

CHAPTER 1

The War Years and the Postwar Growth of Natural Resources Management, 1941-1959

Erosion Control

During the prewar buildup of the U.S. Army, many soldiers had to live and train in dismal surroundings. The joke about living at 'Camp Swampy' was all too real for many recruits.¹ During rainy periods the bare earth around new installations became a sea of mud. During dry weather it produced immense amounts of dust. Army physicians believed that these conditions contributed to flu epidemics and other diseases among the troops.²

Prior to war's outbreak, the U.S. Department of Agriculture Soil Conservation Service (SCS) willingly responded to Army installation requests for erosion control assistance on an individual basis.³ On 1 December 1941, representatives of the Office of the Quartermaster General Repairs and Utilities Branch (R&U), Construction Division, met with experts from the Soil Conservation Service to formalize their cooperation for erosion control on Army bases.⁴ They created the liaison representative program so that SCS experts could provide surveys, planning, and technical assistance to the Army in response to the national emergency.⁵ However, the ongoing reorganization process caused by the Construction Division's transfer from the Quartermaster Corps to the Corps of Engineers also on 1 December complicated the liaison program. For example, SCS liaison representatives encountered

confusion regarding who to report to until mid-January 1942.⁶

The Japanese raid on Pearl Harbor on 7 December 1941 brought the United States into formal conflict with the Axis powers. Military planners recognized that national wartime mobilization required a military construction and training program on a massive scale. Natural resources management within the Army focused on facilitating the war effort.

A short three weeks after Pearl Harbor, an SCS regional officer sent a circular letter to area conservationists notifying them that erosion control operations in Army camps "has first priority as far as technical planning and the use of the technical facilities of this Service are concerned."⁷

An example of a typical inspection of an Army installation by an SCS liaison representative occurred on 19-20 December 1941 at Fort Leonard Wood, Missouri. The inspection concentrated on the cantonment area "and only a very brief amount of time was given to the balance of the 85,000 acre reservation."⁸ The inspector found enormous problems with drainage, grading, road work, and the development of a parade ground and artillery range. Plant cover and topsoil had been removed, leaving a sterile subsoil. River bottom soil was being hauled in and dumped but no one knew if this soil would support a vegetative cover. The inspector requested a party comprising a conservation engineer, soils specialist, and erosion control planner to prepare an erosion control plan that would supplement the proposed landscaping plan. Absent such planning, the inspector worried that runoff from the denuded construction site would create a constant and costly upkeep problem.⁹

Erosion control received early attention from Repairs and Utilities because serious erosion hampered

troop training. In turn, training exercises and tank traffic tore up the ground and caused erosion.¹⁰ From the beginning, the lack of trained personnel and equipment made the erosion control effort difficult.¹¹ The available manpower was spread so thin that when a civilian landscape architect unexpectedly quit at one installation, the commanding officer was "in a bad spot" without a technical person to supervise erosion control measures.¹² Lieutenant Colonel E.F. Ketcham, chief of Repairs and Utilities, noted in 1943 that "the shortage of qualified agronomists in the Seventh Service Command has made it necessary that the fullest use be made of those who are available."¹³ He explained that those installations lucky enough to have agronomists had to share their "technical knowledge and experience" with installations lacking agronomists.¹⁴

The magnitude of Army erosion control needs led to their classification as a national priority and a "Direct National Defense Activity" in early 1942.¹⁵ Simultaneously, installation officers became so conscious of the need for erosion control for practical and tactical reasons that many objected to any so-called landscaping plans because they appeared to go beyond erosion control.¹⁶

In the nationwide push for erosion control at Army installations, some planners went a bit overboard and forgot about their budget limitations. The Agronomy Division chief of the Soil Conservation Service, C.R. Enlow, was forced to write to the San Antonio District Engineer, "While you fellows have done a whale of a piece of work in a very short time, I am afraid that you have over-controlled the erosion a bit. If all of the money that the Army has for erosion control were allotted to the 8th Corps Area, you still would not have enough to do the job you have outlined."¹⁷

After the Soil Conservation Service's initial rush

to help the Army with its erosion control problems, some SCS personnel expressed a desire to return to their normal routine. The Soil Conservation Service chief felt obliged to remind his subordinates that "The erosion control work on cantonments, forts, camps, and all other Army posts, that may be requested by the Utilities Officers in the District Engineers Offices, is No. 1 priority."¹⁸

The beginning of July 1942 saw the transfer of SCS liaison representatives to the War Department payroll so they could function more efficiently within the military chain of command.¹⁹ The Soil Conservation Service accepted the transfers as necessary, agreeing to give the liaison personnel their jobs back when the war ended.²⁰ Ultimately, many former SCS agronomists opted to remain with the military after the war.²¹ The Army and the Soil Conservation Service maintained their erosion control partnership in the decades following the war. Under a departmental cooperative agreement and memoranda of agreement with individual installations, the conservation service continued to provide Army installations with technical assistance, such as soil surveys, on request.²²

Over time, the Soil Conservation Service developed guidelines for erosion control. The guidelines emphasized the need to control excess water before attempting any planting and specified soil preparation methods, methods of seeding and sodding, appropriate regional grass mixtures, and management of growing vegetative cover.²³

In general, the erosion control problems Repairs and Utilities confronted occurred on installations east of the Mississippi.²⁴ In the arid West, problems centered around dust control. Wind rather than rain propelled construction-exposed soils and created dustbowl-like conditions on many installations. Prob-

lems were particularly acute at newly built air bases where the effects of frequent air traffic augmented natural forces.

Burton F. Kiltz, Buildings and Grounds' chief agronomist from 1951 to 1965, served as a dust control specialist with Eighth Army in Dallas during the war. Like many others, he moved from the Soil Conservation Service to the Army engineers to lend his expertise to the military construction effort. Kiltz's first chore was to establish dust control schedules for each installation that had to be met "no matter what the cost."²⁵

Repairs and Utilities, located in faraway Washington, DC, contributed little toward a solution to dust control problems. Headquarters personnel tended to be Easterners who did not know very much about the special problems occurring in desert environments. Accordingly, Kiltz supervised a series of trial and error experiments at various installations until finding a solution. The solution involved dumping crushed rock on dusty areas. Supported by the planting of drought-resistant plants, this approach worked at such places as Fort Bliss.

News of the successful use of crushed rock spread to other installations. By 1943 it became a standard procedure for dust control at airfields. Workers at Dugway Airfield in Utah, for example, covered 22 acres with a gravel blanket and sprinkled additional areas with gravel as needed. They supplemented this by seeding vegetative cover on 320 acres.²⁶

Solving dust problems at air bases required Repairs and Utilities to coordinate with the Buildings and Grounds Section of the Army Air Force. Beginning in 1943, the Repairs and Utilities Grounds Maintenance Unit advised the Army Air Force on how to plant turf and ground covers to control dust at airfields.²⁷

Until the Air Force became an independent branch of the military in 1947, overlapping lines of authority caused confusion for workers in the field.²⁸

In sum, Repairs and Utilities' wartime efforts centered on making installations livable while solving any problems that interfered with troop training. In the East, the water erosion of bare soils at new installations was the major challenge. In the West, wind erosion of dry soil and resulting dusty conditions predominated.

