US Army Corps
of Engineers ®
Nashville District

NATURAL RESOURCES MANANGEMENT RANGER TRAINING PROGRAM

JANUARY 2001
REVISION

NATURAL RESOURCES MANAGEMENT
RANGER TRAINING PROGRAM

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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 Section. 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 insure that he or she would be prepared to assume the full responsibilities of a Park 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, the project training officer 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 training officer and/or experienced rangers. More responsibilities will be given to you as your training program progresses.

Your training will not end with the completion of this manual. Rangers, like managers, 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 concentrate on your weaknesses

and strive for improvement. Maintain good communications with the training officer and keep him or her informed of your needs and problems. For example, if you have a forestry background, you may need to spend less time on forestry management and possibly more on other areas of the manual.

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*

The Turreted Castle

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

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

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

The Seal of the Corps

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

The significance of the design as commemorating the achievements of both the Corps of Engineers and the Corps of Topographical Engineers is plain to be seen. The larger shield is divided into three horizontal sections, of which the top usually is represented in solid blue color; while the bottom is divided into vertical (red and white) stripes. The center section shows the interesting original shields of the two historic corps: the dextral shield being a reproduction of the basic device of the Engineers oldest insignia, the Essayons Button; the sinistral shield showing the Corps of Topographical Engineers red, white, and blue shield between the 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*

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.

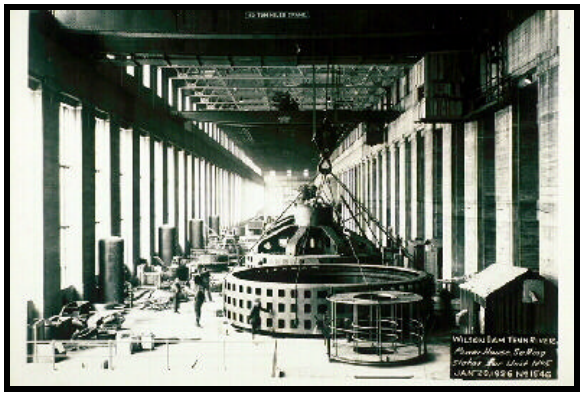
The River and Harbor Act of 1866 provided large sums of money to resurvey and report what was needed to improve the nation's waterways. This Act was the first time the Corps of Engineers, or any federal agency, had to compare the cost of improvements with the benefits provided. As a result of this report, $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 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, run-off 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 o-

cated 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.

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.

A tow enters the chamber at Cheatham Lock.

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.

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 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 Tennessee Valley Authority 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 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.

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 424,629 acres of land and water with a total of 4,621 miles of shoreline. There are 200 Corps-maintained recreation areas and access points, and a total of 65 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.

Office of the Division Chief

Exercises staff responsibilities for supervision and direction of construction, operation and maintenance of multi-purpose civil works projects, environmental compliance, the Department of the Army Permits program for works in waters of the United States, emergency management associated with natural and national disasters, and mobilization readiness of the district.

Management Support Branch

Manages the business functions of the Operations Division by providing support and guidance to field projects and District Office branches for personnel, budget, union matters, adverse personnel actions, congressional contacts, and information management.

Physical Support Branch

Responsible for developing budgets, schedules, and managing navigation structures and channel management activities. Responsible for maintaining emergency response capability that is both land and water mobile. Various responsibilities are handled by the Maintenance Section and the Plant Section.

Readiness Branch

Responsible for managing, planning, organizing, and operating the district's programs pertaining to natural disasters, national emergencies, and response to hazardous substance spills. Administers the district's Security and law Enforcement Management Program.

Regulatory Branch

Responsible for the protection and preservation of the waters of the United States. Evaluates applications for Department of the Army (DA) Permits for work in 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. Various responsibilities are handled by the Eastern/Western Regulatory Sections.

Technical Support Branch

Responsible for providing guidance and technical support for the management of water resource development projects including navigation, flood control, lock operations, recreation, natural resources, hydropower, high voltage switchyards, and water supply systems. Manages the Hydropower Training Program, the Lock Operator Training Program, and the Natural Resources Management Career Training Program to provide qualified journeyman level replacements as needed for field projects. Assigns trainees to permanent duty stations upon completion of training. Various responsibilities are handled by the Hydropower Section, the Locks Section, and the Natural Resources Section.

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.

E. *Talking Our Language*

One of the most frustrating things to a new 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:

ASAP - As soon as possible

AWOL - Absent without leave

BPA - Blanket Purchase Agreement

CEFMS - Corps of Engineers Financial Management System

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

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

CELRN-OP-T-N - Lakes and River Division, Nashville District, Operations Division, Technical Support Branch, Natural Resources Section

CFR - Code of Federal Regulations

CO - Contract Officer (also KO) *or* Construction-Operations Division (see OP)

CPR - Cardiopulmonary Resuscitation

DA - Department of the Army

DOD - Department of Defense

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

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

EC - Engineer Circular

EEO - Equal Employment Opportunity

EM - Engineer Manual

ENG Form - Engineering Form

EP - Engineer Pamphlet

EOC - Emergency Operations Center

ER - Engineer Regulation

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

F&A - Finance and Accounting Branch

FEMA - Federal Emergency Management Agency

FERS - Federal Employees Retirement System

GIS - Geographic Information System

GSA - General Services Administration

IMO - Information Management Office

IG - Inspector General

ISOP - Interpretive Services and Outreach Program

LAN - Local Area Network

LRD - Great Lakes and Ohio River Division

LRN - Nashville District (formerly ORN)

LWOP - Leave without pay

NEDR - Nashville Engineer District Regulation

NLT - Not later than

NPDES - National Pollutant Discharge Elimination System

NRMS - Natural Resources Management System, a database of natural resources information.

NRRS™ - National Recreation Reservation Service

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

OM - Operations Manager (formerly OPM)

OMBIL - Operations and Management Business Information Links

OMP - Operational Management Plan

OP - Operations Division

ORN - see LRN

PCS - Permanent change of station

PFD - Personal flotation device

PPSP - Project Physical Security Plan

PMP - Project Mobilization Plan

PUA - Public Use Area

PWC - Personal Water Craft

SF - Standard Form

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

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

SMP - Shoreline Management Plan

SOP - Standard operating procedure

TEAM - The Environmental Assessment and Management guide

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

WAN - Wide Area Network

Abbreviation of Natural Resources Management Projects:

Lake Barkley - BAR/R

Old Hickory Lake - OLD/R

Cheatham Lake - CHE/R

J. Percy Priest Lake - JPP/R

Cordell Hull Lake - COR/R

Dale Hollow Lake - DAL/R

Center Hill Lake - CEN/R

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

Laurel River Lake - LAU/R

Martins Fork - MAR/R

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
13.

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. Computer Applications
33. Public Use Data Collection
34. Report Calendar
35. Five-Year Program

The OMP is used as a working tool and includes funds, 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 is updated every five years. Approval of the OMP and its updates rests with the District Commander.

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 insure 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 insure that environmental quality exists consistent with project purposes.

