and III and in Kentucky you will have the frequency for the Kentucky Department of Fish and Wildlife Resources (KDFWR).

There are several ways to use the radio system and you should be able to select the method best suited to the situation:

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. To reach Corps personnel, simply say, "6204 to 6200 on LOCAL" (or whatever channel you desire to use).

Communication with local law enforcement is done by switching to the

desired county's radio frequency. Each law enforcement agency utilizes a repeater system for maximum coverage when transmitting/receiving. When communicating with 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, "6200" (COE #) "to Dekalb Central." Wait for a response, then 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.



Radio equipment provides an important communication link. (Motorola Corporation)

We also have the capability of communicating with TWRA. If you desire to reach TWRA and are farther than one mile apart, 3 52 RPTR would be the channel to use if you are anywhere on Center Hill Lake.. This channel will hit their repeater and transmit across the state. If you want to reach TWRA, but are you are on the Caney Fork River in Smith county, you would use channel 2 71 RPTR. Keep in mind that when using these RPTR channels, they are dispatched out of Crossville, Tennessee and Nashville, Tennessee, but can be heard all across the state. If you are within one mile of a TWRA officer that you wish to reach, you

can use the ASTRO 2 channel that does not hit their repeater. The proper way to communicate with TWRA when using the radio would be, "6200 to 3109 on 52" (if using channel 3 52 RPTR), or "6200 to 3109 on ASTRO 2" (if using ASTRO 2 channel).

In Kentucky, we have the capability of communicating with KKDFWR. If you desire to reach a KDFWR Officer, "GAME FISH" would be the channel to use if you are anywhere on Lake Cumberland. This channel will transmit to their vehicle and vessel radios. The proper way to communicate with a KDFWR Officer when using the radio would be, "6515 to 901" (COE# to KDFWR#). When communicating with KDFWR as with local law enforcement and TWRA, park rangers should be familiar with and use the "10"-code system when possible and appropriate.

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 new 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.

Since FM radio is "line of sight," it may be blocked by hills. Sometimes when unable to communicate, the situation may be altered by moving to higher ground. Radio contact can sometimes be established by slowing down or stopping your vehicle or vessel or by moving away from power lines.

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.

When keying your microphone for a transmission, be sure to hold the button down for a second or two before talking; otherwise, the first few syllables will be cut off.

Report radio malfunctions to your supervisor.

[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, 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.

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 both for your own good 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 craft, and recreational boats.

Before locking through, 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. You must make advance arrangements by telephone to lock through Cordell Hull Lock (see current

Cumberland River navigation charts for advance notice required).

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.

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 at no-wake speed 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 (bits, 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. Only those who are directly involved with the locking process should move about, and they should wear non-skid shoes. Everyone onboard should wear a personal flotation device. 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
- 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.
- Become familiar with state boating laws, especially requirements for personal flotation devices.

[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 NRMS 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); Microsoft 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, etc.

The Visitation Estimation and Reporting System (VERS) is a program developed by the Waterways Experiment Station (WES) that is used to calculate and report the monthly visitation at the project.

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.

Operations and Maintenance Business Information Link (OMBIL) is a large system of databases and is web-based. The OMBIL system collects data from all business lines. The purpose of OMBIL 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.

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: <http://corpslakes.usace.army.mil>.

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 DoD's INFOSEC (Information Security) training.
- You must be familiar with basic MS-DOS and Windows concepts; they are fundamental to understanding the operation and utilization of microcomputers.
- You should have a basic knowledge of the use of Microsoft Word, Excel, Access, PowerPoint, and Outlook (email).
- Training is routinely offered from private training centers for basic Microsoft Office applications. Discuss enrolling in these classes with your Training Officer.
- 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.
- You should be capable of inputting, transmitting, receiving and printing all routine reports.

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I. Features of the Cumberland River Basin

1. 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 party 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.

2. 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 confines of the basin, whose general course was already formed.

3. 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.

4. 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 main stream 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.

5. 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 it

flows 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 principle 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.

6. 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.

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 high water levels during the flood of March 1975 would have broken most of the existing records throughout the basin if it were not for the Corps multipurpose projects. To illustrate the benefits derived from these projects, the following table compares actual crest and estimated natural crest. Also, actual monetary damage is compared to estimated monetary damage had the projects not been built.

Flood of 1975

	<i>Clarksville</i>	<i>Nashville</i>	<i>Carthage</i>	<i>Celina</i>
<i>Actual Crest</i>	El. 388.0 (3/14/75)	Stage 47.64 ft (3/15/75)	Stage 46.95 ft (3/14/75)	Stage 38.15 ft (3/13/75)
<i>Est. Natural Crest</i>	El. 393.1	Stage 55.4 ft	Stage 68.5 ft	Stage 58.0 ft
<i>Actual Damage</i>	\$120,000	\$6,500,000	\$1,500,000	\$4,000
<i>Est. Damage</i>	\$6,300,000	\$100,000,000	\$22,000,000	\$435,000

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.

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. The flood storage capacity in a flood risk management project is the volume of water that a project can contain between the normal pool and the top of the flood control pool (near the top of the dam). This capacity is designed to normally remain empty and only utilized during periods of flooding to assist in minimizing downstream flooding. Once the volume of water in a flood risk management project reaches the top of the flood storage capacity, any additional water entering the project must be released so that the project will not be at the risk of overtopping. 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.