Igloos

In the postwar years, Repairs and Utilities continued to oversee projects begun during the war.²⁹ In addition to the old erosion and dust control problems, a new erosion problem centered around land management practices in ammunition storage areas.³⁰ Earth-covered structures called igloos served to store ammunition. Soils easily eroded from the igloos. The area around the igloos required an extensive system of firebreaks and vegetation had to be controlled to preclude the accumulation of combustible material.

In 1947, Repairs and Utilities, now a division under the Military Construction Directorate, considered procedures for repairing ammunition igloos and magazines. Heretofore, water leakage into the igloos had been a serious problem. Repairs and Utilities' initial efforts to solve this problem focused on mechanical solutions such as correcting defective flashings or using a different waterproofing material.³¹ Efforts then turned to the problems of erosion control around the igloos.

Vegetative cover was not an option in very arid locations. Asphalt roofs tended to crack. Each crack became a vulnerable spot in the protective cover.

Tumbleweed sprouted in the cracks, eventually died, and left a root network that weakened the soil and attracted rodents. Rodents further eroded the protective cover. Installation maintenance personnel explored a variety of solutions, including a barricade of protective gravel on top of an arsenic trioxide soil sterilant.³²

The lack of detailed policy statements regarding grounds maintenance in general and igloo maintenance in particular was the subject for a meeting between Repairs and Utilities and the Personnel and Training Division of the Office, Chief of Ordnance, in November 1949. Repairs and Utilities worried that there were widely varying standards of grounds maintenance at Ordnance installations.³³ Repairs and Utilities recognized such variation was partly due to the fact that local conditions rendered detailed instructions undesirable and that change of commands often caused a revision of ground maintenance plans. Repairs and Utilities made two proposals to address these problems. It suggested that specific conditions at all installations should be subject to detailed analysis during the normal review and approval of the land management plan by Army headquarters and the Offices of the Chief of Ordnance and the Chief of Engineers. It further proposed that a special regulation should require that major revisions to grounds maintenance plans be approved through the same channels as the original plan. In this fashion Repairs and Utilities hoped to introduce some standardization in grounds maintenance procedures.

The value of land management planning quickly became apparent in the field. In response to Engineer Letter Number 46, 28 November 1949, requiring Fourth Army installations to consider how to utilize their grounds economically, the Louisiana Ordnance Plant in

Shreveport began a grazing program. The plant found that grazing around its igloos and production line areas was an excellent way to control vegetative growth. Grazing reduced mowing requirements, virtually eliminated hand labor requirements, reduced soil erosion and fire hazards, and contributed substantial revenue from leases.³⁴

Throughout the 1950s, the dual problems of vegetative cover on top of and soil erosion around the storage igloos continued to plague Repairs and Utilities. The American Society of Agricultural Engineers discussed the problem at its annual meeting in 1956. Papers presented by military land managers compared various types of grass as vegetative covers for explosive storage igloos and considered aggregate blankets for earth-covered structures.³⁵

During the 1950s, Repairs and Utilities promoted herbicides for controlling vegetative growth in certain situations, including around igloos.³⁶ Installations employed chemical sterilization of the soil, chemical elimination of undesirable species, and chemical control of plant height, known as chemical mowing.

In 1960, the Office of the Chief of Ordnance sent a letter to Repairs and Utilities indicating the continuing severity of the igloo problem and requesting technical assistance: "This office is vitally interested in assembling data and criteria upon which to base engineering decisions regarding maintenance and repair of protective earth cover on ammunition storage igloos."³⁷ Ammunition storage igloos at Ordnance installations had been built using a minimum of at least two feet of earth cover. Erosion had reduced numerous igloos to less than this minimum. Restoration was necessary, but funds were limited.

Repairs and Utilities had carefully considered the erosion problem the previous year and published a

supplement to Technical Manual 5-630, Repairs and Utilities, Grounds Maintenance and Land Management. The supplement dealt with planting and erosion control on earth-covered structures. While the Ordnance Corps recognized the wisdom of Repairs and Utilities' approach, it decided that "to permit efficient and orderly programming of required maintenance work, it is considered necessary to establish tolerances which will allow a reasonable degree of deviation from the standard."³⁸

Grounds Maintenance

In addition to the special problems associated with igloos, Repairs and Utilities confronted other types of grounds maintenance problems. During the war its Grounds and Grassing Unit provided oversight for the post engineer's grounds maintenance responsibilities. These responsibilities were codified in Technical Manual 5-600: "The post engineer's grounds-maintenance responsibilities include revegetation, renovation, fertilization, and grass mowing."³⁹ Technicians on the staffs of service command engineers supervised grounds maintenance and dust and erosion control projects. During the war, any landscaping done in the name of groundskeeping had to meet a standard of Spartan simplicity.⁴⁰

Land management planning was becoming a major concern, and grounds maintenance, a subset of land management planning, had to fit in with an installation's overall management plan. In 1949, an engineer conference at Fort Belvoir considered how this could best be done. The conference focused attention on cost records for grounds maintenance.⁴¹ Cost records were important, because while some 80 percent of all Army installations were wooded, more funds were spent on the

other 20 percent for such activities as landscaping, maintenance, and grass cutting.⁴²

By 1958, Army Regulation (AR) 420-74 defined grounds maintenance in some detail as

work essential to the assigned military mission for preservation, development, and improvement of lands. It includes technical land management planning and supervision; control of erosion, dust, and vegetative fire hazards; field drainage; establishment, maintenance, and control of vegetative cover; control of weeds and noxious plants; development and maintenance of landscape plantings; traffic control on other than established traffic areas; repair of eroded areas; soil conservation; and woodland management and improvement practices.⁴³

The regulation, as had previous versions of Army Regulation 420-74, distinguished improved from unimproved grounds. Improved grounds were those on which "intensive development and maintenance measures are effected to facilitate the military mission."⁴⁴ These normally included an installation's built-up sections that had lawns and landscape plantings such as parade grounds and athletic fields. Unimproved grounds were areas not defined as improved or woodlands. Normally the term applied to such zones as maneuver areas, artillery ranges, ammunition storage areas, and outlease areas.

Land Management

During the war, land management planning "consisted of evaluating individual proposals which demanded immediate attention with little thought to the

results of such action beyond the immediate future." Following the cessation of hostilities, the Army began to seriously plan for land management.⁴⁵

By 1949, professional Army land managers had formulated a policy for the management and utilization of lands within military installations: "It is the policy of the Department of the Army to manage, utilize and maintain all lands and grounds within the boundaries of an installation so as to facilitate its present and future military mission, and to conserve and maintain all its lands including forests in accordance with sound agricultural principles."⁴⁶ Buildings and Grounds' major tool for implementing this policy was the land utilization and management plan required of each Class I and II installation.⁴⁷

Such plans had become requirements for installations with sufficient acreage only in the previous year. Timber and crop sales, leases, permits, and related activities were predicated upon an approved land management plan. Initially, installations tended to concentrate on land that could be leased for crops and grazing and on woodland management.⁴⁸ As a result, the Army began to find that many of its lands could yield economic benefits without impairing an installation's military mission.