15. Formulates actions to improve environmental quality where necessary.

H. *Tools of the Trade*

Vehicle Operation

Due to the nature of a 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 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.

As part of the first year of training, each ranger will attend an approved defensive driving course. You will be advised as to when and where a class will be held.

Drivers and all passengers are required to wear a seat belt at all times while in a government vehicle, and you will be expected to sign an affidavit so stating. 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 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 deal with assignments and situations while on patrol. Check with some of the other 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 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. 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 through all copies.

Your vehicle should be equipped with 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.

Reference

ORNR 56-1-3, Guide to Interagency Fleet Management System Vehicles

Training Requirements

- Complete the defensive driving course.
- Demonstrate safe driving abilities and habits.
- Be familiar with ORNR 56-1-3.
- Wear a seat belt at all times in a government vehicle and ensure that passengers do so as well.
- 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

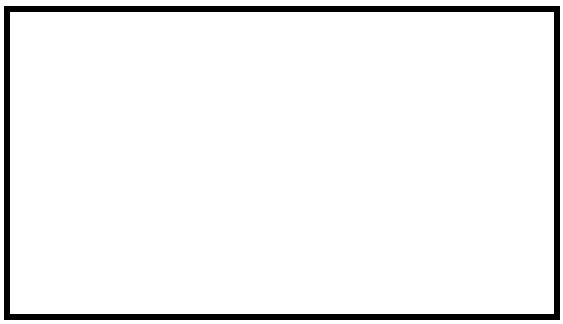
Radio Operation

Each 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 district radio system uses two primary frequencies (Fl and F2 on your radio) and an interconnected radio net of repeater (relay) towers for communication over long distances. The signals are FM (frequency modulated) which travel in a straight line, so communication is limited by a "line of sight" requirement. There are several ways to use the radio system and you should be able to select the method best suited to the circumstances. Three of these methods are *local operation, repeater operation, and system backbone operation.* These will be described further in the paragraphs to follow. A complete quick reference to radio systems operation is given in Annex F of the Radio Operator's Handbook.

Local operation communication is very limited in range, but it is useful when you need to be on the air frequently but don't want to clutter up radio communications at your project. It is used in instances such as surveying, directing traffic, or laying out a campground. Your radio should be set at Fl, no signal tone (ST).

Repeater operation communication is made possible through your project's repeater tower. Most on-project communication occurs using this method. If you are on patrol and wish to call the Resource Manager's office or another employee in a vehicle or boat, you would use this system. To activate the repeater, your radio must be set on F2 and one of the signal tones. The signal tone selected will depend upon which repeater is used and what type of radio you have.



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

The *system backbone* uses more than one repeater and has a much greater range. Base stations and mobile radios equipped with a dual-tone multi-frequency (DTMF) pad can access this system. (The DTMF pad is essentially a touch-tone telephone.) The sending and receiving units should be set at F2, no tone. If your vehicle does not have a DTMF pad, the autodialer attached to a base station can open the system for you. A table of the DTMF codes used with this system is given in the Radio Operator's Handbook.

At some lakes, selected vehicles are equipped with radios capable of direct communication with local law enforcement agencies. If your vehicle has a law enforcement band radio, become thoroughly familiar with its operation and the terminology used by the local agencies.

You should know the range for local radio operations, and the range when using

a relay tower. Use the lowest range sufficient for the purpose 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 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.

Reference

Radio Operators Handbook, Nashville District

Training Requirements

With the completion of your training, you should be able to:

- Use proper sign on, sign off, and prowords.
- Correctly set up and use your project's local and repeater systems.
- Initiate and receive radio calls through the backbone.
- Be thoroughly familiar with the Radio Operator's Handbook.

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 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 that 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.

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

Each 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 coworker. 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 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 (bitts, cleats, chocks, or rings). When tying up, always fasten lines to a floating mooring bitt or loop the line over a floating bitt 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 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.

Computer Applications

The use of microcomputers and automatic data processing systems is now common in schools, colleges and universities, businesses, organizations, and government. Computers have been used in some capacity for many years in the Nashville District; project visitation was being processed on a mainframe computer as early as 1970. In the past, most work depended on a mainframe computer in the district office.

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

The emphasis is now on networked desktop personal computers (PCs) for most applications. With the availability of powerful and adaptable computer software and more competitive prices, all of the work previously done on mainframe computers can now be accomplished at the field level.

Project, district, division, and headquarters offices are linked through the wide area network (WAN). In addition, desktop computers at each office are linked to a local area network (LAN) and have the capability to send messages and files to other project offices or to the district or division office using an email system. Most project offices have several microcomputers linked to a project file-server. Because of these linkages and the ease of sharing computer information, there is a greater need than ever for employees to be sufficiently trained in many aspects of computer information security.

Each Resource Manager's Office has desktop personal computers that are IBM class compatible machines. The computers have a Pentium microprocessor along with large-capacity hard drives and adequate random access memory (RAM) to run most software applications. All offices have at least one networked laser printer.

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 Explorer (web browser), and FormFlow 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 Sta-

tion (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, historographs, and bar charts.

Database management software (Access and dBASE) can be used to handle relatively large data bases. It can generate reports containing specific parts of the data base in a particular order or format.

The Natural Resources Management System (NRMS) program was an example of a large applied database system. The NRMS was a data collection and reporting system which contained statistical data on all Corps lakes in the nation. The NRMS had existed since the late 1970's. The NRMS data, although independent in the past, is now incorporated into a larger system of databases, the Operations and Maintenance Business Information Links (OMBIL). The OMBIL system, which is a web-based data system, will collect NRMS-type data and replace the older System. The purpose of the OMBIL system 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 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 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.

I. *Features of the Cumberland River Basin*

Culture

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

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

Dr. Thomas Walker settled on the Cumberland River near the site of present Barbourville, Kentucky in 1750; it was he who named the river in honor of the Duke of Cumberland. Timothy Demonbreun settled at the site of Nashville in 1760 and lived in a cave in a bluff on the river. James Smith and his company explored the Cumberland and Tennessee River country in 1766. One of the 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.

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.

Minerals

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

Geography

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

The topography of the basin varies from rugged mountains in the eastern portion to the rolling low plateau in the western part, with elevations ranging from

4,150 feet above mean sea level in the Cumberland Mountains to Elevation 302 in the pool water at the mouth of the river. The upper portion of the basin above Burnside, Kentucky, lies in the Cumberland Mountains and Plateau, where the river and its tributaries flow in deep narrow valleys bordered by rugged, mountainous country.

In the central portion of the basin, between Burnside, Kentucky, and Carthage, Tennessee, the valley adjacent to the 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.

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 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 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.

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, estimated natural crest, and highest record crest. Also, actual monetary damage is compared to estimated monetary damage had the projects not been built.

