

MR. Russell

UNITED STATES DEPARTMENT OF AGRICULTURE  
Soil Conservation Service, P. O. Box 48, Goldsboro, N. C. 27530

January 24, 1972

**SUBJECT:** ENG - Report on Failure of Emergency Spillway - Class II  
Pond - Camp LeJeune, North Carolina

**TO:** Robert G. Jessup, State Conservation Engineer  
SCS, Raleigh, North Carolina 27611

This is a report on the failure of the emergency spillway of a Class II pond, hazard Class (a) at Camp LeJeune Marine Base, Jacksonville, North Carolina. The pond was designed and approved by Billy H. Jones, Civil Engineer.

**A. Design Data -**

1. Watershed - 360 acres.
2. Runoff curve number - 60.
3. Principal spillway design storm - 5 year, 24 hour.  
Principal spillway mass curve flood routed 12 inch diameter tube - 18 inch diameter riser with 1.3 feet depth of storage (used 1.5 feet depth) and 12 acre pool at riser elevation (41.5 ft.).  
Riser was fabricated one foot too long and elevation of normal pool was increased one foot at request of base personnel. Crest of emergency spillway and settled top of dam elevation was increased one foot also.
4. Foundation drain installed to planned normal pool elevation (41.5 ft.) on each side slope.
5. Emergency spillway design storm - 0.75 of value on sheet 3 - Supplement NC-2, Chapter 2, Engineering Field Manual (see Eng. Memo. NC-2, Rev. 6, 2-2-71). Rainfall 5.25 inches - 6 hour storm. This storm was not flood routed in design.
6. Maximum design storm - 0.75 of value on sheet 4, same reference as Item 5 above. Rainfall 7.35 inches - 6 hour storm. This storm was not flood routed in design. The estimated stage in spillway 40 feet wide was 1.3 feet. The planned grade on spillway outlet was six percent. With one foot increase in elevation of spillway crest, the grade on outlet would be seven percent.

7. Settled top of dam elevation was 2 feet above crest of spillway elevation.

The emergency spillway design storm (25 year frequency - approximately) and the maximum design storm (exceeds 100 year frequency) were flood routed for this report. The stage for the emergency spillway with 40 feet bottom width is 0.8 feet. The stage for the maximum design storm with 40 feet wide spillway is 1.4 feet.

#### B. Description of Failure -

The emergency spillway washed out approximately 11 feet below crest elevation (44.0 ft.) leaving 5 feet of water in pond. The washout was approximately 65 feet wide at the top and 30 feet wide at the bottom. The eroded section was perpendicular with center line of dam and continued straight for approximately 200 feet to flood plain. The grade on channel in eroded area was 0.3 percent and was nearly uniform.

The spillway failure occurred during weekend of October 23-24-25, 1971, and failure was first observed on Tuesday, October 26. The following is rainfall for October as reported by Camp LeJeune:

October 1	1.24 inches
October 12	2.72 inches
October 18	0.10 inches
October 21	0.07 inches
October 26	7.37 inches
TOTAL	10.50 inches

Two other local reports gave totals of 11.67 inches and 12.82 inches for October.

Mr. Russell with Camp LeJeune Conservation Department and E. M. Cox, Soil Conservation Techn., say most of the 7.37 inches came between 7:00 p.m. and 12:00 p.m. Friday, October 22, and the ground profile was near saturation from rainfall preceding the 7.37 inches. The pond site was observed around 10:00 a.m. Saturday, October 23, and water was flowing through the spillway. The observer did not check the stage in spillway nor the condition of spillway.

The maximum stage at spillway entrance before failure was 0.9 feet. This was measured October 28, from high water mark left on front of dam.

The structure was completed in August, seeded with Bermuda Grass, and mulched. The site was observed by E. M. Cox and Billy H. Jones on September 14, 1971, and slides were made of vegetation and pond. The vegetative cover was very good for limited period of growth (see

attached slides). Mr. Charles Petterson with Camp LeJeune Conservation Division said ruts were made in the outlet section of emergency spillway by a jeep. The ruts were reseeded and mulched as shown in color slide of spillway.