By 1951, the chief of Buildings and Grounds' Land Management Section, Walter Kell, was vigorously promoting land management plans. He wanted each installation protected by a plan that said how it should be managed and what resources would be required. Heretofore, few land management plans had been in effect. When Burton F. Kiltz succeeded Kell as the chief that same year, one of his first tasks was to prepare a new land management manual to assist installations in preparing plans. Kiltz soon realized that he was really creating a forestry manual, so he

delegated the task to Buildings and Grounds' forester, Cyril Webster. However, Webster died before completing the task, and Kiltz finished the manual.⁴⁹ This episode illustrates how throughout its early history the Buildings and Grounds' professional land management staff was beset by frequent turnover and unfilled vacancies.⁵⁰

Buildings and Grounds land managers in the mid-1950s sought to put installation planning on a scientific basis.⁵¹ They promoted scientific applications as well as the hiring of experienced professionals at the installation level. To further these goals, the chief of Buildings and Grounds' Land Management Section, Burton Kiltz, took an important step that contributed to the growing sophistication of Army land management planning. Kiltz belonged to the American Society of Agronomy (ASA). In 1955, he supported the creation of a military land management division (A-2 Division) within the society. This established a link between the society and military land planners. It brought scientific recognition of military land management problems to a national technical audience. The recognition helped attract trained professionals to the Army.⁵² Periodically, Army specialists presented papers to this division. Furthermore, topical section meetings developed ideas and disseminated information that influenced Army policy.⁵³ In sum, the creation of the A-2 Division elevated the stature of military land managers within the scientific community.

The problem of staffing persisted, however. In 1956, Kiltz wrote, "Our greatest need is for more professionally competent employees; however, technical excellence is not enough. We need employees who know military regulations and who sympathize with the military problems of the installations or commands to which they are assigned."⁵⁴ During his installation

visits, Kiltz pressed installation commanders to hire professionals who understood land management.⁵⁵ The installations' staffs usually recognized the value of Kiltz's advice, but it took time for them to act upon the suggestions. Many installations continued to do without specialists who could advise a commander about such issues as the environmental consequences of training activities. When a commander inquired about the effect of shrapnel on future timber harvesting or the effect of tank training on erosion, often there was no one qualified to answer.⁵⁶

Gradually this changed as the drive for professionalism began to pay dividends. For example, special fire problems occurred in the pine areas of the Atlantic Seaboard states. A peculiar weather phenomenon sometimes caused the jet stream to descend and create extremely low relative humidities. As Wendell Becton described the situation: "In the past these had caused fires to run completely across whole states. The prevailing opinion was that nothing could be done to combat such fires."⁵⁷ However, installation foresters devised an elaborate firebreak system and successfully used large-scale controlled burning during low danger periods to alleviate the problem.

During World War II, dire necessity forced Repairs and Utilities to focus on land stabilization at Army installations. Once this was accomplished, the question became what to do with the land. It took until the mid-1950s for a policy to evolve. From the end of the war until this time the land management planning that took place was rudimentary in nature. One veteran of this era states that the Army did not participate in land management before about 1955.⁵⁸

The 1958 version of Army Regulation 420-74 defined Repairs and Utilities' land management goals: "These regulations prescribe applicable procedures for the

economical maintenance of grounds and management of land, conservation of agricultural and forested lands, and establishment and maintenance of durable turf for troop training, lawns, and recreation areas." The regulation called for "modern, progressive methods of land management and improvement for all applicable lands."⁵⁹

Buildings and Grounds realized that installations needed an organized approach. With this realization came the birth of modern land management planning in the Army. Before planning could be effective, people would have to be trained to implement plans. On the basis of an installation's acreage, Buildings and Grounds established criteria as to how many and what types of trained personnel were needed.

An agronomist generally headed an installation's land management team. Foresters had a more limited role and reported to the agronomists.⁶⁰ The agronomists reported up the chain of command to their counterparts at the headquarters of the numbered armies. The headquarters personnel closely cooperated with the Buildings and Grounds Branch. Under Repairs and Utilities, the Buildings and Grounds Branch Land Management Section prepared policy and disseminated the policy to the army headquarters. After review and comment, a final policy evolved that guided installation procedures. All in all, there was a good feedback network up and down the chain of command and good coordination between the headquarters and Buildings and Grounds.⁶¹

By the end of the decade, land and forest management had progressed from the scattered application of Buildings and Grounds' broad management policies to the widespread development and approval of sound management programs.

Agricultural Leasing

Agricultural leasing programs began during World World II. The first such programs were in place by the 1943 growing season.⁶² As the program evolved during and after the war, farmers leased open land around airfields and ammunition storage sites. Their activities formed buffer strips, controlled weeds, and reduced maintenance costs. Army policy promoted leasing because of its economic benefits. Local farmers of good reputation worked under strict surveillance. Farmers whose land had been acquired by the military initially had first priority in leasing the land. By 1955, installations awarded leases to the highest local bidder.⁶³ National policy called for consultation with county agricultural agents on crop rotation and soil management. Leases could be revoked if the Army again needed the land for military purposes. By 1956, the Army leased 992,894 acres.⁶⁴

Forest Management

During the 1940s and 1950s, there was a close connection between the status of Army land management and individual installations' forestry programs. Until 1942, the forestry program on Army reservations operated under an old regulation prohibiting the sale of timber except trees that had been so damaged that they were unusable for construction purposes.⁶⁵ In 1942, Army regulations changed the definition of damaged to include timber that had reached maturity and was beginning to deteriorate. Two years later a new regulation considerably broadened the criteria for disposing of timber.⁶⁶

During World War II, large supplies of wood products from Army reserves had been assembled for

shipment to Europe. The forestry activities of the Allied Forestry Section in the Chief of Engineers' European Theater of Operations were so successful that these stockpiles were not needed.⁶⁷ When the war ended, the stockpiles were sold as surplus property to create a revolving fund to finance future lumber procurement contracts at Army installations. This revolving fund operated until 1952.⁶⁸

Postwar forest management got off to a slow start. Much of the forest land acquired during the war had been heavily cut over and had little standing timber left.⁶⁹ When Repairs and Utilities turned its attention to timber management on military installations after the war, it faced the same problem confronting dust and erosion control efforts--lack of trained personnel. Accordingly, the chief of Repairs and Utilities, Colonel Frank Forney, requested that the U.S. Forest Service loan forest management experts so that productive timberland on military installations could be used.⁷⁰ The foresters were to assist the War Department in "the formulation of broad War Department policy which will correlate the best possible forestry practice with military plans."⁷¹

Repairs and Utilities did not expect sophisticated timber management plans. Given the Army-wide shortage of trained forestry personnel, it could not have implemented such plans. Rather, it requested "simple plans of management worked out in order to insure at least reasonably good timber cutting."⁷² The division also wanted timber harvesting to accord with watershed protection needs at military installations.