Flood of 1975

	Clarksville	*Nashville*	*Carthage*	*Celina*
Actual Crest	388.0 ft (3/14/75)	47.64 ft (3/15/75)	46.95 ft (3/14/75)	38.15 (3/13/75)
Est. Crest	393.1 ft	55.4 ft	68.5 ft	58.0 ft
Record Crest	396.6 ft (Jan'37)	56.2 ft (Jan'27)	59.8 ft (Dec'26)	57.25 ft (Dec'26)
Actual Damage	$120,000	$6,500,000	$1,500,000	$4,000
Est. Damage	$6,300,000	$100,000,000	$22,000,000	$435,000

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 identification.

References

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

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

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

- *The Cumberland*, James McCague, Holt, Rinehart, and Winston, New York, 1973.
- *Early Times in the Cumberland Valley*, James A. Crutchfield, First American National Bank, Nashville, TN, 1976.
- *Essentials of Earth History*, William L. Stokes, Prentice Hall, Inc., Englewood Cliffs, NJ, 1973.
- Project Operational Management Plan, Part I
- "*Report on the March 1975 Cumberland River Basin Flood*", Nashville District, Corps of Engineers.

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 to the Natural Resources Section, as well as orientations with the following elements:

- Readiness Branch
- Regulatory Branch
- Hydropower Section
- Locks Section
- Real Estate Division, Management and Disposal Branch
- Audio-Visual Information
- Contracting Division
- Construction Branch
- Safety and Occupational Health Office
- Public Affairs Office
- Office of Counsel
- Physical Support Branch

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.

Lake Cumberland

Visit Mill Springs Mill and become familiar with Corps role in its restoration. Tour the state parks.

Dale Hollow Lake

Visit the National Fish Hatchery, state park, and eagle hacking tower.

Cordell Hull Lake

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

Center Hill Lake

Tour the project with special attention to state parks and the Appalachian Craft Center.

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.

J. Percy Priest Lake

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

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.

Lake Barkley

Tour the project with emphasis on TVA, USFS Land Between the Lakes and other federal/state agencies with which the

Corps works. Visit Fort Donelson National Battlefield and Smithland Lock and Dam.

Laurel River Lake

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

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.

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 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 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 follow:

- 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 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 above-board; this inspires confidence. Be enthusiastic, as this inspires enthusiasm, maintain eye contact, and solicit feedback.

Enthusiasm inspires enthusiasm!

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

- When answering the telephone, identify yourself as to project, name, and title ("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 all 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 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.

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.

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, 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.

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 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 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 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. Here are several suggestions which should be helpful in maintaining 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 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 just 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 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 in 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.

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 Ranger, you must be constantly aware of the fact 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, the ranger must ensure that positive understanding exists concerning the position of the Corps and the concessionaire. Carry out discussions in a friendly but businesslike manner. Avoid levity as

this may cause misunderstanding as to the seriousness of the purpose. Do not be apologetic for regulations and policy, and do not belittle or criticize the government in order to gain favor with the other party. However, you should show interest in the well-being of the concessionaire and readily carry his or her requests and recommendations back to the resource manager.

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

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

References

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.

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.

C. *Protection*

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).

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).

The Corps conducts emergency operations when flooding conditions exist.

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 amount (estimated), 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.

The ranger 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.

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 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 Project Physical Security Plan 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.

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 resource 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 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 $5000 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. Corps of Engineers personnel were added to the federal officials covered by this law in 1983.

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 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 Resource 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.

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.

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 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 they 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 District Supervisors dated 18 April 1989, Subject: New ENG Form 3394, Accident Reports. 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 District Supervisors dated 18 April 1989, Subject: New ENG Form 3394, Accident Reports.

Training Requirements

- All 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.

Fire Prevention and Control

The 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 fire fighting equipment in administrative and maintenance areas.

Wildfires on public lands usually result from human activity, with less than one per cent 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 fire fighting equipment (fire flapper, water backpack, fire rake, and Pulaski) at a safety meeting.

Pest Control

Pest control, in its broadest sense, includes all factors that limit or control pests. Pests can include any form of terrestrial or aquatic plant or animal life, virus, bacteria, or other micro-organisms. Control methods can be divided into two main categories: natural and applied. Natural controls include the effects of climate, habitat, interspecies competition, predation, and other natural factors. Applied controls are human control efforts such as herbicides, rodenticides, and other chemical measures, mechanical devices, (traps, mowers), biological controls, physical controls (lake drawdown, fire, grazing), and legal controls (quarantines, shipping restrictions, etc.).

The objectives of the pest control program are to maintain employee and public health and safety and to manage project resources to minimize aesthetic, environmental, and economic degradation.

All rangers should be familiar with a multitude of information including basic biology, physiology, life cycles, and habitats of potential pests. Rangers should also be familiar with control methodologies, such as the use of chemical, physical, and biological controls. While some controls are designed to react to existing problems, such as trapping to control problem rodent populations, pest control should also be preventative, such as ensuring proper sanitation and eliminating potential breeding areas.

You should be continuously alert to potential pest problems, including mosquitoes, ticks, ants, termites, tree and turf pathogens, rodents, poison ivy, exotic plants, etc. You should be familiar with pesticide labels, pest control equipment, safety, and first aid for poisoning, bites, etc.

You should be thoroughly acquainted with all aspects of the project pest control program, as described in the Project Operational Management Plan, Part I, and provide technical assistance and information to maintenance personnel and the public. Visitors to the project may occasionally voice complaints or inquire about specific pests. You should be aware of the various control programs conducted and available at the project to be able to provide accurate information to the public.

Pest control operations are often carried out in cooperation with other agencies such as the county health department, state wildlife agency, U.S. Forest Service, and U.S. Department of Agriculture, Wildlife Services. You should maintain frequent contact with such officials; a program of periodic meetings and joint inspections will usually benefit all concerned.

Key Terms

The following terms will be encountered when working with pest control programs. You should study the following key terms and their definitions:

active ingredient - chemical that controls the target species

adulticide - pesticide that is effective on the adult stages of an insect pest

annual - plants with a one-year life cycle, as opposed to biennials or perennials

anti-coagulant - agent that prevents clotting of blood

attractants - agent which attracts the target species, usually refers to a scent

biological control - control through natural, biological agent (e.g., predator species or bacteria that is specific to the target species)

chemical control - control through herbicides, pesticides, or similar chemical means

contact poison - kills by direct contact to leaves, skin, etc., does not have to be taken internally

cultural control - "housekeeping" practices which alter the environment, condition of the host, or the behavior of the pest to suppress or prevent infestation

diluent - inert ingredient in pesticide formulations used as a diluting agent

emulsifiable concentrate - pesticide containing the active ingredient, one or more petroleum solvents and an emulsifier which allows the formulation to be mixed with water

emulsion - a suspension of pesticides in another liquid

fumigation - use of toxic gases for insect control, usually for structural or food pests

fungicide - chemical agent toxic to fungi

herbicide - chemical formulation toxic to plants

inert ingredients - wetting agents, spreaders, diluents, extenders, or other substances added to chemical formulations to make them safer or easier to apply, more accurate to measure, or to increase efficacy of active ingredients

insecticide - chemical formulation toxic to insects

larvacide - pesticide effective against larval stages of insects

life cycle - various stages of plant or insect life (i.e., egg to larvae to pupae to adult)

mechanical control - control using tools such as hoes, rakes, harvesting equipment, etc.