The soil investigation sheet, SCS-538, showed the spillway area to have a profile of "SM" material for one foot at surface with 3 feet of "SC" material (1-4 feet), one foot of "SM" (4-5 feet), and 4 feet of "SP, SM" (5-9 feet). The crest elevation of spillway (43.0) was approximately 1.5 feet above "SP, SM" material. This was raised one foot during construction.

In checking the soil profile exposed from washout, the depth to "SP, SM" material was not uniform, and some of this material was probably left exposed in spillway during construction.

Two major factors contributing to spillway failure were intensity of storm and condition of spillway. From local observations and rainfall records, the storm approached the 100 year frequency and lack of established vegetation, especially in the "SP, SM" material, contributed to the failure.

#### C. Recommendation for Repair -

Shape eroded side slopes to 1:1 minimum and backfill with "SM" and "SC" materials. Compact backfill and use "SC" material in upper part of fill. Reseed repaired area and leave gate open until vegetation is established. The repairs have been completed except establishment of vegetation. The crest of emergency spillway was reconstructed 0.2 foot above original constructed elevation of 44.0 feet.

*Billy H. Jones*  
**BILLY H. JONES**  
 Civil Engineer

Attachments: (1) Pond design folder  
 (2) 3 color slides  
 (3) \_\_\_ black & white pictures

cc:

John Rice  
 Wilson Spencer  
 E. P. Moore  
 E. M. Cox  
 Mr. Russell ✓



HEADQUARTERS, MARINE CORPS BASE  
 CAMP LEJEUNE, NORTH CAROLINA 28542

4700 AB/LD/rlp  
 5 Sep 1968

From: Commanding General  
 To: Base Maintenance Officer

Subj: Troop Training Project; authorization for

Encl: (1) BSecurityO/ProvMar Action Brief of 16 Aug 1968 (copy)

1. Reference (a) is approved for: Construction of a fresh water pond at Grid Square 8642 (864422).

Project Officer is Capt. BRAY, telephone 7-5380.  
 Expenditure of funds are as indicated below, and will not be exceeded without prior approval of this Headquarters. By copy hereof, Base Maintenance Officer will issue the necessary work order. Project reports will be submitted in accordance with BO 11013.2\_\_.

CAC 7010

PROJECT NO. 9728

FUNDED COST

UNFUNDED COST

Expense Operating Budget  
 Functional Category "R" \_\_\_\_\_

Military Labor \$2,000.00

Fair value of pre-  
 expended and/or  
 salvaged materials \_\_\_\_\_

Equipment  
 Depreciation \$ 90.00

Equipment usage (FMF) \$ 800.00

Other (Project 64002) \$ 350.00

Other \$2,090.00

\$1,150.00

TOTAL

TOTAL

Direct liaison authorized with 8th Engineers, 2d Engineers and MCES for obtaining the use of heavy equipment on an "as available" basis, based upon previous concurrence of 2d Marine Division and Force Troops. This is a joint improvement project.

Copy to: (less encl (1))  
 CG, 2dMarDiv, FMF (DivEngO)  
 CG, ForTrps, FMFLant (AC/S, G-4)  
 CO, MCES  
 → FMO  
 BAccountingO (3)

FREDRIC O. OLSON  
 By direction



UNITED STATES DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
Bureau of Sport Fisheries and Wildlife  
Division of Wildlife Services  
Atlanta, Georgia 30323

Field Trip Report

Wildlife Management Program  
Marine Corps Base  
Camp Lejeune, North Carolina

March 19-20, 1969

## INTRODUCTION

In accordance with the cooperative agreement between Camp Lejeune, the State Wildlife Resources Commission, and this Bureau, an inspection of the wildlife management program on the Marine Corps Base was made by Enhancement Biologist Larimer, Division of Wildlife Services, on March 19-20, 1969. Mr. Charles D. Peterson, the Base Wildlife Technician, guided a tour of the Base and reviewed and discussed the Station wildlife program on March 19. The inspection ended with the annual conservation meeting and following field trip on March 20. Colonel Olson chaired this meeting.