In August 1947, Repairs and Utilities requested the Forest Service to study forest resources.⁷³ Forest Service experts reported in June 1948 that "at least 1,432,500 acres of the total forest land was free from contamination and could, without limiting military

operations, be managed to yield 200 million board feet of lumber annually."⁷⁴ From this time, the Buildings and Grounds Branch of the Repairs and Utilities Division viewed proper timber management as the key to profitable timber harvesting.⁷⁵

The Forest Service's studies and reports pointed out the economic potential of timberlands on Army installations. In addition, the earlier success of the Army-Navy Lumber Agency's revolving fund program "served to inform everyone that large supplies of timber did in fact exist on lands held by the services."⁷⁶ The chief R&U agronomist, Walter Kell, believed that the Corps could manage a sound forestry program because he had seen the Corps' success in France during the war.⁷⁷ He decided that Army installations should each prepare a detailed forestry plan using the Forest Service plan as a model. It was "to show requirements for manpower by types, equipment needed, suggested harvesting schedule, forces needed to combat fires . . . where active firing ranges lay, how to isolate them by construction of fire breaks."⁷⁸

Each numbered army, operating under the general guidance of the Buildings and Grounds Branch's Land Management Section, attended to the task of devising a forestry management plan. Skepticism greeted the request for individual plans. Many officers felt that installations "were so badly duded and the trees so full of metal that a forestry program was likely to fail."⁷⁹ At first, the Third and the Sixth Armies were the only ones to show any interest in forest management.⁸⁰

In the Third Army, as elsewhere, installations lacked foresters to devise management plans. The army called upon the proven technical expertise of the South Atlantic Division engineers.⁸¹ Wendell R. Becton received the assignment to assist the Third Army by

writing forestry management plans for each installation. The task involved detailed coordination and cooperation with installation commanders who had to treat forestry projects with the same seriousness as other military missions. Becton found that "a knowledge of Army Staff operations that had been gained by study and experience proved of great assistance in tailoring forestry practices to the military situations and having the plans accepted."⁸²

Ultimately, such an ad hoc approach could not endure. The Forest Service study had recommended that a civilian chief manage the forestry planning process. In 1950, Becton departed from active duty to fill this position.

The Fort Benning Experience

The history of forest management at Fort Benning, Georgia, shows the evolution of management practices. In 1920, the Army requested that a Forest Service employee inspect Fort Benning. The forester's report recommended the employment of a forester on-site. The report led to the establishment by executive order of a national military forest in 1924. The Forest Service established an organization to administer nearly 78,560 acres under an agreement between the Secretaries of Agriculture and War. The laws and agreement recognized that the land would be "subject to the unhampered use of War or Navy Department."⁸³

Three years later, the Forest Service requested that the executive order be canceled, because "a forest land use policy cannot be founded upon the notions and absent interest of a shifting Army personnel."⁸⁴ In 1936, the Army again requested Forest Service personnel to make a detailed study of the fort's timber resources. The foresters identified areas for cutting

and trained Army personnel in proper harvesting techniques. They again recommended that a trained forester be assigned to the installation. The fort's expansion in World War II made this plan obsolete.

A third request to the Forest Service came in 1943. The 1943 study determined that the 1936 plan had been followed for about two years. Subsequent harvesting practices ignored its recommendations.

In 1948, a forester from the Forest Service returned to Fort Benning. He found that cutting could be performed without interfering with current military practices provided there was constant supervision by a capable person and continuous liaison with the Infantry Center. However, such a person would have to start from scratch because "there has been no continuity of management or records of cutting." The 1948 report concluded that the installation's history "demonstrated conclusively the futility of drawing up detailed management plans without the continuity and guidance of a well trained technical forester." It criticized the Army for merely expressing support for good forest management without actually investing the resources necessary to carry out such a program: "If one lesson can be learned it is that the forest management activity should be carried out by a technical forester under the direction of the Army and not by an unrelated agency on a personnel assignment basis."⁸⁵

Forest Management Continuing Into the 1950s

Meanwhile, in the late 1940s, the numbered armies continued with the task of devising forestry management plans for each installation. In the Third Army, Wendell Becton began by writing broad policy statements. They described personnel and financial requirements, equipment, and a harvesting schedule. He

advised installations where they could find qualified people.⁸⁶ At Repairs and Utilities' request, the Forest Service, other government agencies, and the nation's forestry schools advertised the need for Army foresters. At this time the most important goal was simply "to get a body in there" so each installation would have someone to begin the work.⁸⁷ In some cases, positions could not immediately be filled by professional foresters because the Army did not want to displace the incumbent active-duty World War II veterans.⁸⁸

The Buildings and Grounds Branch received copies of each installation's forestry plan. It did not influence the plan's details but instead provided oversight. While Buildings and Grounds nominally had to examine such details as plans to erect watchtowers for fire control at an installation, the few people assigned to this top level of responsibility had more than a full-time job establishing policy, approving the detailed plans, and allocating money and manpower.⁸⁹ Buildings and Grounds was the driving force propelling the planning process. It verified that installations made plans and that the plans appeared reasonable.

Around 1948, an unidentified R&U employee wrote about the division's future direction. He asserted that land held for military purposes presented a tremendous national resource and that the timber growing on military lands was vital to meeting national emergencies whether they occur "this year, in five years, or a hundred years."⁹⁰ Past inattention had reduced most of the forest lands to overgrown woodlots containing undesirable species. The writer concluded that either qualified personnel had to be assigned to timber management or future harvests had to be abandoned.⁹¹

When Kiltz joined Repairs and Utilities in 1951,

he found a well-managed office whose major job was to keep track of projects started during the war years.⁹² In addition to soils stabilization, major challenges centered around forest management.

During the early 1950s, the biggest problem confronting Buildings and Grounds and Corps of Engineers foresters in the field was fires caused by training exercises. While each installation had a post engineer, his major concerns were buildings and maintenance, not land management. Land management simply was not part of most post engineers' experience. They were ill-prepared to handle the special land management problems caused by fires.

Fires happened with great frequency. As the Third Army's forester observed, there was "no way to get around it, fires are going to happen."⁹³ Fires had been a persistent problem over the years. When foresters in the Department of Agriculture examined the problem, they concluded that "there was no reason the Army couldn't successfully handle the problem."⁹⁴ These foresters believed that it merely was a matter of getting people assigned to the installations to do the work. This suggestion hit at Buildings and Grounds' core problem--the lack of trained personnel. According to Wendell Becton, before 1950 "the Army dragged its feet on making such assignments. It didn't want to utilize scarce resources for this task. Thus the problem lasted longer than it had to."

When Becton became civilian chief forester in 1950, he immediately set out to address the fire problem. His solution was to use the time-tested forestry practice of controlled burns. Becton visited installations where he worked with foresters to isolate firing ranges by clearing fire breaks. This created dedicated areas for exclusive use as firing ranges. Becton told installation commanders, foresters, and

post engineers alike, "Forget trying to keep fires off it, let it burn."⁹⁵ Instead, fire breaks and prescribed burning on adjacent lands controlled the fires.