Nashville Peak Pools and Discharges

Mainstem Projects	Max Pool During May 2010 Event	Pool of Record	Date of Record Pool	Max Discharge During May 2010 Event	Record Discharge	Date of Record Discharge
Wolf Creek Dam	703.86	751.70	5/13/1984	14,880	40,360	12/29/1951
Cordell Hull Lock and Dam	508.33	508.33	5/3/2010	130,100	130,100	5/3/2010
Old Hickory Lock and Dam	451.45	451.45	5/2/2010	212,260	212,260	5/2/2010
Cheatham Lock and Dam	404.15	404.15	5/3/2010	240,000	240,000	5/3/2010
Barkley Lock and Dam	369.00	372.50	5/4/2011	303,200	303,200	5/4/2010

7. 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.

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.
- 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. ROTATIONAL JOB ASSIGNMENTS

A. District Office

Near the end of your first year of duty, you will spend two weeks in the Nashville District Office. During this period you will receive an orientation with the Operations Division, Natural Resources Management Branch, as well as orientations with the following elements:

- Readiness Branch
- Navigation Branch
- Hydropower Branch
- Management Support Branch
- Real Estate Division
- Resource Management Division
- Contracting Division
- Planning, Programs and Project Management Division
- Hydrology and Hydraulics Branch
- Construction Branch
- Safety and Occupational Health Office
- Public Affairs Office
- Office of Counsel
- Equal Employment Opportunity Office

B. 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 state parks and the Appalachian Craft Center.

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 eagle hacking tower.

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.

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 Resource Manager'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.

C. 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.

III. ON-THE-JOB TRAINING AND EXPERIENCE

A. Public Relations

The term, “public relations,” may be variously defined depending upon the situation. According to Webster’s Dictionary, “public relations is the art or science of developing reciprocal understanding and good will between a person, firm, or institution and the public; also the degree of understanding and good will achieved.”

One central fact is important; in your work as a park ranger, public relations is present and ongoing at all times, 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.

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 public to become involved.

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.

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.

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.

If you are assigned to talk with a reporter, it is important that you maintain presence of mind, be alert, and straightforward 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.

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, Flickr, LinkedIn, and MySpace. Social media blends technology with social interaction to create added value for business, industries, or government agencies. Park rangers respond to questions from the public through various internet communications and post project updates on the social media network.

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.

Training Requirements

- Demonstrate your writing abilities by preparing a general information letter to the public, news release, and agency memorandum.
- Complete correspondence course, “Principles Of Communications,” Subcourse No. PD2301, Army Institute for Professional Development, www.atsc.army.mil/accp/catalog.htm. If you are interested in writing for publications or preparing project newsletters, you may consider taking the correspondence course “Feature Writing and Editorials,” Subcourse No. DI0240, Army Institute for Professional Development, www.atsc.army.mil/accp/catalog.htm.
- You also will have the opportunity to organize and conduct a monthly safety meeting for project employees. To further develop your public speaking skills, you may wish to join a local Toastmaster’s Club, an organization that helps individuals to enhance speaking and leadership skills.

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B. 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.

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.



Wear your uniform with pride!

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.”

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.

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.

Email Etiquette

To Line

This line is for recipients to whom you are sending an email message to give a briefing, update, approval, and/or if an action is required. Ensure the recipient to whom you are sending the message is the right person(s).

Copy Line (CC, Courtesy Copy)

This line is for recipients to whom you want to send information only with no action required, or whom you want to ensure are aware of the message being sent to the recipient in the TO Line. Only include recipients who have a reason and need to know.

Emails to a Large Number of Recipients

When sending an email, some people place a large number of external addressees in the TO Line. There are drawbacks to this practice: (1) each recipient knows that you have sent the same message to a large number of recipients, and (2) you may be publicizing external email addresses without permission. A more appropriate method to send an email to a large number of recipients, is to place all addresses in the BCC (Blind Courtesy Copy) field. Better still, you could do a mail merge and create one message for each recipient. A mail merge also allows you to use fields in the message so that you can send the message to each recipient personally.

Subject Line

Always give an email message a subject/title. Try to use a subject that is meaningful to the recipient as well as yourself. Also, if the message is urgent, requires an action, or has suspense, put this in the subject line so the recipient immediately knows this message is important and needs action. Examples: ACTION, UPDATE, INFO, S: DD/MON.

Distribution Lists

Ensure you have the correct distribution list before you send a message. Also, ensure you keep your personal distribution lists up-to-date. There are some distribution lists that are managed in ACE-IT, some managed in various divisions/offices, and some that are personally managed—gain a better understanding of who develops and changes distribution lists.

Body of the Email

Email is much less formal than a written letter. Be concise and to the point—do not make an email longer than it needs to be. Always start the message with a clear indication of the purpose of the message and state if you are trying to inform or get a decision in the first paragraph. Include any suspense or actions required at the beginning. Remember BLUF (bottom line up front) and give the big picture of the issue first. Then briefly summarize the key points and provide pertinent background information. Arrange the main ideas in a logical sequence. Then briefly recap your main ideas, restate your conclusion, and your recommendation or action.

Reply to All

Do not overuse Reply to All. Only use this feature if you really need your message to be seen by each person who received the original message.

