# FEASIBILITY OF A GREEN-TREE RESERVOIR IN EASTERN TEXAS

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## ABSTRACT

*The establishment of a green-tree reservoir on private land in eastern Texas was economically successful for a timber company. The initial investment was recouped within two years from hunter fees. Hunter success averaged 1.07 and 1.51 ducks per day, respectively, for the first and second seasons. Questionnaires indicated the hunters were pleased with the project and would like to see the project continued and expanded.*

Bottomland hardwood forests, when flooded during winter, provide excellent habitat for mallards (*Anas platyrhynchos*) and wood ducks (*Aix sponsa*). Rudolph and Hunter (1964) found that green-tree reservoirs, which increased migrant duck populations during hunting season, proved popular and profitable in Mississippi Delta states. Many duck clubs in Arkansas have developed green-tree reservoirs for duck hunting. Properly managed, these forest reservoirs also increase timber growth (Broadfoot, 1958).

In eastern Texas there are numerous locations along rivers where soils, topography, and timber stands are suitable for green-tree reservoirs. However, their attractiveness to ducks and duck hunters has not been investigated in Texas.

The present study was conducted from 1972 through 1976 in the Angelina River bottom with the following objectives in mind: (1) find if the green-tree reservoirs would attract and hold ducks during the hunting season, (2) determine whether the reservoir had commercial potential, (3) determine hunter success, and (4) assess hunter attitudes towards paid duck hunting.

## STUDY AREAS AND METHODS

The study area consisted of 122.8 hectares (ha) three miles northeast of Wells in Cherokee County, Texas. The land is owned and managed primarily for timber by International Paper Company. The terrain is gentle, averaging 29.9 cms in elevation change per 30.48 horizontal meters. The soil is a Bibb clay loam. Water was supplied by an intermittent stream, seepage, and occasional flooding by the Angelina River. Of the 122.8 ha flooded, 50.6 was a swamp, and 71.5 ha of adjacent forest was flooded following construction of an earthen dam.

Waterelm (*Planera aquatica*) is the dominant woody species in the swamp. Overcup oak (*Quercus lyrata*), red maple (*Acer rubrum*) and hawthorns (*Crataegus* spp.) dominate the transition between the swamp and ridges. Blackgum (*Nyssa sylvatica*), sweetgum (*Liquidambar styraciflua*), willow oak (*Quercus phellos*), water oak (*Q. nigra*), and laurel oak (*Q. laurifolia*) dominate the ridges. Overstory trees were sawtimber size. Redtop panicum (*Panicum agrostoides*), hummock sedge (*Carex joori*), redtop flatsedge (*Cyperus erythrorhizos*), and yellow nutgrass (*Carex esculentus*) are the main herbaceous species. The vegetation is described in detail by Chambless and Nixon (1975).

Twelve supplemental food plots varying in size from 0.46 ha to 1.93 ha were cleared with a D-4 bulldozer in areas that would be covered by less than 46 cms of water when flooded. Food plots were planted during two seasons. In August 1973 plots were fertilized with a 12-12-12 analyses fertilizer at the rate of 224 kg/ha and seeded to 11.21 kg/ha of Japanese millet (*Echinochloa frumentacea*) and 11.21 kg/ha of browntop millet (*Panicum ramosum*).

In August 1974 the plots were reseeded at a ratio of 1/3 browntop millet and 2/3 Japanese millet at approximately 22 kg/ha. No fertilizer was applied.

Ducks were censused by direct counts on three transect lines once a week, beginning in the first week of November and continuing through the middle of January during the 1972-1973, 1973-1974, and 1974-1975 seasons. Ducks were not censused during the 1975-1976 season. Data were collected between 11:00 a.m. and 4:00 p.m. to census "holding birds" instead of birds flying over the area in early morning or late afternoon. Population totals were estimated by expanding the census data to an area basis as described by Overton (1971).