nematicide - pesticide effective against nematodes

perennial - persistent plant living more than two years, as opposed to annual or biennial

pesticide - umbrella term for all chemical control agents (herbicides, insecticides, etc.)

repellant - agent that repels target species without killing them

rodenticide - pesticide effective against rats, mice, and other rodents

soil sterilant - herbicide applied to the soil which is residual (long-lasting), preventing successful germination of plant seeds

solution - mixture of two or more liquids or dissolved agents

systemic insecticides - poisons taken into the bloodstream; kills through damage of vital organs

thermal fogger - device which sprays pesticides in a vapor or fog form

toxicity - the measure of harmful effect of a chemical agent on a target species

ultra-low volume application - application of highly concentrated pesticide containing eight or more pounds of active ingredient per gallon of solution

References

- ER 1130-2-500, Chapter 14 - Aquatic Plant Control Program
- ER 1130-2-540, Chapter 3 - Pest Control Program for Civil Works Projects
- Project Operational Management Plan, Part I
- *How to Identify and Control Water Weeds and Algae*, James C. Schmidt, Ed., 4th Edition, Applied Biochemists, Inc. Milwaukee, WI, 1990.
- Technical Report A-88-9, *Aquatic Plant Identification and Herbicide Use Guide, Vol. II: Aquatic Plants and Susceptibility to Herbicides*, Howard E. Westerdahl and Kurt D. Getsinger, Ed., Waterways Experiment Station (WES), Vicksburg, 1988.

Training Requirements

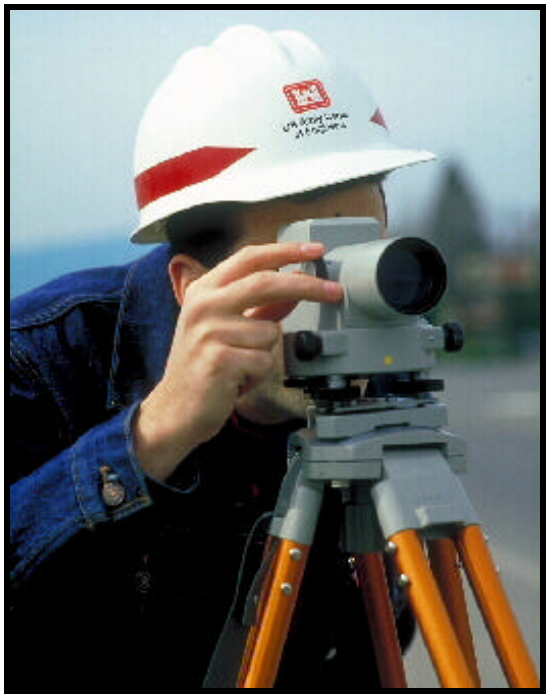
- Become familiar with meaning and importance of key terms.
- Become familiar with the referenced materials concerning the basic fundamentals described in the text.
- Complete the following correspondence course: "Basic Pest Management," Course No. USN 151, TPC Training Systems, 750 Lake Cook Road, Suite 250, Buffalo Grove, Illinois.
- Learn to identify the problem aquatic plant species in the district.

D. *Special Skills*

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 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 cadastrial surveying. In your work, you will be faced with numerous decisions involving project boundaries. Thus, a working knowledge of property surveying is essential.



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

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.

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

- Complete Correspondence Course No. EN0591, "Surveying I," Army Correspondence Course Program, Army Institute for Professional Development, website at: www.atsc.army.mil/accp/catalog.htm.
- 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.

Photography

Photography is an important aspect of ranger work. Slides, prints, digital images, and videotape 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 diskette or memory card (Olympus Co).

You should periodically inspect the slides, color and black and white prints and negatives, 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, and 1/2-inch VHS format videotape cassette camera-recorders (camcorders).

The high quality 35mm cameras currently in use 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 which are more difficult with which to tamper.

The use of the videotape camcorder is somewhat more complex and requires practice. The lens allows zooming in for a close-up or fading to a more distant shot. The term, "panning," refers to moving the camera smoothly in an arc from subject to subject. The camcorder also records sound. 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 stressing features unique to your lake. Include visitors in pictures of recreational facilities whenever possible, but be sure that they are observing good safety practices such as wearing PFD's when water skiing or riding in boats. The visitors should be the central element of the picture, and their faces should be clearly visible if possible.

Shots of 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.

or

  - 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.

Maps and Aerial Photographs

Reading maps and aerial photographs is an essential skill to the ranger. Maps and aerial photographs provide the means of fixing 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, foot, and especially by airplane 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, which require their use.

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. The newer survey maps also are plotted on the state plane coordinate system.

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.

Aerial photographs are taken in consecutive order along a linear flight path. A map constructed from these individual photos in such a manner as to eliminate the distortion caused by the curvature of the earth's surface is known as an aerial photo mosaic. If two consecutive individual photos are viewed with the aid of an optical instrument called a stereoscope, a three-dimensional (relief) image can be seen.

Planimeter

A planimeter is an instrument used to determine area, based on the scale of a map or aerial photograph. By precisely tracing the borders with the planimeter pointer and then applying the proper mathematical formula to the resulting reading, the area of any closed figure can be found. The planimeter may be used to determine the acreage of a leased area, recreation area, timber harvest, management compartment, cove, etc.

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.
- Use a scale to measure distance and a planimeter to determine area on a map or aerial photograph.
- You should visit the offices of the county property assessor and register of deeds and examine the maps which are available there.
- Complete the Correspondence Course No. IS0788, "Land Navigation," Army Correspondence Course Program, Army Institute for Professional Development, website at: www.atsc.army.mil/accp/catalog.htm.

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 rangers and your Training Officer to learn the basic use of this equipment.

Training Requirements

- Complete Correspondence Course No. EN0113, "Construction Print Reading," Army Correspondence Course Program, Army Institute for Professional Development, website at:

www.atsc.army.mil/accp/catalog.htm.

- 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.

E. *Outdoor Recreation Management*

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 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 standard possible.

We must also 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 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 siting, constructing, operating, and maintaining recreational facilities is invaluable.

Americans With Disabilities Act

We are responsible under Section 504 of the Rehabilitation Act to provide access to all of our programs or activities. This is not meant to imply that every facility must be accessible by American Disabilities Act Accessibility Guidelines (ADAAG), though that is the ideal. Some of the facilities for a particular activity must meet the guidelines.

New facilities should meet ADA guidelines.

As an example, not every picnic or camping site has to meet the ADAAG, but some of the sites must. It is always desirable to avoid creating obstacles such as steps wherever possible. New facilities should meet ADAAG 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-1110-2-410, Design of Recreation Areas and Facilities
- EM-385-1-1, Safety and Health Requirements
- EP 310-1-6a/6b, Sign Standards Manual

Recommended Course

"The Campground Management and Rehabilitation Workshop," sponsored by the University of Tennessee at Martin.

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 Americans With Disabilities Act Accessibility Guidelines (ADAAG).