Reply (RE) or Forward (FW)

Ensure that the RE: and FW: are relative to the original email's subject. If you use the "Reply" or "Forward" functions, but your message has a different subject than the message you received from the sender, you should either send a new message with a different subject line or change the subject with your RE or FW. This will allow for a quick and easy search

of all messages pertaining to the subject line.

Forwarding

Do not forward a message and say "read below." The purpose of the email needs to be restated concisely so the reader does NOT have to read all the forwarded messages. It would be a good idea to delete all the former emails or attachments that are not necessary. Deleting all unnecessary information (including superfluous "CLASSIFICATIONS and CAVEATS") will save time (and paper if the email is printed) for the person receiving the message and avoid any confusion.

Attachments

When sending attachments, do not attach unnecessary files. By sending large attachments, you can bring down the receiver's email system. Whenever possible, provide the link to the attachment instead of attaching the file. Since it is very difficult to read an attachment or a Portable Document File (PDF) on a Blackberry, a brief summary of the information should be stated in the message and the action that needs to be taken. This way the recipient will be able to react quicker and this will allow the recipient to be able to get a safe location where he/she can open the attachment. If the attachment is a Word document, it is usually preferred that you cut and paste the document or the relevant portions of the document into the email message. Also, understand that "Forwarding" an email forwards all attachments and "Replying" to an email does NOT include attachments.

Signature Block

Ensure your signature block is correct and includes your name, title, organization, and contact numbers. Example of a signature block:

Mary Marple

Park Ranger, Center Hill Lake
US Army Corps of Engineers
158 Resource Lane
Lancaster, Tennessee 38569
(931) 858-3125
(615) 548-4521

Internet: <http://www.lrn.usace.army.mil/Locations/Lakes/CenterHillLake>

Facebook: <http://www.facebook.com.nashvillecorps>

Out of Office

This is a very important tool to alert others that you will not be in the office. It should alert them to NOT send you any exceptionally large email attachments that may clog up your inbox. (Before you send a message with a large email attachment, you should first get the recipient's permission—the Out of Office tool will alert you that the recipient is not in the office and therefore you should not send the attachment.)

Calendar Scheduling

Ensure you always set up appointments by using the Outlook Calendar Scheduling Tool. Always include the call-in number or location instructions for a meeting in a calendar request and put these at the beginning of the body or within the subject line of calendar note. If a separate email note is sent with the call-in information or location, the recipient most likely will not be able to find this email when the meeting begins. By including this vital information in the calendar request, the recipient will be able to click on the calendar request and have all the information he/she needs.

Rules to Remember

Your emails are official business correspondence that reflects 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 resolved face-to-face or over the phone.

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 (and to whom) you are sending because it never disappears.

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.

Use proper spelling, grammar, and punctuation and utilize the spell checking option. Read the email before you send and/or have someone else read the message. This will assure you are sending out a more effective message and avoid any misunderstandings.

Do not write in ALL CAPITALS—if you write in capitals it may seem as if you are shouting.

Do not ask to recall a message—probably your message has already been delivered and read. It is better to send an email to say you have made an error and are resending the new version of the email message and to delete the previous message.

If you have sent three emails and still have not come to an agreement on an issue or have not received a reply, either call or visit the person to ensure you are communicating properly. Email is not a substitute for the person-to-person communication that a telephone call or personal face-to-face office visit affords you.

If you have sent an urgent email, you should follow-up with a phone call in 24-hours to ensure receipt and action.

If you have an email that uses special fonts or pictures, put a note on the email that the message is “Best Viewed in HTML or Rich Text” to inform the recipient to right-click the bar at the top of the message to convert it to the proper format.

References

It is important for the trainee to familiarize himself or herself with:

- AR 600-50, Standards of Conduct.
- ORNP 690-1-1, Employee Personnel Handbook.
- ER 1130-2-550, Chapter 8 - Uniforms for Natural Resources Management Team.
- Email Etiquette 101, LRD

Training Requirements

- Keep your vehicle clean and well maintained.
- 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.
- Become familiar with the standards of conduct found in AR 600-50.
- You should be conscious of your professional image, both on and off the job.

[Click here to open Evaluation 6 to print.](#)

C. 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 operational management plan (OMP) for each lake outlines the actions to be taken in the event that emergency situations arise.

The procedure for reporting all emergency operations activities is as follows:

As you gather the necessary information, use ORN Form 363 as a checklist when reporting any emergency activities. After all necessary information is gathered, call the Emergency Manager at the Readiness Branch/ Emergency Operations Center at (615) 736-7037. The Emergency Manager can then give you guidance as to any additional information that may be essential to the operation. As soon as the emergency situation has passed, each ranger involved will complete the report on ORN Form 363 and send it through the Resource Manager to the Emergency Manager. The Resource Manager will ensure that a duplicate copy

of the report is sent to the Chief, Natural Resources Management Branch.

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 ORNR 500-1-1, Natural Disaster Procedures. 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).



Cheatham Lake, 2010 flood

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.

Project Mobilization

In the event of the declaration of a national emergency there will be a transition from a peacetime to a mobilization situation, involving rapid changes in the operations of the Nashville District. Upon receipt of an order to mobilize, the Nashville District will provide engineering and construction support utilizing available resources to specified military installations and facilities within the civil works boundary. Essential operations will continue at civil works projects needed to support the mobilization effort.