## DISCUSSION

Marine Corps Base, Camp Lejeune, North Carolina, is located near the city of Jacksonville on the Atlantic Coast of eastern North Carolina. Military personnel, civilian workers, and military dependents total 65,000-68,000 people. The Base encompasses a total of about 110,000 acres, including 26,000 acres in water and swamp. Approximately 95,000 acres are available for hunting and fishing. The topography is typical of the lower coastal plain. Relief varies from gentle slopes to flat. Mixed stands of pines and hardwoods are found on the higher elevations; pure hardwood stands in the bottoms. The soils and the basic carrying capacity for wildlife on the Station are relatively poor. The 21 identified soils include fine sands, sandy loams, and muck. Sandy loams low in organic material are characteristic.

The inspection revealed a typical scarcity of openings and clearings and attendant "edge" effects essential to good wildlife habitat. Base personnel recognize this need and have tried to solve the problem by preserving existing openings, creating new clearings, and utilizing firebreaks, access roads, and powerlines. However, Lejeune, like most military installations, has been faced by the fact that natural vegetative succession since the Base was established in 1941 has closed in more openings than have been cleared. Good wildlife management calls for approximately 25 percent of the area suited to wildlife to be in cover types other than woodland.

The timber management program is the primary factor in determining the type and quality of wildlife habitat over much of the Station. Timber management is inseparable from wildlife management as it will affect a far greater acreage than will the most ambitious wildlife planting plan.

We understand that the current Camp Lejeune forestry management plan was developed in 1964. A resume of 1968 work included clearing 18 acres, harvesting 1,700 acres, reforesting 140 acres, and burning 7,300 acres by prescription. A combination of selective cutting and clear cuts is employed with the emphasis on selected cutting. There is a 10-year cutting cycle. Six of the sixty 1,000-acre compartments were cut in 1968. An additional 25,000 acres lie within impact areas and are not managed.

Our inspections indicate that the timber management program has given less consideration to wildlife needs than is acceptable. Spot checks indicated that, in effect, TSI work converted mixed stands of hardwoods and pines to pinelands. Additionally, hardwood harvests along a creek on Town Point has created unsightly litter and some erosion on the steep banks.

The problem at Lejeune is a common one. The capable Station Forester and his assistants are skilled professionals in pulp and timber production. These men understandably measure their success in cords of pulpwood, board feet of timber, and dollar sales. Unfortunately, management for optimum timber production is not compatible with optimum wildlife populations in the Southeast. The hardwoods, including many unmerchantable species of hardwoods, are of much greater value to wildlife than pines. Production of pines, however, is more profitable than that for hardwood. If multiple use rather than pine production is an objective on Camp Lejeune, limitations must be placed on pine production. Acceptable parameters for wildlife must include the following: (a) that bottom lands and lower slopes suited to hardwoods or mixed hardwood-pine stands be managed for hardwoods; (b) that the much greater acreage of drier, higher sites best suited to pine production be managed for pines but with restrictions to assure that minimum number of mast-producing hardwoods will be preserved on these sites. Acceptable approaches would include either a strip-type management, whereby 4- to 5-chain-wide strips managed intensively for pines were separated by 2- to 3-chain-wide strips where the hardwood-pine mixture was preserved, or a system whereby a minimum basal area of hardwoods--possibly 4-5 square feet of the larger and most consistent mast producers, plus all good den trees--were left on each acre. Clear cutting, again in relatively small blocks, is generally preferable to selective cutting.

Plans call for prescribed or controlled burning over 7,000-9,000 acres annually. An inspection of a recent prescribed burn on Town Point indicated that some 1,400 acres were covered in one treatment. Controlled burning is an approved and effective wildlife management tool as well as good forestry management. It should, however, be confined to the period mid-December to mid-February in order to minimize losses of nesting wildlife. In addition, it should be done either in narrow strips not exceeding 4-5 chains in width on a checkerboarded-type pattern with the treated blocks not exceeding 50-100 acres in size.