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. Studies have shown that on average, day use visitors to Corps of Engineers lakes spend about $21.50 for every recreation visit that they make in the lake area. Likewise, overnight visitors spend about $82.50 for every recreation visit they make. These expenditures include those for food, lodging, fuel, bait, souvenirs, etc.

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

As a 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, the newest type, 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 type, 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 so as to increase the chances of obtaining an accurate sample according to time, day of the week, and season. The Waterways Experiment Station (WES) 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 recreation use.

At the end of each month, the traffic counters are read and the data collected is entered into the microcomputer in the project office. When the raw visitation data has been entered, the VERS system applies statistical data 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 recreation 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 recreation 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 Resource 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.

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, rowdyism, and overuse/overcrowding. Campsite reservations are currently handled through the National Recreation Reservation System (NRRS™), a multi-agency initiative by the Corps of Engineers and the U.S. Forest Service that allows 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
- CEORN-CO-T-N Memorandum, dated 24 September 1999, Nashville District Policy on Recreation Use Fee Collection Procedures
- NRRS™ Operating Procedures Manual

Training Requirements

- As a 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.

  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 CEORN-CO-T-N Memorandum, dated 24 September 1999, 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.

F. *Natural Resources Management*

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 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 Chapter 2 of ER 1130-2-540, 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, the 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 Watermilfoil 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 totally to formerly fishable embayments, and they can choke much of the lake and can actually 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 an inefficient 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. Just as stocking is useful only in specific situations, so is the case with closed fishing seasons. 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; 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 the 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 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 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, electrofishing, etc.). You should become acquainted with the state personnel responsible for fisheries management and enforcement at your lake.

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 animal, 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 all habitats, there are limitations as 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 could 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., trails, 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 plants 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, MS
- *Wildlife Management Techniques*, Robert H. Giles, Jr., Ed., The Wildlife Society, Edwards Brothers, Ann Arbor, MI, 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.

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 used for more difficult identifications.

- *Silviculture* is the branch of forestry dealing with the development and care of forests. Silvicultural practices with which the ranger will be involved include regeneration reforestation; cultural practices to improve the forests for wildlife habitat, recreation and aesthetics; and practices to insure stand vigor. The 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 per cent 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 per cent 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. Each year, the number of these cases continues to grow. Prevention efforts through surveillance, communications with adjacent landowners and real estate agents, and public information are important in reducing the number of these incidents. Once discovered, however, 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 Section to develop a valuation of the damaged property and work towards restoration or legal action.

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.
- *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.

Soils

The physical characteristics of the soil can often determine if a site is suitable for a particular management activity. As a 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 the 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 the natural vegetation should 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
- (6) *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.

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 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.

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 centigrade 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 Centigrade (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 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 often is called simply a current. This unidirectional movement may be caused by differential heat distribution within the lake, flows of stream water through the lake (due to upstream releases for flood control or hydropower 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 Ed., 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.

G. *Environmental Management*

Environmental Management is the conservation, protection and restoration of our natural and cultural resources. The Corps of Engineers must manage resources for multiple uses. We, as resource managers, must be alert when actions by the Corps or others have the potential for environmental impacts on Federal lands. It might be helpful to think of stewardship instead of management since our goals are to preserve, safeguard, and enhance these resources at all field projects.

The Corps recognized the need for a reference guide for use by field managers to assist environmental management practices. A comprehensive information and self-evaluation program was developed. The Environmental Assessment and Management (TEAM) guide (which replaces ERGO), helps to ensure that project operations are being conducted in compliance with existing federal, state and local environmental laws and regulations. Furthermore, TEAM assures that project supervisors are implementing effective environmental practices in accordance with USACE goals and objectives. Required periodic internal evaluations will assess project compliance. In your work as a ranger, you need to be aware of cultural and historical resources, hazardous waste management and other environmental concerns that affect the water resource project where you work.

Cultural & Historic Resources

The Cumberland River basin is rich in historical, archaeological and cultural resources. These non-renewable resources portray a clear link to our past while enhancing our present and future lives. All known cultural and historical resources within project boundaries will be preserved, protected and maintained. They must first, however, be identified. Each field project is responsible for locating and documenting such areas within their jurisdiction.

A Historic Properties Inventory included within an approved Historic Properties Management Plan will be maintained at each field project and the Nashville District Office. This information, however, will not be available for public review.

These sites must be inspected on a regular basis as part of your routine patrol of project lands. The unauthorized excavation, removal, damage, or alteration of historical and/or archaeological resources on project lands is prohibited and enforced through C.F.R. Title 36, the Archaeologi-

cal Resources Protection Act (ARPA), or other appropriate statutes.

Special steps must be taken when operational and construction activities threaten cultural and historical resources. If a site is discovered during construction, the work will be halted until the situation is evaluated. Alternative considerations will be made in planning of all project actions affecting such sites.

Hazardous Waste and Materials

Hazardous waste and toxic materials pose a substantial risk to human health and/or the environment. The Nashville District is committed to implementing the best management practices concerning hazardous wastes.

Two types of hazardous wastes are recognized: characteristic and listed. A characteristic hazardous waste is one that has at least one of the following characteristics: ignitable, corrosive, reactive, or toxic. Listed wastes are those specifically listed as toxic or acutely hazardous by the Environmental Protection Agency (EPA). Further information can be found in the TEAM manual.

Hazardous materials are materials or substances listed by the Department of Transportation (DOT) capable of posing an unreasonable risk to health, safety and property when transported. The Nashville District Policy regarding hazardous waste is to prevent its generation, if possible, rather than having to control it after its production.

It is the responsibility of each project manager to comply with all federal, state and local environmental regulations. Each manager shall conduct and document an annual environmental compliance review. This review will follow the guidelines provided in the TEAM manual. Facility managers should purchase only the amount of supplies and materials needed and use what is purchased. Excess viable material can be transferred to another project. Under no circumstances will the Corps authorize the storage of hazardous waste at a field project beyond time limits specified in the TEAM manual.

"In 1976, Congress passed the Resource Conservation and Recovery Act (RCRA) which directed the U.S. Environmental Protection Agency (EPA) to develop and implement a program to protect human health and the environment from improper hazardous waste management practices. The program is designed to control the management of hazardous waste from its generation to its ultimate disposal-from `cradle-to-grave'." District facilities must strive to maintain status as "Conditionally Exempt Small Quantity Generators" (CESQG). This means that our facilities can generate no more than 100 kilograms of hazardous waste per month. This amount is equivalent to approximately one-half of a 55 gallon barrel. Each project facility must never accumulate more than 1,000 kilograms of hazardous waste on site at any one time. A CESQG must properly identify and label all wastes generated and ship it through a licensed transporter to an approved hazardous waste collection facility. EPA identification numbers are not required by regulation for CESQG's.

All waste generated at field locations must be disposed of in accordance with applicable federal, state, and local regulations. All hazardous waste disposals will

be manifested. It is essential that disposal instructions on product labels, Material Safety Data Sheets (MSDS) and other available information be consulted and understood prior to disposal decisions.