A Project Mobilization Plan (PMP) has been prepared for each lake outlining functions which will continue or change during mobilization, staffing requirements required to support mobilization activities, and other requirements and programs to be implemented. This plan is on file at the resource manager’s office.

In the event of a nuclear attack, field personnel and their families will take shelter in the facilities on hand at their project (usually located within the lock or power plant). A designated shelter manager will be responsible for

organization of recovery teams, monitoring teams, and all necessary recording and reporting of radiological information.

References

- ER 500-1-1, Natural Disaster Procedures
- ORNR 500-1-1, Natural Disaster Plan
- ORNR 500-1-7, Oil and Hazardous Substances Pollution Contingency Plan
- Project Operational Management Plan, Part II
- Project Mobilization Plan

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.

The Project Physical Security Plan (PPSP) 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.

ENG Form 4337, Offense/Incident Report, 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-190-1-50, Law Enforcement Policy, U.S. Army Corps of Engineers, for additional information.

References

- AR 190-13, Army Physical Security Program
- Project Physical Security Plan
- ER 190-1-50, Law Enforcement Policy, U.S. Army Corps of Engineers

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. 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 Agreements

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 cooperative agreements with local law enforcement agencies to provide increased patrolling of water resources projects (Section 120, PL 94-587, Water Resources Development Act of 1976, as amended by PL 96-536). You should become familiar with these cooperative agreements at your lake. You will assist in formulating specifications and participate in negotiations with the local agency.

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

Training Requirements

- Complete Prospect Course, Visitor Assistance Program, Basic
- 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.
- Participate in developing specifications and negotiating a cooperative agreement 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.

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.

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. Your Training Officer 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), set of life jugs (gallon milk jugs), 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. An excellent text, *Life Saving and Water*

Safety, prepared by the American National Red Cross, gives detailed instructions and illustrations on a number of rescue methods including self-rescue, swimming rescue, and other special forms of rescue. You should read this text, which can be found at each Resource Manager's Office.

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. Specific guidelines for completing the Accident Investigation Report Form (ENG 3394) are found in a Memorandum for Operations Managers and Field Supervisors dated 10 March 2006, Subject: Reporting Public Fatalities and Serious Injuries. You should refer to this memorandum before completing the report. Vehicle accidents involving less than \$2,000 damage to the government vehicle must be reported on ORN Form 523, Minor Accident Report.

References

- EM 385-1-1, Safety and Health Requirements Manual
- ORNR 385-1-1, Safety Policy
- Part II, Project Operational Management Plan
- ORNR 385-1-16, Recovery of Bodies in District Waters
- *Life Saving and Water Safety*, American National Red Cross
- Memorandum for Operations Managers and Field Supervisors dated 10 March 2006, Subject: Reporting Public Fatalities and Serious Injuries.

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.
- Complete an accident report, ENG Form 3394, for an accident at your lake.
- You should become familiar with the referenced documents.

[Click here to open Evaluation 10 to print.](#)

5. 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.



The cooperation of state forestry agencies is an important factor in fire suppression.

References

- Project Operational Management Plan
- “*Firefighter’s Guide*,” Forest Service Manual 5108

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 “*Firefighter’s Guide*.”
- Take part in an actual fire fighting 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 flapper, water backpack, fire rake, and Pulaski) at a safety meeting.

[Click here to open Evaluation 11 to print.](#)

6. Pest Control

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 insecticides 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. 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.

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.

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.

Tree insect pests have been a concern for several years. Starting in the 1970's, 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, emerald ash borer, 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. Kentucky has started to eradicate ash trees to help control the emerald ash borer problem. A few cases of ash borer infestation have been noted in Tennessee. It is generally not practical to treat large areas with pesticides in an attempt to control these pest insects.

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 a 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, multiflora 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. Multiflora 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 power house 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 Corps ERGO Supplement to the TEAM manual.

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 the Natural Resources Management Branch in January of each year. As part of the projects hazard communication program, Materials Safety Data Sheets (MSDS'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
- County Extension Agent or U.S. Department of Agriculture requirements for pesticide applicators.
- US TEAM Manual - Section 7 - Pesticide Management
- Corps of Engineers ERGO Supplement - Section 7 - Pesticide Management
- 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.
- Complete the following correspondence course: "Basic Pest Management," Course No. USN 151, TPC Training Systems, 750 Lake Cook Road, Suite 250, Buffalo Grove, Illinois.

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D. 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 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.

You will need both study and practical experience to develop surveying skills.

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 (EDM). 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.

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.
- You should know the system (i.e., pins, monuments, signs, and painted hack marks and blazes) of marking 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 slides and prints are also required for publications such as brochure maps.



Digital cameras save the image to a digital medium such as a memory card (Olympus Co).

You should periodically inspect the digital images, slides, color and black and white prints, and videotapes on file in the Resource Manager's Office at your lake. Advise your supervisor of topics which require updating or additional coverage.

The photographic equipment commonly used by rangers includes 35mm single-lens reflex cameras, digital cameras, Polaroid "instant" cameras, VHS format videotape cassette camera-recorders (camcorders), and digital video recorders.