The planting program for wildlife is well planned and not excessively ambitious. It consists basically of about 63 sites covering 250 acres. At a given time, about 50 of these plots are cultivated for food or cover. Plantings are routinely fertilized and limed. Both annuals and perennials are planted. Species used include annual lespedeza, part-ridge pea, beggar-lice, bicolor lespedeza, browntop millet, milo, soybean, buckwheat, and cowpeas. Experimental plantings of about 15 acres of chufas for turkey feed were made last year. Clovers and fescus are planted for permanent pasture; rye, oats, and wheat for winter grazing. Comparatively few permanent clover-grass pastures have been planted, however, because of difficulties in doing the necessary maintenance by mowing and fertilization. Available equipment is hard pressed to keep road sides and cantonment areas mowed during the summer.

Funding for the wildlife program has been adequate. Permit sales, supplemented by small amounts of non-appropriated funds, have covered seed, fertilizer, and similar needs. Manpower and organization have been less satisfactory--a fact recognized by Base authorities. The Wildlife Coordinator works out of the Provost Marshall's office with direct assistance of a small number of transient marines. The Base Forester works out of the Roads and Grounds Section. The Forester has a professional assistant as well as a small staff of six civilian aids. Through no fault of those concerned, there is inadequate coordination between the two functions. Equipment could be better used. In addition, this organization does not lend itself to solving conflicts of interest between forestry and wildlife. The Wildlife Coordinator should occupy a position parallel to that of the Forester, and there should be a coordinator trained in both fields to resolve conflicts and use the total equipment and manpower to best advantage. We are pleased to note that such action is being considered by Camp Lejeune.

A new cooperative agreement for the Base was completed in early 1969. There is also a long-range wildlife management plan. The plan could be more comprehensive and specific, but it is serving the purpose at present. The Camp Lejeune policy is to provide, within manageable quotas, for controlled access to fish and wildlife on a first-come, first-served basis. Within these parameters, the Base provided 14,275 man-days of hunting in 1968. Civilians hunted 1,590 man-days; the remainder was by military personnel. The allied sports of archery and skeet and trap provided 7,700 man-days of recreation.

We were pleased to find solid progress in clearing up stream pollution. Construction of six secondary sewage treatment plants began in 1968 and is scheduled to be finished in 1969. The predator control program is basically sound. It should, however, emphasize control of feral dogs and limit control of wild animals to problem individuals or situations.

A commendable program of gathering game harvest information and statistics and data on the deer herd has been initiated.

#### Deer

Considerable progress has been made toward satisfactory management of the deer herd. In 1968, some 440 deer of either sex were harvested. Two separate doe hunts were used to control the size of the herd. The estimated Base population is 2,400 animals, and attempts are being made to gather the scientific data essential to sound herd management with the cooperation of North Carolina Wildlife Resources Commission biologists. Ovaries and lower jawbones were removed from deer harvested in 1968 and the animals were weighed.

Our most recent inspection indicated that overbrowsing to the point of range damage still exists in some sectors. Apparently it is less prevalent than in the past. If the deer population estimate is reasonably accurate, it would appear that a harvest of 600-800 animals could be sustained and that a further increase in the kill would be beneficial to the herd and to the range.

#### Turkeys

Camp Lejeune is justly proud of its turkey management program. Quality turkey hunting was provided in 1968 through a spring gobbler season. In addition, the Base has provided a surplus for restocking in other parts of the State during past years. The estimated population of 425 turkeys is, of course, modest. However, military activities on the Base may preclude extremely large populations. The present turkey management program appears to be realistic and sound.

#### Doves

In contrast to many military reservations, dove management has not been emphasized at Camp Lejeune and does not provide much recreation. This has resulted in part from the fact that good dove hunting is available off the reservation and in part from limitations in equipment. We believe that a more intensive dove management program would be productive and popular. A modest beginning would involve creating two to four dove management fields. These fields should be larger than 15 acres in size and should not be hunted more frequently than once or twice weekly. The Georgia Game and Fish Commission pamphlet entitled "How to Have Small Game on Your Land" contains what we believe to be an excellent approach to dove management. This approach is adaptable to the farming equipment available at the Base. Seedings can be done by broadcasting and the necessary open ground created by subsequent disking at spaced intervals.