Emergency procedures

It is your responsibility as a ranger to be familiar with your project emergency procedures. These can be found in standard operating procedures, the Project Operational Management Plan, and the Emergency Management section of this manual.

If you come across an emergency situation such as a spill, leak, or other questionable occurrence, the safety of project personnel and the public are of paramount importance. Do not walk into or touch the spilled material. Avoid inhalation of fumes, smoke and vapor. Document all actions taken, such as who you called, date, time, and response received. Attempt to identify the hazard though placards, container labels, shipping papers, physical characteristics, or from a knowledgeable person on the scene. Contact your Project Emergency Manager and begin notification of those listed on the Project Emergency Action Plan.

Important Terms

Air Emissions - Emissions from equipment and vehicles at Corps facilities are a source of air pollution. Preventive maintenance will ensure efficient operation of all vehicles, vessels and machinery. These should be regularly inspected for proper operation to satisfy correct emission standards. Maintenance operations such as controlled burns, debris removal and spill clean up, often produce particulates and gases. Every effort should be taken to minimize these impacts if possible. Be sure that all required federal, state and local permits for such activities are acquired.

Natural Resources - Protection and management of our natural resources including fisheries, wildlife, forests, soils and watersheds, is a priority. Because of its importance, this topic is discussed in detail in the section on Natural Resources Management.

Pesticides - Certain undesirable biological species (insects, rodents, aquatic plants, etc.), often come into conflict with daily operations at Corps facilities. Pesticides are useful regulators for the prevention, control or elimination of such pests. Because of their toxic nature, pesticides must be stored and handled with care and many must be applied only by a licensed applicator. Each project has a Pest Control Plan to manage pests and pesticides in a way which provides for the safety of the environment and the public.

Oil and Petroleum - The Nashville District resource projects rarely store, transport or dispose of petroleum-based fuels, oils or lubricants. Nevertheless, fuel spills onto federal lands are a possibility. All rangers must be familiar with the emergency response required for oil and chemical spills. It is important to know exactly what to do, who to contact, and what equipment will be needed to respond in an emergency. Be familiar with the storage locations of absorbent spill control materials at your project.

Solid Wastes - Each project generates non-hazardous materials, such as trash, rubbish, garbage, bulky wastes, and/or liquids, that are classified as solid wastes. Landfills at one time were the efficient location to dis-

pose of solid wastes. However, these areas are becoming less practicable. Effective recycling programs will be used to reduce the amount of solid waste generated at each project.

The TEAM manual makes references to other additional factors that may or may not be present at the particular facility where you work. Although, as a ranger, you may not be directly involved with these specific items, it is important that you become aware of them. Special pollutants such as PCBs, asbestos, radon gas, and environmental noise will be monitored and corrected where appropriate. Underground storage tanks for use of hazardous materials or petroleum products have leaked and caused groundwater contamination. Underground storage tanks on Corps or concessionaire facilities must be in compliance with current federal regulations or be removed. Wastewater treatment plants will strictly adhere to all federal guidelines prescribed by the National Pollution Discharge Elimination Permit System (NPDES).

References

- *TEAM Manual with ERGO supplements*, U.S. Army Corps of Engineers.
- *Commander's Guide to Environmental Management*, Veronique D. Hauschild and William B. Pringle, Ed., Potomac Research, Inc., October 1990.
- *Understanding the Small Quantity Generator Hazardous Waste Rules: A Handbook for Small Business*, United States Environmental Protection Agency, Washington, DC., September 1986.
- Project Operational Management Plan: Chapter 18, Security and Emergency Operations; Chapter 23, Historic Properties Management; Chapter 26, Environmental Management.
- ER 1130-2-540, Environmental Stewardship Operations and Maintenance Policies

Training Requirements

- Read and become familiar with the booklet *Understanding the Small Quantity Generator Hazardous Waste Rules: A Handbook for Small Business*.
- Participate in a project emergency exercise for an oil or a hazardous substance spill.
- Become familiar with the DOT Emergency Response Guidebook.
- Locate your project's known historical and cultural resource areas and inspect for any alterations or digging activities.

H. *Permit/Outgrant Management*

As a 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.

Shoreline allocation maps are an important component of the Shoreline Plan.

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 this permit 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. 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.)

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, electric lines, security

lights, driveways, 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 also provide that the area may 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. Consents to easement are issued for indefinite terms.

Department of the Army Permits

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

A *nationwide permit* is a form of a general 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 can 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 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 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 Department of the Army Permit also require a proper real estate outgrant if the work involves a structure or fill (e.g.,

construction of a barge terminal or causeway.)

Application Procedures

Usually the first step in the permit/outgrant process consists of an on-site meeting between the 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.

Shoreline use permits and real estate outgrants 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 or outgrant directly to the Resource Manager's 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 outgrant is sent to the individual. Outgrant 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 data bases 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 was an owner or tenant at the time the federal government acquired the property in question.

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). (The applicant is not required to submit an application form in addition to his or her bid form.)

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 Department of the Army 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 pro-

posed 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 ranger, you will be required to conduct preliminary site evaluations and provide other documentation necessary for processing Department of the Army 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.

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, permits to governmental agencies, nationwide permits, or regional permits.

Inspections

Floating facilities and mowing, landscaping, or trimming work authorized by shoreline use permit must be inspected at least once a year. In the course of normal operations, these permit sites are actually inspected more often. 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 performed under Department of the Army Permit to assure compliance with plans and all permit conditions.

Overview of Shoreline (Lakeshore) Management

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

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

District policy was established, and lakeshore management plans were first implemented for Barkley, Cheatham, Old Hickory, and Lake Cumberland in 1973. Their primary objective was to set forth guidance and policies on how to judiciously balance public and private use of the shorelines while protecting scenic, environmental, cultural, and other natural values. The plans allocated areas where private moorage and residential mowing or hand-clipping privileges were authorized and protected areas where such uses were prohibited. District policy prohibited new permits or outgrants for these privileges at the other lakes in the district. Private use by adjoining property owners at these lakes was mainly restricted to water pipelines, agricultural leases, paths, and fire lanes on a case-by-case basis. Existing permits or outgrants in variance with the new policy were honored under the "grandfather" clause (allowed to remain in effect until sale or transfer of the adjacent property or removal of the nonconforming structure).

The Nashville District was a pioneer in the development of the Corps-wide lakeshore management program, which became effective through ER 1130-2-406 on 13 December 1974. This regulation required the preparation of a lakeshore management plan at each lake supporting private facilities or privileges and specified that no permits or outgrants for private exclusive use would be issued on new lakes

or older lakes where no such privileges were granted previously.

Lakeshore management plans have proved effective in providing consistent policies and guidelines on private use of public property for Resource Managers and the public alike. However, the process has not always been smooth:

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

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

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

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 now 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

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.

I. *Interpretive Services*

The 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 interpretative 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 recrea-

tional, 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 and 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 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.

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:
  - VISA Card - This card is generally used like any other bank credit card. The cards are issued to certain field employees 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.
  - Bank of America Card - The Bank of America credit card is similar to the Visa card, except that it 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 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 Division and other selected employees of CT 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 pro-

curement 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 Operators 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.