The high quality 35mm cameras used at the district lakes feature automatic light metering systems which make them easy to use yet capable of producing excellent results. With an electronic strobe unit attached, the 35mm camera may be used in practically all lighting conditions. Compact 35mm cameras used at some lakes feature automatic focusing as well as light metering. Because they are convenient to carry and use, these compact cameras are particularly suited for ranger patrol.

Polaroid "instant" cameras also feature automatic light metering and are simple to operate. They produce only color prints without negatives. These cameras are very portable and relatively inexpensive. They are extremely useful for documenting safety problems, permit or outgrant inspections, trespasses, and other violations of federal regulations.

Digital cameras operate much like standard 35 mm cameras, except that the image is saved digitally to a diskette or memory card. The digital image can then be transferred to a PC and the image can be enhanced through the use of photo-imaging software and then printed or "dropped" into PowerPoint presentations or publications. 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 that are more difficult with which to tamper.

The use of videotape camcorders and digital video recorders are somewhat more complex to use than “still” cameras and require practice. The lens allows zooming for 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. Camcorders and digital video recorders also may record sound. An internal clock allows the video recording to be marked with the date or time and date.

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

stress 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.

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.

Key Terms and Photography Hints

aerial photography - Use a shutter speed no slower than 1/250 second with the 35 mm camera.

averaging meter - a light meter which reads light values over the entire scene appearing in the view finder

boating, skiing, etc. shots - Use faster shutter speeds to stop the action.

camping, picnicking, scenic shots - Use slower shutter speeds which will increase depth-of-field (higher f-stop).

depth-of-field - the area of the photo that is in sharp focus, varies with different f-stops, the larger the f-stop number, the more depth-of-field

f-stops - numbers on top of lens barrel denoting various lens openings, the larger the f-stop number, the smaller the amount

of light that passes through the lens when the shutter opens

filters - For haze and glare, use a polarizing filter over the lens when shooting color film or a K2 (yellow) filter for black and white film.

ISO (formerly ASA) Rating - number representing film speed or sensitivity to light

spot meter - a light meter which reads light values only in the small circle appearing in the center of the view finder (valuable with telephoto lenses)

timed exposure - In a timed exposure, the shutter is held open for a predetermined period. This requires the use of a tripod or similar rest for the camera and a shutter release cable. Timed exposures produce scenic nighttime shots, e.g. lighted buildings, star tracks, moving lights, etc.

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. You should become proficient with the photographic equipment available at the project.
 - Complete one of the following:
 - Correspondence Course No. SS0507, “Principles of Photography,” Army Correspondence Course Program, Army Institute for Professional Development, website at : www.atsc.army.mil/accp/catalog.htm.
 - Correspondence Course No. DI0350, “Electronic Journalism,” Army Correspondence Course Program, Army Institute for Professional Development, website at: www.atsc.army.mil/accp/catalog.htm.
- or*
- Photography course in a local community college, continuing education center, etc.

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3. Maps and Geographic Information

Maps and geographic information are essential tools for the park ranger. 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.

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. 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 and aerial photographs to visualize areas of interest.

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.

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.
- 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.
- Become familiar with the GIS available to you and spatial data specific to your project area.
- Learn basic data collection functions with the GPS equipment available at your lake.

[Click here to open an Appendix of Examples.](#)

[Click here to open Evaluation 15 to print.](#)

4. 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.

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 conformity to regulations and policies.

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 is 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.

Each Resource Manager's Office has a drafting table complete with drafting machine and other equipment. You should work with the other park rangers and your Training Officer to learn the basic use of this equipment.

Training Requirements

- Demonstrate a working knowledge of the drafting equipment in the Resource Manager's Office.
- 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.

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E. 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.



New facilities should meet ABA/ADA guidelines.

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.

References

- Project Master Plan and Operational Management Plan
- EM 1110-1-400, Recreation Facility and Customer Services Standards
- EM-385-1-1, Safety and Health Requirements
- EP 310-1-6a/6b, 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, signs, buoys, and sanitary facilities (including sewage treatment plants).
 - Become familiar with the “American with Disabilities Act and Architectural Barriers Act Accessibility Guidelines” published by the U.S. Access Board. <http://www.access-board.gov/ada-aba/final.cfm>.

Additional Training

- The National Center on Accessibility promotes access and inclusion for people with disabilities in parks, recreation and tourism. Based at Indiana University and established in 1992 through a cooperative agreement with the National Park Service, NCA has emerged as a leading authority on access issues unique to park and recreation programs and facilities. <http://www.ncaonline.org/>

Click here to open [Evaluation 17](#) to print.

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.



Data gathered from recreation surveys are used to develop load factors.

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; optical laser counters, inductive loop types, or pneumatic hose types; are used to count vehicles.

Optical laser counters use 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.

All types of counters record vehicle counts on battery-powered meters. Meter readings may have to be adjusted before they are transmitted to the district office to allow for the number of axles per vehicle and one or two-way traffic.

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 a microcomputer at the project office. 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.

References

- ER 1130-2-550, Chapter 13 - Recreation Use Surveys
- ER 1130-2-550, Chapter 12 - Natural Resources Management System

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.
- 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 visitation coordinator in compiling the monthly visitation data, inputting the data into the microcomputer and retrieving the project visitation report.
- If a recreation use survey is scheduled during your training, you will be assigned to take part in the survey, and you will enter the information on a survey form or directly into a portable computer. If the opportunity to participate in an actual survey does not present itself, you should become thoroughly familiar with all forms and procedures.