At Buildings and Grounds, the new chief of the Land Management Section inherited the same problem for installations nationwide. Forest and brush fires were an all too common experience. Typically, some installation would have heavy rains that yielded tall grass. Absent cutting or grazing, the grass would dry out and catch fire easily. A rapidly spreading, tremendous fire would start--in the West burning tumbleweeds carried the flames--and there was little anyone could do. Kiltz recalls, "First thing you knew, the whole county was on fire."⁹⁶

Sometimes a fire spread beyond the boundaries of a base and private landowners would sue. In one case at Fort Bragg, Becton investigated a citizen's complaint and determined that the owner had repeatedly experienced this problem. He sued not to recover losses but to motivate the Army to control its fires.⁹⁷

Becton became known as a consistent champion of the importance of fire prevention. Burton Kiltz, chief of the Land Management Section, recognized that Becton was more familiar with fire problems than anyone in the Army. Kiltz endorsed Becton's solution, calling Becton "the best salesman on the need to manage forests."⁹⁸

Over time, Kiltz spread knowledge of Becton's fire prevention techniques. Under his direction, Buildings and Grounds began promoting fire control measures including timber harvesting, building fire lanes, using grazing to control combustible growth on nonforested areas, and conducting controlled burns in forested areas.⁹⁹

The fire control issue also highlighted another problem: differing perceptions held by field foresters versus headquarters agronomy personnel. Becton recalls

that Buildings and Grounds' suggestions were sometimes geared toward cleared, cultivated areas and thus did not accord with the management needs of rough, uncleared woodland areas. He believed that the B&G personnel were spread too thin to visit the field often enough to understand forestry needs.¹⁰⁰

Simultaneously, B&G personnel felt that they contributed to solving the fire problem by disseminating information about control techniques. Kiltz recalls that he personally visited installations as often as possible, usually making at least one inspection trip a month.¹⁰¹ While headquarters and field personnel worked toward the same goal, there apparently existed some understandable tension stemming from their different responsibilities.

Also in 1951, the Departments of the Army and Agriculture issued a joint policy statement on the use of national forest lands for defense purposes. The statement recognized that national forests were vital to the economy and for the defense production of the country. However, "the use of national forests for maneuvers and training will inevitably result in damage to important natural resources and frequently inflict damages of an irreparable nature."¹⁰² Consequently, the Department of the Army pledged that it would try to obtain alternative lands for maneuvers whenever possible. Beginning in 1954, Buildings and Grounds' Land Management Section expanded its cooperation with the Department of Agriculture by compiling and reporting annual reforestation data for all branches of the Department of Defense.¹⁰³

Buildings and Grounds continued to request technical assistance from the Forest Service. In 1955, the Chief of Engineers, Major General Samuel D. Sturgis, Jr., informed the Army Chief of Staff, General Maxwell D. Taylor, about the ongoing good relationship and

close cooperation between the Corps of Engineers and the Forest Service.¹⁰⁴ In particular, the two exchanged information about research and development activities related to forest management. Buildings and Grounds participated in exchanges regarding forest and grass fire prevention techniques, control of forest insects and tree diseases, optimum timber production on military lands, and wood preservation methods.

In response to the growing body of knowledge about forestry and recognition of the value of forests, a 1955 regulation required that a woodland management supplement to the approved land management plan had to be completed for each Army installation having 100 acres or more of productive or potentially productive timberland.¹⁰⁵ The same year, the Department of Defense provided a statement regarding management of woodlands: "Forest areas of commercial value shall be maintained in accordance with the management plan which will include provisions for the removal of dead, diseased, or poor risk trees; the harvesting of merchantable timber; protection from fire; control of disease and insects, reforestation, and other approved practices."¹⁰⁶

Not every installation complied with the Army Regulation 420-74 dictates. In 1955, Redstone Arsenal, Alabama, and Volunteer Ordnance Works, Tennessee, requested assistance from forestry experts in order to improve their timber stands. Examination of the record revealed that neither installation had submitted an approved woodland management plan nor did they have trained foresters. Field inspections revealed that although the installations lacked the formal plans required by Army Regulation 420-74, they had responded to the Army-wide growing awareness of the value of land management.¹⁰⁷ At Redstone, all unimproved grounds that would require mowing were under agricultural or

grazing leasing. At Volunteer, an extensive reforestation effort was under way. Neither of these findings would have been likely before the advent of the Army Regulation 420-74 planning mandate.

In 1956, Cyril B. Webster, the B&G forester, addressed the annual meeting of the American Society of Agricultural Engineers on the topic of managing military woodlands. He explained that it was Department of the Army policy to provide, to the extent consistent with an installation's mission, "scientific management of the installation woodlands in order to conserve and protect natural resources, give proper maintenance to military grounds, insure continuing production of forest products useful to National Defense." The Chief of Engineers held the responsibility for making this policy effective as part of his installation maintenance and repair duties. At this time, the total reported acreage of Army woodland was 1,940,154 acres in the United States, Alaska, the Canal Zone, and the Caribbean.¹⁰⁸

The annual cost for "good management," including protection for the 77 installations reporting woodland in 1956, would have been about \$2 million, according to Webster. However, the actual cost to the installations that year was about \$0.5 million, and the U.S. Treasury received an income of about \$1.25 million from the annual timber harvest. Webster believed that costs would diminish as management was extended and that "good forestry practices applied to the installations need not constitute a drain on the taxpayer's pocketbook, but will actually pay cash dividends."¹⁰⁹

In 1958, Army Regulation 420-74 elaborated on what constituted woodland management. Such management included "the development and application of technically sound operating plans and practices which will insure the continuous production of designated

tree species."¹¹⁰ It defined a woodland as an area of 100 acres or more that produced or could produce productive forest products. This meant that in addition to standing timber capable of harvest for pulpwood or sawtimber, treeless areas designated for reforestation were classified as woodland.