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 the 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 the 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 I., 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 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 Assurance

Before the contractor performs any work, two important programs must be es-

tablished 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 and quality assurance; be able to describe the basic steps involved in having a service performed under a requirements contract.

RANGER TRAINING PROGRAM

EVALUATION FORM

"Vehicle Operation"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates knowledge of ORNR 56-1-3, Guide to Interagency Fleet Management System Vehicles

(2) Trainee will complete the basic defensive driving course.

(3) Trainee will demonstrate knowledge of basic vehicle inspection (fluid levels, tire pressure, lights).

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

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of ORNR 56-1-3			
Complete Defensive Driving Course			
Vehicle inspection			
Complete required forms correctly			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Radio Operation"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates knowledge of the Nashville District Radio Operator's Handbook.

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

(3) Trainee demonstrates proper sign-on, sign-off, and prowords.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of Radio Operator's Handbook			
Set up and use project radio system			
Use proper radio procedures			
Complete required forms correctly			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Boat Operation"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

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

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

(3) Trainee demonstrates knowledge of state boating safety laws.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Receive motorboat training			
Attend boating course, obtain license			
Knowledge of state boating laws			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Computer Applications"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee successfully completes the DoD INFOSEC training requirement.

(2) Trainee is familiar with MS-DOS and Windows concepts.

(3) Trainee shows proficiency with computer applications including Microsoft WORD, EXCEL, ACCESS, POWERPOINT, OUTLOOK, etc.

(4) Trainee shows familiarity with CEFMS.

(5) Trainee demonstrates ability to use the local area network to share files and access printers.

(6) Trainee will generate and input the project's fishing report, and the monthly visitation report.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Completes INFOSEC Training			
Familiar with MS-DOS and WINDOWS			
Knowledge and use of computer applications			
Familiar with CEFMS			
Uses local area network			
Inputs fishing and visitation reports			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Public Relations"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates writing ability by preparing a general information letter to the public, a news release, and a memorandum.

(2) Trainee will organize and conduct a safety meeting for project employees.

(3) Trainee will complete correspondence course No PD2301, "Principles of Communication," Army Correspondence Course Program, Army Institute for Professional Development, website at www.atsc.army.mil/accp/catalog.htm.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Prepare a news release, memorandum, and letter			
Organize and conduct a safety meeting			
Complete "Principles of Communication"			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Standards of Conduct"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee maintains a well-groomed appearance while wearing the uniform correctly in accordance with ER 1130-2-550, Chapter 8.

(2) Trainee demonstrates punctuality in work hours and appointments.

(3) Trainee demonstrates knowledge of standards of conduct found in AR 600-50.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Personal appearance			
Punctuality			
Demonstrates knowledge of AR 600-50			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Emergency Management"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates knowledge of portion of the Project Operational Management Plan pertaining to Emergency Operations.

(2) Trainee demonstrates knowledge of the Project Mobilization Plan.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of OMP			
Demonstrate knowledge of PMP			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Crime Prevention and Physical Security"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates knowledge of the Project Physical Security Plan

(2) As directed by the supervisor, Trainee will conduct a security inspection of a project facility and report any security problems or deficiencies.

(3) Trainee will prepare a monthly consolidated incident report.

(4) Trainee will demonstrate procedure to be taken in event of a bomb threat.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrates knowledge of the PPSP			
Conducts security inspection of a project facility			
Prepares a monthly consolidated incident report			
Demonstrates procedure taken in the event of a bomb threat			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Visitor Assistance"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will complete 40 hour OCE sponsored visitor assistance course.

(2) Trainee will attend a session of the U.S. Magistrate's Court petty offense docket to observe courtroom procedure.

(3) Trainee demonstrates knowledge of CFR Title 36, Rules and Regulations.

(4) Trainee will participate in the development and negotiation of a cooperative law enforcement agreement.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Complete visitor assistance training			
Understand importance of courtroom demeanor, case development			
Demonstrate knowledge of CFR Title 36			
Participate in law enforcement agreement			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Safety"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will become familiar with requirements of EM 385-1-1, Safety and Health Requirements Manual.

(2) Trainee will complete an accident report, ENG Form 3394, for an accident at the project.

(3) Trainee will complete First Aid and CPR training.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Understands requirements of EM 385-1-1			
ENG 3394 completed correctly			
Complete First Aid and CPR course			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Fire Prevention and Control"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates knowledge of the sections of the Project Operational Management Plan pertaining to wildfire protection and wildfire trespass.

(2) Trainee demonstrates proper use of fire fighting equipment (fire flapper, water backpack, fire rake) at a safety meeting.

(3) Trainee will become familiar with U.S. Forest Service Manual "Firefighter's Guide."

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of OMP sections on wildfire			
Demonstrate proper use of fire fighting equipment			
Demonstrate knowledge of Firefighter's Guide			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Pest Control"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates knowledge of key terms and definitions.

(2) Trainee will complete correspondence course "Basic Pest Management," Course No. USN 151, TPC Training Systems, 750 Lake Cook Road, Suite 250, Buffalo Grove, IL

(3) Trainee demonstrates ability to identify problem aquatic plant species in District lakes.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Define key terms			
Demonstrate knowledge of OMP section on pest control			
Complete "Basic Pest Management"			
Identify problem aquatic plant species			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Surveying"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will complete correspondence course No. EN0591, "Surveying 1," Army Correspondence Course Program, Army Institute for Professional Development, website at www.atsc.army.mil/accp/catalog.htm.

(2) Trainee demonstrates ability to set up level properly and determine the elevations of points by differential leveling.

(3) Trainee demonstrates ability to measure horizontal distances using stadia and steel tape.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Complete "Surveying 1"			
Measure horizontal and vertical angles			
Measure horizontal distances			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Photography"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate proficiency in use of project photographic equipment.

(2) The Trainee will complete one of the following:

(a) 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.

(b) Correspondence Course No. DI0350, "Electronic Journalism," Army Correspondence Course Program, Army Institute for Professional Development, website at www.atsc.army.mil/accp/catalog.htm.

(c) Photography course in a local community college, continuing education center, etc.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate proficiency with photographic equipment			
Complete correspondence course or local training			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Maps and Aerial Photographs"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate ability to interpret maps and aerial photographs maintained at the Resource Managers Office.

(2) Trainee will demonstrate proficiency in scaling and use of the planimeter.

(3) Trainee will complete Correspondence Course No. IS0788, "Land Navigation," Army Correspondence Course Program, Army Institute for Professional Development, website at www.atsc.army.mil/accp/catalog.htm.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate ability to interpret maps and aerial photographs			
Demonstrate proficiency in scaling and planimeter use			
Complete "Land Navigation"			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Plans and Drawings"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will complete correspondence course No. EN0113, "Construction Print Reading," Army Correspondence Course Program, Army Institute for Professional Development, website at www.atsc.army.mil/accp/catalog.htm.

(2) Trainee will demonstrate a working knowledge of drafting equipment.