[Click here to open Evaluation 18 to print.](#)

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.



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 who collect fees, prepare remittances, issue permits, take reservations, and control access.

The fee structure at the thirty fee campgrounds operated by the Nashville District is such that campers have a wide range from which to choose. 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, rowdiness, and overuse/overcrowding. Campsite reservations are currently handled through the National Recreation Reservation System (NRRS™), a multi-agency reservation system initiated by the Corps of Engineers and the U.S. Forest Service and now including several other federal agencies and allowing customers to access reservations for a variety of recreation facilities by calling a central toll free number or on the internet.

Desktop PCs are now used at district fee campgrounds to facilitate the Park Office campground management system. With this computerized campground management system, park attendants can connect to the database at the call center, issue permits, create and confirm reservations, locate campers, issue credit vouchers, generate necessary forms, track collections, and prepare bills for collection.



References

- ER 1130-2-550, Chapter 9 - Recreation Use Fees
- CELRN-OP-R Memorandum, dated 15 May 2007, Nashville District Policy on Recreation Use Fee Collection Procedures
- NRRS™ Operating Procedures Manual

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. You should be especially familiar with the procedures for transmitting funds through the NRRS™. You should also have a working knowledge of NRRS™ equipment and procedures.
- It will be necessary for you to review the CELRN-OP-R Memorandum, dated 15 May 2007, Nashville District Policy on Recreation Use Fee Collection Procedures concerning district policy on campground administration and charging recreation use fees.
- 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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F. 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 1130-2-540, Chapter 2, Environmental Stewardship Operations and Maintenance Policies.



Background

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 of these 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, Environmental Stewardship Operations and Maintenance Policies.

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.

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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.

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, goose browse fields, 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 (e.g., 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. Request 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.

Much of the 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.
 - *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, the “Corps Watch” Program, and public information are important in reducing the number of these incidents. Once discovered, however, park rangers 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 Natural Resources Management Branch to develop a valuation of the

damaged property and work towards restoration or legal action.

- *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. The Guide is the culmination of more than seventy-five years of developing tree evaluation methods. It is edited, published, and copyrighted by the International Society of Arboriculture, Post Office Box 3129, Champaign, IL 61826-3129. 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
- *Summer Key to Tennessee Trees*, R. E. Shanks and A. J. Sharp, The University of Tennessee Press, Knoxville, Tennessee, 1968

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.
- Participate in the surveying and recording of a tree vandalism case, if one occurs during the training period.

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4. Soils

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.

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.

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.

Click here to open [Evaluation 23](#) to print.

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.

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.

[Click here to open Evaluation 24 to print.](#)

6. Limnology

This section is intended as a brief introduction to the elemental factors and processes that form the dynamic systems in lakes and streams. You should have a basic understanding of the biological, physical, and chemical natures of inland waters.

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 makeup 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.

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.

[Click here to open Evaluation 25 to print.](#)

G. 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 be in compliance with 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. Environmental 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 Environmental 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/>

This website also 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. This manual compiles 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 OMBIL (Operations and Maintenance Business Information Link) 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 OMBIL reports for EPCRA (Emergency Planning and Community Right-to-Know Act) Status, RCRA (Resource Conservation and Recovery Act) Generator Status, Storage Tanks, Wastewater, and Water Quality. The development of the OMBIL program started in 1996 and was completed four years later. Starting in 2000, both the External and Internal Corps facility assessments were required to be entered into OMBIL. The automated information system is intended to gather information from several national data bases such as CEFMS, as well as each functional area of operations and maintenance, including: environmental compliance, flood damage reduction, natural resources, navigation, recreation, regulatory, and hydropower. Its primary goal is to provide a single

repository of information required to manage the Corps' operations function.

[Click here to view Attachment 1](#) which lists the 13 protocols found in the TEAM/ERGO manuals.

Compliance issues are discussed below 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.

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 Material Safety Data Sheets (MSDS) 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 MSDS' 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. PCB's 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 insulation, 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 power house 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 environmental 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, environmental 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 notebook file and pick a product and matching MSDS 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.

[Click here to open Evaluation 26 to print.](#)

H. 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.

1. 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.

2. 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, driveways, steps, marine railways, rip-rap, 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, small residential storage buildings, 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.

3. 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 will 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. Failure to comply with a condition does not necessarily mean an activity 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).

4. 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 processed in the Real Estate Division, Management and Disposal Branch. If a license is being requested, the applicant is instructed to send payment directly to the Real Estate office. 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. 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.

You will be responsible for checking incoming applications for real estate outgrants in your area of the lake. They must be complete, accurate, and consistent with lake policy. Attach a copy of the proper segment map, marked to show the location of the proposed work, to the application. If the request is for a new hay and/or grazing lease, complete ORN Form 87, Application for Lease; and ORN-463, Outgrant Environmental Evaluation, when you have received all the required bid forms (usually three).

If everything is satisfactory with the application for a hay and grazing lease, the Resource Manager will sign the application and forward it to the Natural Resources Management Branch 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.