One benefit of knowledgeable woodland management practices was the cultivation of the specific types of cover required for each training area. Such cultivation created training areas without drawing on appropriated military funds. This resulted in a tremendous savings that was not generally acknowledged by installation commanders when they considered their budgets.¹¹¹

Another important benefit of good forestry practice was that it prevented major insect problems. As the Third Army forester recalls, "Insects are not a big problem if you manage trees well."¹¹² Becton reminded installation commanders that thinning increased the vigor of the remaining trees, and the removal of infested or decaying trees kept harmful insects from spreading. A woodlot required such thinning once every 8 to 10 years. Becton helped installations plan an 8- to 10-year maintenance cycle. An installation's woodlands would be divided into 8 or 10 segments and one segment would be worked on per year. The application of such forestry management practices obviated the widespread use of chemicals for woodland insect control.¹¹³

Wildlife Management

In the years following World War II, wildlife management on Army installations consisted primarily of enforcing all state and federal fish and game laws. The dilemma presented by large animal populations

confined in fenced installations caused commanders to turn to state fish and wildlife laws as the basis for hunting policy.¹¹⁴ However, consistent policies for enforcement did not exist among military installations until the 1958 passage of the Engle Military Lands Bill.¹¹⁵

Periodically, Repairs and Utilities sent installations regulations on the "Development and Conservation of Wildlife on Military Reservations." These both stated existing policy and updated installation commands about new federal and state laws. For example, Repairs and Utilities issued a 1950 regulation, Army Regulation 210-480, to alert installations that henceforth the Migratory Bird Treaty Act would be operative on all military reservations and the Alaska Game Law would be enforced in Alaska. The regulation also addressed the enforcement of fish and game laws and the duty of the commanding officer to issue hunting and fishing permits.¹¹⁶

Prior to the mid-1950s, wildlife management programs existed on only a few installations. In 1949, the passage of Public Law 81-345 initiated the first official DOD wildlife program by providing for a fish and wildlife program to be implemented at Eglin Air Force Base in Florida. The law further provided that the program be conducted in cooperation with the state and the Interior Department and that the base could sell special hunting and fishing permits and keep the proceeds to sustain the program. The success of the Eglin program ultimately led to the 1960 passage of the Sikes Act, Public Law 86-797, which extended the law to all military bases.¹¹⁷

In general, during the 1940s and 1950s, the public lacked concern about wildlife on existing military lands.¹¹⁸ However, the public prevented several Army attempts to acquire more land that they viewed as

important for wildlife conservation. In 1941, public pressure forced the Army to abandon plans for a training center near North America's last refuge of trumpeter swans in Montana.¹¹⁹ The public also objected in 1955 when the Army tried to incorporate 10,700 acres of a national wildlife refuge into the Fort Sill Military Reservation. Conservationists opposed this action and began to examine military natural resources management policies. This examination led to the Engle Military Lands Bill.¹²⁰

Testimony on the bill provided a blanket condemnation of military wildlife policies. When passed as Public Law 85-337 in February 1958, the bill tried to resolve basic conflicts between military and civilian conservation agencies. It dealt with hunting, fishing, and trapping on military reservations and required that all such activities accord with state and federal laws. The Engle Act also required state licenses for hunting and fishing and granted access by conservation officials for management and conservation activities.¹²¹

Outside pressure for public use of military lands increased as a result of the vast increase in land controlled by the Department of Defense. In 1940, the military controlled 2.5 million acres (excluding Alaska). By the early 1960s, the figure had risen to 28.7 million acres.¹²²

Although they controlled a great deal more land than ever before, post commanders did not make public access to hunting and fishing a high priority. Any plans for such recreation could not be allowed to affect adversely the use of the land for military purposes. When deer herds on bases got too big, only military personnel received permission to hunt. Public pressure eventually led to various forms of supervised public access. Each of the field army headquarters

designed hunting policy with input from Buildings and Grounds, the individual installations, and the states.¹²³ The installation's land manager usually handled wildlife management.¹²⁴ In 1960, the Sikes Act and its provision for collecting and retaining license fees gave installations the necessary incentive to welcome public access.

Pest Control

The 1941 transfer of responsibility for military construction and maintenance of Army installations from the Quartermaster Corps to the Corps of Engineers included most of the quartermasters' former responsibilities for controlling insects, rodents, and other pests. Initially, much confusion occurred among the Surgeon General, Quartermaster General, and Chief of Engineers about who would now be responsible for what aspects of pest control.

Procurement of pest control equipment and supplies for indoor and outdoor use was one of the points of contention. A series of letters and circulars addressing these responsibilities began in March 1942 and culminated in War Department Circular No. 178 dated 7 August 1943.¹²⁵ This circular, titled "Insect and Rodent and Vermin Responsibilities in the Armed Forces," made the engineers responsible for carrying out pest control tasks on real property. This involved such chores as draining for mosquito control, outdoor spraying, and fumigation of entire buildings. The engineers also had to procure their own supplies for these functions. The Quartermaster General retained responsibility for procuring pest control supplies for routine indoor spraying. The Surgeon General and post medical officers remained responsible for oversight of pest control, including conducting inspections and

initiating and enforcing preventive measures.¹²⁶

Embarrassing newspaper publicity arising from a squabble over who--the quartermasters or the engineers--must procure poison to kill ants in one installation office is said to have directly led to the assignment of an entomologist to the Office of the Chief of Engineers in July 1943.¹²⁷

In July 1943, the OCE Repairs and Utilities Branch established the Insect and Rodent Control Unit, which later became the Entomology Section. An entomologist for the U.S. Department of Agriculture, William D. Reed, transferred to the Corps of Engineers to organize and staff the entomology services at the Office of the Chief of Engineers and at army headquarters and installations.¹²⁸ The Corps of Engineers also held its first entomology training course in the summer of 1943, and the courses have continued on a regular basis since that time.¹²⁹

As with other activities under the Repairs and Utilities Branch, the lack of trained personnel greatly impaired the mission: "During initial phases of organization of the mission the engineers attempted to provide technical and administrative leadership for pest control activities with unsatisfactory results."¹³⁰ In the summer of 1943, Reed was the only trained entomologist in the Corps of Engineers. Only four or five types of pesticides existed, and there was little equipment to apply them with. The unit cost of pest control in 1943 was \$6.27 per 1,000 square feet of buildings, a figure which decreased in subsequent years as the technology improved.¹³¹

Post engineers were responsible for pest control activities to protect the health and morale of the troops and to preserve property. Post engineers did not become responsible for pests affecting trees or other plants until the late 1950s. The post engineer

performed the work of spraying, supervised drainage projects, and installed screens under the supervision of the medical officer.¹³²

The Office of the Surgeon General provided "such technical advice or recommendations as may be required to aid the Chief of Engineers in carrying out his functions in the Insect Control Program."¹³³ The Office of the Surgeon General also performed rodent and mosquito control research, as well as providing Repairs and Utilities with relevant publications advising post surgeons and post engineers on such topics as "Methods for Insect and Rodent Control."¹³⁴

Repairs and Utilities largely confined itself to information dissemination through circular letters on such topics as mosquito control. Each month, J.L. Vincenz of Repairs and Utilities submitted a report on insect and rodent control to the Surgeon General.¹³⁵ Repairs and Utilities' pest control activities focused not just on pests affecting human health but on those that harmed installation property. In 1945, Vincenz provided Repairs and Utilities' perspective on the damage caused by powder-post beetle attacks. Vincenz described Repairs and Utilities' control strategy, which relied upon the use of a solution of pentachlorophenol. Repairs and Utilities employed this approach based on practices developed by the Department of Agriculture. He noted that application of the chemical caused skin irritation to workers using the chemical and recommended that applicators wear rubber gloves and goggles. He sent his recommendations to the Office of the Surgeon General for review.¹³⁶