(3) Trainee will demonstrate ability to interpret plans and specifications of a structure at the lake.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Complete "Construction Print Reading"			
Demonstrate knowledge of drafting equipment			
Demonstrate ability to read plans			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Facilities Management"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will spend one week working with the project Facility Manager and assist in observing sites, structures and facilities for damage or deterioration and unsafe objects or conditions.

(2) Trainee will learn proper procedures for storage of materials, supplies, and equipment.

(3) Trainee will become familiar with maintenance of roads, trails, grounds, signs, buoys, and sanitary facilities.

(4) Trainee demonstrates knowledge of the Americans with Disabilities Act Accessibility Guidelines.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Work with facility manager			
Familiar with storage procedures			
Familiar with facility maintenance procedures			
Familiar with AEAA Guidelines			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Public Use Data"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will read and maintain several project meters for at least one month.

(2) Trainee will assist the project visitation coordinator in compiling and inputting monthly visitation data into the VERS program and generating the project visitation report.

(3) Trainee will identify information contained in the VERS report and be able to define "visits," "visitor hours," and "visitor days."

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Read and maintain traffic meters			
Assist visitation coordinator			
Define visitation terms			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Administration of Recreation Use Fee Areas"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will spend one week working with the project fee cashier, assisting with all aspects of the fee program.

(2) Trainee will read and demonstrate knowledge of regulations and district policies on campground administration, recreation use fees, and the National Recreation Reservation Service.

(3) Trainee will assist in preparation of the annual use fee closeout report.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Assist recreation use fee cashier			
Demonstrate knowledge of applicable regulations and policies			
Assist in preparation of closeout report			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Fisheries Management"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate knowledge of the Project Operational Management Plan section pertaining to fisheries management and ER113-2-540.

(2) Trainee will demonstrate ability to identify common species of game, rough, and forage fish found in the lake.

(3) Trainee will prepare a weekly fishing report.

(4) Trainee will be familiar with state fishing regulations and fisheries management programs at the lake.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of OMP and ER 1130-2-540			
Identify common fish species			
Create weekly fishing report			
Familiar with state regulations and programs			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Wildlife Management"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate knowledge of the Project Operational Management Plan section pertaining to wildlife management and ER113-2-540.

(2) Trainee will be familiar with state hunting regulations and wildlife management programs at the lake.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of OMP and ER 1130-2-540			
Familiar with state regulations and programs			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Forest Management"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee demonstrates knowledge of the sections of the Project Operational Management Plan and ER 1130-2-540 pertaining to forest management.

(2) Trainee demonstrates ability to identify common tree species around the lake.

(3) Trainee demonstrates knowledge of tree valuation methodology.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of OMP and ER 1130-2-540			
Identify common tree species			
Familiar with tree valuation methodology			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Soils"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate knowledge of the basic soil types found around the lake and the main physical characteristics.

(2) Trainee will demonstrate knowledge of soil characteristics which would limit recreational development at the lake.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of basic soil types			
Demonstrate knowledge of soil characteristics which limit recreational development			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Watersheds"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate knowledge of the watershed boundaries of the Nashville District and the Great Lakes and Rivers Division.

(2) Trainee will demonstrate knowledge of the section of the Project Operational Management Plan pertaining to basin surveillance.

(3) Trainee demonstrates knowledge of the area of responsibility for the lake and patrol the watershed.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Demonstrate knowledge of watershed boundaries			
Demonstrate knowledge of OMP, basin surveillance			
Demonstrates knowledge of area of responsibility			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Limnology"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will be able to define the major lake strata and describe the mechanics of lake overturn.

(2) Trainee will determine the trophic state and seasonal variation pattern of the lake.

(3) Trainee will demonstrate lake temperature sampling according to standard procedure.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Define and describe lake strata/turnover			
Determine trophic state and lake season			
Demonstrate lake temperature sampling			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Environmental Management"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will become familiar with the booklet "Understanding the Small Quantity Generator Hazardous Waste Rules: A Handbook for Small Business."

(2) Trainee will participate in a project emergency exercise for an oil or hazardous substance spill.

(3) Trainee demonstrates knowledge of known historical and cultural resource areas at the lake.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Read handbook "Understanding the Small Quantity Generator"			
Participate in an emergency exercise			
Demonstrates knowledge of known historical and cultural sites.			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Permit/Outgrant Management"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate knowledge of different types of permits and outgrants, and procedures for processing applications.

(2) Trainee will conduct a compliance inspection of a minor real estate outgrant.

(3) Trainee will accompany a real estate compliance inspector on an inspection of a major real estate outgrant.

(4) Train will inspect work performed under a Department of the Army Permit and prepare a record of his or her observations.

(5) Trainee will conduct (or observe) an inspection of a private boat dock.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Knowledge of permit/outgrant types and processing procedures			
Conduct minor compliance inspection			
Observe major compliance inspection			
Inspect and document DA Permit work			
Inspect (or observe) private boat dock			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Interpretive Services"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will demonstrate knowledge of portion of Project Operational Management Plan pertaining to interpretive services.

(2) Trainee will plan and conduct an on-site and an off-site interpretive program.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Knowledge of OMP section on interpretive services			
Conduct on-site/off-site programs			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Procurement and Supply"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee completes an orientation by Contracting Division personnel during two-week District Office orientation.

(2) Trainee will participate in procurement of needed supplies for the project and perform the following:

  (a) Complete a PR&C in CEFMS.

  (b) Select preferred method of procurement.

  (c) Make the actual purchase.

  (d) Review necessary property accounting procedures.

  (e) Review receiving and payment procedures.

(3) Trainee will describe the significance of the limitations associated with purchases over $2,000, $25,000, and $100,000.

(4) Trainee will review appointment letters of a COR, ordering officer, and responsible employee.

EVALUATION	Excellent	Satisfactory	Unsatisfactory
Contract Division orientation			
Understands basic procurement procedures			
Understands procurement limitations			
Knowledge of appointment authorities			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**

RANGER TRAINING PROGRAM

EVALUATION FORM

"Requirements Contract Administration"

Trainee Name	Assigned Project	Date Completed

TRAINING REQUIREMENTS:

(1) Trainee will complete an orientation by the project COR.

(2) Trainee will spend one week with the project Park Contract Representative and:

- (a) Identify and develop a work order for a needed non routine item.
- (b) Prepare a government estimate and list of GFI.
- (c) Participate in discussions between the COR and the contractor.
- (d) Participate in the acquisition and transfer of GFI.
- (e) Inspect both routine and non-routine work.

(3) Trainee will demonstrate knowledge of the following:

- (a) Routine and non-routine work
- (b) Quality control and quality assurance
- (c) The basic steps involved in having a service performed under a requirements contract

EVALUATION	Excellent	Satisfactory	Unsatisfactory
COR orientation			
Temporary assignment with PCR			
Demonstrates knowledge of contract terms and procedures			

Evaluator Comments:

Trainee Comments:

Signature of Trainee	**Signature of Evaluator**	**Training Administrator, CO-T-N**