### Waterfowl

Camp Lejeune winters a good number of ducks and provides fair to good hunting. In 1968, one fresh water impoundment creating some additional waterfowl habitat was built. Existing waterfowl habitat was improved by erecting 12 new nesting boxes for wood duck and adding predator guards to older boxes. Plans to construct a 260-acre lake on Wallace Creek for fish and waterfowl were finalized. Several of the duck blinds on New River were repaired. Lejeune personnel continued to cooperate with the State and Federal wildlife agencies in a duck banding program. A salt water marsh was selected as the site for a future impoundment designed to provide food and resting areas for ducks as well as additional hunting opportunities. The greentree reservoir was flooded in mid- to late September and drawn down in late March. That it provided less duck use than in 1967, the first year of operation, was attributed to a lower wood duck population in eastern North Carolina.

### Other Game

The Base continued to support fair to excellent populations of squirrels, rabbits, quail, and rails and to provide hunting for all of these species. These species are almost certainly underharvested and could provide additional recreation. There are notable opportunities for quail management. If there is sufficient demand, a modest quail management program covering 500-1,000 acres could be initiated without excessive cost. Key tools in such a program would include a very heavy timber thinning operation and a stepped-up program of controlled burning--probably around small protected islands of heavy escape cover. Creation of food plots might also be necessary.

### CONCLUSIONS AND RECOMMENDATIONS

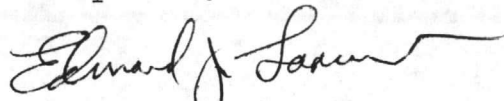
Camp Lejeune has an excellent wildlife program as well as notable opportunities, problems, and needs. A few of several highly commendable Base policies and practices should be mentioned. These include (a) providing better than adequate access to hunting and fishing; (b) the recently initiated policy of collecting harvest and population statistics essential to sound, scientific, wildlife management; (c) the well-managed spring gobbler hunts; (d) the excellent cooperation and coordination with State and Federal wildlife agencies; (e) the increasingly effective deer herd management; and (f) the planned waterfowl program. In addition, Camp Lejeune has a worthy wildlife food and cover planting program of long standing.



The following recommendations are designed to supplement, modify, and further improve the excellent, existing program. We suggest:

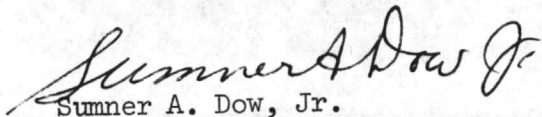
1. That an attempt be made to better coordinate the wildlife and forestry management on Lejeune, giving the two functions equal rank, housing them together, pooling equipment and manpower, and placing them under a joint wildlife and forestry coordinator with training in both fields.
2. That hardwoods be given a higher priority in forestry management and that steps be taken to insure a balance between hardwoods and pines compatible with good wildlife management.
3. That increasing the area in small clearings, openings, and non-forested types to an ultimate total of 25 percent of the hard lands be a long-range objective of forestry and wildlife management.
4. That the deer harvest be increased to the point where the quality of the range will improve.
5. That small-scale, intensive dove and quail management aimed at providing quality hunting be initiated. These could be pilot programs for more ambitious management in the future.

Prepared by:

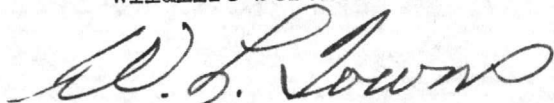


Edward J. Larimer  
Wildlife Enhancement Specialist  
Division of Wildlife Services

Approved by:



Sumner A. Dow, Jr.  
Regional Supervisor, Division of  
Wildlife Services



W. L. Towns  
Deputy Regional Director

Attachment

Pamphlet entitled "How to Have Small Game on Your Land"

Comments on Field Trip Report by Mr. Larimer  
from Fish and Wildlife Service

Page 1, paragraph 2 under "Discussion":

As timber harvest progresses under the Forest Management plan, more openings and Clearings will be made. <sup>each year</sup> When a stand of timber in clear cut or seed tree cut and site preparation is done the land is left open and ready for reforestation. These openings range in size from 10 acres to 200 acres. When reforestation work is done small parts of these areas may be left for permanent openings. In order for these openings to remain open permanently a brush-bog would have to be run over them every two to three years. The wildlife management program would have to bear the expense of this brush-bog work.