Unusual evidence of early concern about the environmental effects of pest control practices appears in the November 1945 edition of Technical Manual 5-600. The section on "Airplane Spraying of DDT" states, "Much still must be learned about the effect of DDT on

the balance of nature important to agriculture and wildlife before general outdoor application of DDT can be safely employed in the continental United States." The balance of the paragraph set forth procedures for obtaining approval of such spraying.¹³⁷ However, such concern about the potential harmful effects of toxic chemicals rarely surfaced during the 1940s and 1950s.¹³⁸

The years following World War II saw the development of new pesticides, better equipment, and technical knowledge among the Corps of Engineers entomologists. Ongoing entomology training courses and updated technical manuals disseminated the growing body of knowledge. The 1956 edition of Technical Manual 5-632, Repairs and Utilities, Insect and Rodent Control, originally issued in October 1945, stated the importance of field rodent control in preventing both the erosion and the hazardous training conditions caused by their burrowing.¹³⁹

On one occasion, the Entomology Section attracted the unfavorable scrutiny of Congress. A soldier's complaint of roaches and other insects reached his congressman and led to a congressional inquiry into unsanitary conditions at Fort Gordon, Georgia, in the fall of 1957.¹⁴⁰ The New Jersey recruit had been horrified at the size of the cockroaches and the abundance of insect life at Fort Gordon. The inquiry determined that he was simply unfamiliar with the effects of the southern climate on insects. No one else at the base had complained, and the congressmen concluded that Fort Gordon applied pesticides regularly and effectively.¹⁴¹

Notes

1. Mays interview.
2. Ibid.
3. Merrill to Field Officers, Soil Conservation Service (SCS) Letter #553, re: Cooperation with Army on Erosion Control, 23 Dec. 1941, File 1, Bandel collection.
4. See draft memo on "Conference on Erosion Control at Army Posts," 1 Dec. 1941, File 1, Bandel collection.
5. Musser to Area Conservationists, 30 Dec. 1941, File 1, Bandel collection.
6. "Due to the start of hostilities and the reorganization of the War Department, it has been difficult to get organization procedure established." Middleton to Enlow, 17 Jan. 1942, File 1, Bandel collection.
7. Musser to Area Conservationists, 30 Dec. 1941, File 1, Bandel collection.
8. Kell to Seymour, re: Soil erosion control at Ft. Wood, MO, 24 Dec. 1941, File 1, Bandel collection.
9. Ibid.
10. Mays interview.
11. Morrish to Windom, re: Erosion control at Ft. Knox, KY, 15 Dec. 1941, File 1, Bandel collection.
12. Colman to Kell, re: Cooperation on erosion control, 26 Jan. 1942, File 1, Bandel collection.
13. See Ketcham's memo of 29 June 1943, re: "Personnel and Organization of Army Installations for Erosion Control and Grounds Maintenance Work," OCE General Correspondence 1918-45, Box 775, Records of the Office of the Chief of Engineers, Record Group 77, National Archives, Washington, DC (hereafter cited as RG 77, NA).
14. Ibid.

15. For an example, see Roosa to Utilities Officer, re: Implementing SCS erosion control plans, 24 Jan. 1942, File 1, Bandel collection.
16. Middleton to Enlow, re: Erosion control, 8 Jan. 1942, File 1, Bandel collection.
17. Enlow to Cheek, re: Erosion control plans, 17 Jan. 1942, File 1, Bandel collection.
18. Bennett to Regional Conservators, re: SCS personnel detailed to War Dept., 8 Apr. 1942, File 1, Bandel collection.
19. Morrish to Roth, 30 Oct. 1951, File 1, Bandel collection.
20. Enlow to Cheek, 4 June 1942, File 1, Bandel collection.
21. Kiltz interview. One former SCS employee, Ralph H. Morrish, became chief land manager of the Repairs and Utilities (R&U) Buildings and Grounds (B&G) Branch. Morrish was instrumental in getting the branch started between 1943 and 1945. His successor, Walter Kell, was one of the first SCS liaison representatives.
22. Bandel interview.
23. Middleton to Enlow, re: Erosion control, 10 Jan. 1942, File 1, Bandel collection.
24. Kiltz interview.
25. Ibid.
26. Truax to Chief of Engineers, re: Dust control at airfields, 30 June 1943, OCE General Correspondence 1918-45, File 612, Box 775, RG77, NA.
27. See File 618.38, Box 782, OCE General Correspondence 1918-45, RG77, NA.
28. Kiltz interview.
29. Ibid.
30. Vance W. Mays, "Evaluation of Vine Honeysuckle as a Protective Cover for Earth-Covered Structures," presented at the 1959 annual meeting of the American Society of Agronomy, File 2, Bandel collection.
31. Rossell to Commanding General, Fifth Army, re: Repair of Igloos, 18 Apr. 1947, File 2, Bandel collection.

32. See File 2, Bandel collection, most of which is devoted to discussion of igloos.
33. Memo for Record on Meeting with Office, Chief of Engineers representatives on Grounds Maintenance, 16 Nov. 1949, File 2, Bandel collection.
34. Commanding General, Fourth Army to Commanding Officer, Louisiana Ordnance Plant, re: Grounds maintenance at ordnance installations, 8 Feb. 1950, File 2, Bandel collection.
35. See File 2, Bandel collection.
36. For a typical example, see HQ 5th Army to Chief of Engineers, re: "Stabilization of Storage Pad Barricades," 9 Aug. 1955, File 2, Bandel collection.
37. "Review of Criteria for Earth Cover on Igloos," 8 Dec. 1960, File 2, Bandel collection.
38. Headquarters, Department of the Army, Chief of Ordnance, re: "Earth Cover on Igloo Magazines," 28 July 1959, File 2, Bandel collection.
39. Department of the Army, Guides and Procedures: Repairs and Utilities, Technical Manual (TM) 5-600 (Washington, DC: November 1945), p. 66.
40. Ibid.
41. Kell to Agronomists, 15 June 1949, File 1, Bandel collection.
42. Becton interview.
43. Department of the Army, Repairs and Utilities: Grounds, Army Regulation (AR) 420-74 (Washington, DC: 1958), in OCE Maintenance Management Branch, Policy Section, Box 1, Accession No. 67-4785, RG77, Washington National Records Center (WNRC), Suitland, MD. (Hereafter cited as Army Regulation 420-74, 1958.)
44. Ibid.
45. Burton F. Kiltz, "Maintenance Planning for Army Building Areas," presented at the Annual Meeting of American Society of Agricultural Engineers, 21 June 1956, Vance Mays Papers, Office of History, Corps of Engineers, Washington, DC. (Collection hereafter cited as Mays papers.)