Information on applying for individual DA Permits is contained in EP-1145-2-1, Regulatory Program Applicant Information Pamphlet. In addition to the information required on ENG Form 4345, Application for Department of the Army Permit, 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 the Natural Resources Management Branch. After review there, it will be forwarded to the Regulatory Branch for final action, which includes billing the applicant for the required fee. The goal is to reach a decision regarding issuance or denial of the permit within sixty days of receipt of a complete application by the Regulatory Branch.

5. 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 Permission (a type of Individual or Standard Permit), permits to governmental agencies, nationwide permits, or regional permits.

6. 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.

7. 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, 31 October 1990
- The Regulator's Handbook
- EP-1145-2-1, Regulatory Program Applicant Information
- Public Notice ORNOR-F-86-23, dated 8 May 1986
- ORDP 405-2-2, Compliance Inspection Handbook for Resource Managers, December 1980
- District shoreline management plans and transcripts of related public meetings
- Standing Operating Procedure (SOP), Processing Major Outgrants, 20 July 2011

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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I. 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.



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:

- Any interpretation that does not somehow relate what is being displayed or described to something

within the personality or experience of the visitor will be sterile.

- Information as such is not interpretation; interpretation is revelation based upon information. However, all interpretation includes information.
- Interpretation is an art which combines many arts, whether the materials presented are scientific, historical, or architectural. Any art is in some degree teachable.
- The chief aim of interpretation is not instruction but provocation.
- Interpretation should aim to present a whole rather than a part and must address itself to the whole person rather than any phase.
- Interpretation addressed to children (up to the age of twelve) should not be a dilution of the presentation to adults but should follow a fundamentally different approach. To be at its best it will require a separate program.

Visitor perception and interpretive programs can be classified according to central themes and interpretive techniques employed.

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.

Audio-visual Media

Motion Pictures - Many excellent films 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.

Slide and Slide/Sound Programs - If lighting conditions allow, slides can be used to vividly illustrate talks and demonstrations. Slide programs are relatively inexpensive and easily changed. Each lake has a cassette tape recorder which is capable of cueing a slide projector as well as playing a sound track. Thus, a slide program may be enhanced with narration, music, or sound effects.

Videocassette Recordings - Professionally produced videotapes on many topics are becoming increasingly available. Videotapes may also be shot and edited locally. Most schools, libraries, and many other organizations have televisions and videocassette recorders that facilitate off-site programs to organized groups.

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.

Multimedia - The use of a combination of several slide projectors, with or without sound, and with or without movies or videotapes, offers new and exciting experiences for viewers. Interactive computer programs can also enhance the learning experience with a mix of graphics, video clips, as well as music and narration. These varied techniques of presentation command more attention and interest but are necessarily limited to fixed locations such as visitor centers.

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 brochures

- Literature on environmental awareness
 - Announcements of special events
 - Checklists of flora and fauna
 - Newspaper articles
 - Newsbriefs
 - 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

Training Requirements

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

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J. 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 have to 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 \$2,500 for supplies or materials and \$2,000 for construction activities. 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.
- *Wage Rates* - Federal law requires government contractors to pay wages that are commensurate with those being paid in the private sector in 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 between \$2,500 and \$100,000 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 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 computer database, Corps of Engineers Financial Management System (CEFMS). 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 less than \$2,500 using the VISA card), 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:

- Credit Card - The government generally utilizes two types of credit cards:
 - IMPAC (International Merchants Purchase Authorization Card) - This card 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 up to \$2,500 and to purchase construction services up to \$2,000. Each individual and office has a monthly dollar limit on purchases. This is considered the most efficient method for making local purchases.
 - Government Travel Card - This card is issued to a specific employee for the payment of authorized travel expenses such as lodging and meals. The individual is responsible for paying the entire credit card bill from his or her reimbursement for travel expenses. Although responsible for payment, the employee cannot use the card for unauthorized personal 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. 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, DD Form 1155 - Operations Managers and Contracting Officers (Contracting Division) may issue Purchase Orders for simplified purchases. Upon receipt of an approved PR&C, a purchase order is issued for services, supplies, and construction. The limitations are \$25,000 for Operations Managers and \$100,000 for Contracting Officers.
- Formal Contract - Although this method can be used for smaller purchases, it must be used for the procurement of services, supplies, or construction work over \$100,000. All contracts in excess of \$100,000 must be announced (synopsized) in the Commerce Business Daily (CBD) for thirty days before being advertised (sent to prospective contractors for bids or proposals). Then they must be advertised for at least thirty days. Two primary methods are used to award contracts in the Nashville District:
 - Sealed Bidding - a method of solicitation that is issued as an Invitation for Bid (IFB), in which a contract is awarded to the lowest responsive, responsible bidder. This method is normally used to award most contracts for 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 experience, 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. The panel is free to discuss both technical and price proposals with the offerors. The offerors then are permitted to change their proposals and submit "best and final offers" (BAFO's). The contract is awarded to the offeror whose overall proposal is determined to be most advantageous 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 (CO) - The Chief of Contracting and other selected employees of the Contracting Division have been appointed contracting officers by name, and they are the only people authorized to execute contracts or modifications or to legally bind the government to a contract. The Operations Managers also have Contracting Division warrants limited to \$25,000. They are subject to the restrictions of the certificate of appointment, controlling laws, regulations, and directives.
- Contracting Officer's Representative (COR) - an individual appointed by 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
 - or approve final pay estimates.
- Ordering Officer - an individual appointed by name and in writing by the contracting officer for the purpose of placing delivery orders under an indefinite delivery contract such as a requirements contract for project operations and maintenance services.
- Authorized Caller - an individual appointed by name in writing by a contracting officer to place orders against blanket purchase agreements (BPA's).
- 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.
- DFAR - The Defense Acquisition Regulation is the Department of Defense supplement to the FAR.
- AFAR - the Army supplement to the FAR.
- EFAR - the Corps of Engineers supplement to the FAR.