At the top of page two it is stated that "the emphasis is on selected cutting. This is a

Misunderstanding. The forestry management plan is based on even aged management. This means that all mature stands will receive some type of Clear cut in order to establish a new stand of even age. The only selective cutting done is in immature stands. The figure of 25,000 acres lying in impact areas should be corrected to 5,200 acres.

Paragraph 2 and 3, page 2

Problems mentioned here are not at all uncommon due to the fact that Wildlife Managers and forest managers have different goals. In order for a well balanced multiple use program to be worked out there must be some give and take from both sides.

The natural order of plant succession from bare ground to climax forest is first lower vegetation such as grass and weeds, then pine and following pine will be hardwood. Such trees as oak, hickory and beech dominate



the Climax forest. So it is possible that if no hardwood is cut or controlled in any way the forest will eventually become predominately hardwood with a scarcity of pine. When this happens the forest is much depreciated in Commercial value.

Hardwood cutting has been much curtailed within the past three years anyway. It is not the objective of forest Management plan to convert all hardwood stands into pine, but to keep in proper balance the volume of hardwood and pine.

Paragraph 4, page 2

It is admitted that in some cases the prescribed burning program had included areas too large in size and efforts are being made to cut down the size of these areas as much as possible in the future. All burning is done during the

Months of December, January and  
February.



RECEIVED  
BASE MAINTENANCE DIVISION  
MARINE CORPS BASE  
CAMP LEJEUNE, NORTH CAROLINA 28542

JUN 11 2 59 PM '69

IN REPLY REFER TO

4A/LEK/awk  
5420/4  
9 June 1969

MEMORANDUM FOR THE BASE PROVOST MARSHAL (ATTN: BASE WILDLIFE  
TECHNICIAN)  
→ BASE MAINTENANCE OFFICER (ATTN: BASE  
FORESTER)

Subj: Field Trip Report, U. S. Department of Interior,  
Fish and Wildlife Service, Bureau of Sport Fisheries  
and Wildlife, Division of Wildlife Services, March  
1969

Encl: (1) Deputy Regional Director, Dept of Interior, Bureau  
of Sport Fisheries and Wildlife ltr of 22 May 1969  
w/Field Trip Report

1. Enclosure (1) is forwarded for your information. Request addressees review subject report and prepare comments/recommendations for the Chairman, Committee on Conservation of Natural Resources by 1 September 1969. Comments/recommendations are desired for consideration in programs for improvement of conservation procedures on this Base.
2. The Base Forester may retain attached copy of subject report. The Base Wildlife Technician has been furnished a copy of the report. Please contact this office, (Base Conservation Officer, LtColonel Beverly, phone 2544), for assistance or information as required.

*Fredric O. Olson*  
FREDRIC O. OLSON  
Colonel, USMC  
Assistant Chief of Staff,  
Facilities





UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE  
PEACHTREE-SEVENTH BUILDING  
ATLANTA, GEORGIA 30323

.. May 22, 1969

Commanding Officer  
Marine Corps Base  
Camp Lejeune, North Carolina 28542

Dear Sir:

Attached are two copies of our most recent report on your wildlife management program. The report was prepared by Mr. Larimer, Division of Wildlife Services, following his visit to the Base on March 19-20, 1969. This was, of course, the occasion of the Annual Meeting of the Committee for the Conservation of Natural Resources.

Our report is intended as an aid to the further development of your excellent wildlife management program. It repeats, at least in part, the recommendations and suggestions made to the Committee by Mr. Larimer on March 20.

Please permit us to express our appreciation for the courtesies and cooperation extended to our biologist during his visit to Camp Lejeune. We also would like to compliment on your choice of Mr. Charles D. Peterson as your Fish and Wildlife Coordinator and to commend him for the excellent job he is doing with the natural resources on the Base.

Sincerely yours,

W. L. Towns  
Deputy Regional Director

Attachment