46. HQ 4th Army Engineer Letter #46, 28 Nov. 1949, File 2, Bandel collection.
47. Department of the Army memo 100-80-4, 27 Feb. 1948, cited in Engineer Letter #46 above, required commanding officers at each Class I and II installation to prepare such plans.
48. Kiltz, "Maintenance Planning for Army Building Areas," Mays papers.
49. Kiltz interview.
50. Becton interview.
51. Kiltz interview.
52. Ibid.
53. Mays interview.
54. Kiltz, "Maintenance Planning for Army Building Areas," Mays papers.
55. Kiltz interview.
56. Mays interview.
57. Becton, "Military Forestry History," p. 9.
58. Mays interview.
59. Army Regulation 420-74, 1958.
60. Mays interview.
61. Ibid.
62. Alvin T.M. Lee, "Getting and Using Land in Time of War," in Land: USDA Yearbook of Agriculture (Washington, DC: 1958), pp. 93-94.
63. Mays interview.
64. 1) Lee, "Getting and Using Land in Time of War."
2) Although planned by installation land managers, the actual leases are administered by District Engineers and the Real Estate Division, OCE, as is the actual sale of timber. Becton interview.
65. Burton F. Kiltz, "Progress of the Woodland Management Program," presented at the 1964 Annual Meeting of the American Society of Agronomy, November 1964, Wendell Becton Papers, Office of History, Corps

of Engineers, Washington, DC. (Collection hereafter cited as Becton papers.)

66. Ibid.

67. 1) Wendell R. Becton, "Military Forestry History," p. 5, File 3, Bandel collection. 2) Correspondence, Becton to authors, 2 Feb. 1988.

68. Ibid., p. 6.

69. "Resume--DA Forest Management Program," no date, File 3, Bandel collection.

70. Forney to Watts, re: loan of foresters to Army, 28 June 1948, File 1, Bandel collection.

71. Crawford to Chief, U.S. Forest Service, 6 Aug. 1947, File 1, Bandel collection.

72. Ibid.

73. Ibid.

74. Forest Management Weekly Log--Week Ending 25 June 1948, File 1, Bandel collection.

75. Ibid.

76. Becton, "Military Forestry History," p. 6. This agency had coordinated military lumber procurement contracts in the years following the war. See also Becton to authors, 2 Feb. 1988.

77. Becton interview.

78. Becton to authors, 2 Feb. 1988.

79. Becton, "Military Forestry History," p. 7.

80. Kiltz to author, 23 Mar. 1988.

81. Because of its work for the Army-Navy Lumber Agency, the division had foresters, timber estimators, and other technical help. See Becton to authors, 2 Feb. 1988.

82. Becton to authors, 2 Feb. 1988.

83. E.T. Hawes, "Report on Forest Management Activities & Possibilities at Fort Benning, GA," 1948, File 1, Bandel collection.

84. Ibid.

85. Ibid.
86. Becton, "Military Forestry History," p. 8.
87. Becton interview.
88. Ibid.
89. Ibid.
90. Report on role of R&U in land management, no date, File 1, Bandel collection.
91. Ibid.
92. Kiltz interview.
93. Becton interview.
94. Ibid.
95. Ibid.
96. Kiltz interview.
97. Becton interview.
98. Kiltz interview.
99. Ibid.
100. Becton interview; also Becton to authors, 2 Feb. 1988.
101. Kiltz interview.
102. U.S. Department of Agriculture/Army Joint Policy Statement on Forest Lands, approved 3 July 1951 by Secretary of the Army Frank Pace, Jr., File 1, Bandel collection.
103. Records of the R&U Division, B&G Branch, Land Management Section, Reforestation Report Files, Box 11, RG77, Accession No. 64A-2124, WNRC.
104. Sturgis to Taylor, re: Cooperation with Forest Service, 6 July 1955, File 1, Bandel collection.
105. HQ 5th Army, "Forestry Management and Coordination with United States Forest Service," 10 June 1955, File 1, Bandel collection.

106. Department of Defense (DOD) Instruction 4150.6, 7 June 1955, cited in Kiltz, "Progress of the Woodland Management Program," p. 5.
107. C.B. Webster, Report of special visit to ordnance installations, 16 Dec. 1955, File 2, Bandel collection.
108. Cyril B. Webster, "Managing Military Woodlands," presented to the Annual Meeting of American Society of Agricultural Engineers, 21 June 1956, Mays papers.
109. Ibid.
110. Army Regulation 420-74, 1958.
111. Becton to authors, 2 Feb. 1988.
112. Becton interview.
113. Ibid.
114. Mays interview.
115. G. Blair Joselyn, "Wildlife Management on Military Installations--A Critique of Army Policy," Journal of Wildlife Management, 29, No. 1 (January 1965): 216.
116. Department of the Army, Installations: Development and Conservation of Wildlife on Military Reservations, Army Regulation 210-480 (Washington, DC: 17 August 1950), OCE Maintenance Management Branch, Policy Section, Box 1, RG77, Accession No. 67-4785, WNRC.
117. E.J. Bedker, "National Security Management: Renewable Natural Resources," 1979, p. 14, File 3, Bandel collection.
118. Joselyn, "Wildlife Management on Military Installations," p. 215.
119. Lenore Fine and Jesse A. Remington, The Corps of Engineers: Construction in the United States (Washington, DC: Government Printing Office, 1972), p. 347.
120. Joselyn, "Wildlife Management on Military Installations," pp. 215-216.
121. Ibid.
122. Ibid.
123. Mays interview.

124. Becton interview.
125. Rough draft of chapters for Army Medical History WWII, 1945, WWII Administrative Records ZI, Box 1257, Entry 31(2I), Records of the Office of the Surgeon General (Army), Record Group 112, National Archives (hereafter cited as RG112, NA).
126. Ibid.
127. Ibid. Also see handwritten draft, "The Army Engineer Entomology Program," no date, File 3, Bandel collection.
128. "History of Engineer Entomology Services," no date, File 3, Bandel collection.
129. Handwritten draft, "Current status of Entomology Services," no date, File 3, Bandel collection.
130. "History of Engineer Entomology Services," no date, File 3, Bandel collection.
131. Handwritten draft, "Current Status of Entomology Services," File 3, Bandel collection.
132. TM5-600, November 1945, pp. 73-76. Also see Department of the Army, Repairs and Utilities: Insect and Rodent Control, TM5-632 (Washington, DC: Government Printing Office, February 1956), pp. 112-121, for material on plant-attacking pests.
133. Robinson to Chief of Engineers, re: "Funds for mosquito control," 17 Aug. 1942, OCE General Correspondence 1918-45, Box 838, RG 77, NA.
134. WWII Administrative Records ZI, entire contents Boxes 1263 and 1262, Entry 31(2I), RG112, NA.
135. OCE General Correspondence 1918-45, Box 838, RG77, NA.
136. Vincenz to Reagan, "Recommendations for Use of Pentachlorophenol-oil Solutions in Treating Seasoned Lumber for Insect Control," 29 Oct. 1945, OCE General Correspondence 1918-45, Box 838, RG 77, NA.
137. TM5-600, November 1945, p. 75.
138. 1) Kiltz interview. 2) TM5-632, February 1956, p. 30, presents a much weaker warning about DDT than that in TM5-600 of November 1945.

139. TM5-632, February 1956, p. 132.

140. Brown to Chief of Engineers, re: Congressional inquiry of alleged unsanitary conditions at Ft. Gordon, 25 Oct. 1957, O&M Administrative Files FY 58, Entomology Section, Box 11, RG77, Accession No. 64A-2124, WNRC.

141. Ibid.