References

- AR 600-50, Standards of Conduct
- ORNR 1180-1-1, Acquisition Management Instructions
- ORN 529, Small Purchase Document Checklist
- ORNR 735-2-4, Property Accountability
- ORNR 56-1-3, Surface Transportation (paragraph 1-10)
- DFSCH 4280, Government Vehicle Operations Guide

Training Requirements

- Complete an orientation by Contracting Division personnel during your two-week tour in 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, \$25,000 and \$100,000 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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K. Requirements Contract Administration

Because of ever decreasing maintenance forces, Resource Managers have had to rely increasingly on contracting for operations and maintenance 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, the requirements contract has emerged as the primary means of accomplishing the majority of O&M work. The requirements contract is a type of indefinite delivery contract that provides for a wide variety of work items and the flexibility needed to effectively and efficiently operate and maintain project facilities. The objective of this section of your training manual is to familiarize you with the requirements contract and the activities involved in its day-to-day administration.



The requirements contract is a competitively negotiated procurement (see Section III, Subsection J, Procurement & Supply, of this manual) and is awarded for one year with normally two to 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. These items are on a firm fixed price per job basis, such as \$15 to clean a picnic shelter, \$200 per mowing of a picnic area, or \$0.25 per linear foot of pavement striping. When a delivery 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 emergency work, rip-rapping, erecting a prefabricated picnic shelter, or renovating campsites. This work is on an hourly rather than per job basis, such as \$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. Each individual job, such as erecting a picnic shelter, is accomplished by the issuance of a delivery order. Each delivery order is based on an agreement reached between the government and the contractor on the number of hours of each service (e.g., carpenter, laborer, dump truck, etc.)

required to perform the work. The government provides all the necessary materials, and the contractor provides everything else.

Contract Administration

The processes involved in the administration of a requirements contract at the field level can best be demonstrated by describing each of the basic steps involved in the completion of a particular job. The following paragraphs summarize each of these basic steps from the decision to perform the work to its completion:

Non-Routine Work Orders

This process is unnecessary for routine work items since the price for these services was established prior to awarding the contract. ORN Form 564, Delivery Order Cost Estimate, is presented to the contractor to initiate discussions for non-routine work. At this point, the contractor's copy of the form contains only the description of the work to be performed and any other plans and specifications necessary to describe exactly what is to be done. The contractor then prepares an estimate of the required number of hours of labor and/or equipment and the materials necessary to perform the work. Corps personnel prepare a government estimate and list of required materials and/or government furnished items (GFI). Then the contractor's estimate is reviewed, and if it is found unacceptable, documented discussions take place in an effort to reach an agreement. If discussions are successful in reaching an agreement on the number of hours of each line item to perform the work the agreed upon hours are multiplied by the bid price for each item and the total becomes a firm, fixed price to perform the work. If these

discussions do not succeed, the government is at liberty to obtain the needed services by whatever means deemed to be in its best interest.

Delivery Orders

When an agreement is reached on an acceptable estimate for a particular job, a delivery order is issued to the contractor. Delivery orders are prepared on DD Form 1155 and are approved by the ordering officer for the contract. **Neither routine nor non-routine work can begin prior to issuance of the delivery order.** A delivery order for non-routine work may be modified after issuance to reflect changes in the scope of work, delivery dates, cost codes, etc. Unless errors are discovered, delivery orders for routine work normally are not modified because the contractor bid these services on a firm, fixed price basis.

Property Accounting

As previously discussed, the government is responsible for providing the materials necessary to complete non-routine work. Upon issuance of a delivery 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 Mill Springs Mill). 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 a written quality assurance plan. Among other things, the quality assurance plan addresses the standards by which the contractor's performance will be evaluated and includes the inspection to be used. All records of inspections by both the Corps and the contractor are kept on file.

Discrepancy Reports

If the contractor fails to perform according to the standards set forth in the contract, the contracting officer's representative (COR) may issue a discrepancy report. 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
- Project Quality Assurance Plan
- DA Pamphlet 715-15, Service Contract Administration
- CELRN-CO Memorandum dated 30 September 1998, Subject: Standard Operating Procedure for O&M Service Contracts
- Training Manual, Administration of O&M Contracts
- Training Manual, O&M Contracts-Advanced

Recommended Course

- OCE 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 work order for it, and
 - prepare the government estimate and list of GFI.
 - Participate in discussions between the COR and the contractor in the development of a delivery order.
 - 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) and quality assurance (QA); be able to describe the basic steps involved in having a service performed under a requirements contract.

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L. Partnerships

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.

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.

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.

References

- ER 1130-2-500, Chapter 12, Challenge-cost sharing program
- Handshake Handout
- 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.

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