Duck hunts were conducted during two seasons. During 1974-1975 the dates included the weekends of December 14-15 and 28-29, and January 4-5 and 18-19. Dates were selected to correspond with documented duck population peaks (Table 1). In early December 1974, the public was informed of the scheduled hunt through various media announcements. Applicants had an option of buying a $7.00 one day permit or a $30.00 season permit to hunt ducks only. Hunter numbers were limited to 30 per day by controlling the number of permits sold. The entrance gate at the check station was open to hunters at 5:00 a.m. and the hunt-day began at legal shooting time and ended at 2:00 p.m. Departing hunters recorded their duck kill by species and completed a questionnaire providing data on hunters attitudes and success.

During 1975-1976, hunters were sold season permits only at $35.00. Permits entitled the holder to hunt ducks from January 1-18, the time of year when the duck population was higher and more stable on the area in previous years. Hunters became aware of the hunt by word-of-mouth and by personal contact with the land owner. No check was made of hunters entering or leaving the study area, but information about hunter success and attitudes was obtained by a mailed questionnaire at the end of the hunting season.

## RESULTS

In 1973, seed germination on the food plots was excellent, but the immature plants were destroyed by abnormal flooding of the Angelina River in September. The average seed yield of millet for the 1974 plantings was 11.3 g/sq.m. The distribution of ducks in the flooded area was not closely correlated to the location of the supplemental food plots (Allen, 1975).

Table 1. Duck populations during 1972 through 1975 on the study area.

| | | *Month* | | |
|---|---|---|---|---|
| *Year and Week* | | *November* | *December* | *January* |
| | | | Number of Ducks | |
| 1972-1973 | | | | |
| | 1 | 50 | 900 | 75 |
| | 2 | 250 | 530 | 250 |
| | 3 | 400 | 50 | 400 |
| | 4 | 525 | 275 | 200 |
| 1973-1974 | | | | |
| | 1 | 250 | 400 | 615 |
| | 2 | 25 | 450 | 850 |
| | 3 | 400 | 700 | 825 |
| | 4 | 175 | 750 | N.C.[1] |
| 1974-1975 | | | | |
| | 1 | 300 | 600 | 1050 |
| | 2 | 650 | 650 | 700 |
| | 3 | 750 | 675 | 550 |
| | 4 | 840 | 660 | N.C. |

[1]No census taken

Table 2. Hunter success by duck species during 1974-1975 on the study area.

| Date | Number of Hunters | Reported Duck Harvest | | | |
|---|---|---|---|---|---|
| | | Mallard | Wood Duck | Other | Total |
| Dec. 14 | 22 | 4 | 8 | 0 | 12 |
| Dec. 15 | 16 | 16 | 2 | 0 | 18 |
| Dec. 28 | 16 | 7 | 4 | 0 | 11 |
| Dec. 29 | 8 | 17 | 1 | 3 | 21 |
| Jan. 4 | 23 | 39 | 2 | 0 | 41 |
| Jan. 5 | 17 | 12 | 3 | 6 | 21 |
| Jan. 18 | 10 | 3 | 0 | 0 | 3 |
| Jan. 19 | 10 | 3 | 0 | 0 | 3 |
| Total | 122 | 101 | 20 | 9 | 130 |

In early November, 1974, there were approximately 300 ducks on the study area (Table 1). Populations increased rapidly the next few weeks and during the first week in January the population was approximately 1050. The species composition was approximately 70-75 percent mallards, 15-20 percent wood ducks, and 5-10 percent green-winged teal (*Anas carolinensis*), ring-necked ducks (*Aythya collaris*), and shovelers (*Spatula cylpeata*).

During the 1974-1975 season, 78 percent of the 130 ducks bagged in 122 hunt-days were mallards, 15 percent were wood ducks, and seven percent green-winged teal (Table 2). This hunter success of 1.07 ducks per day is comparable to the 1.04 ducks per trip for upper Mississippi, Minnesota, Wisconsin, Iowa and Illinois as reported by Green (1963). Of the 122 completed questionnaires, 98.2 percent of the hunters enjoyed the hunt, 100 percent would like to see International Paper Company flood more area and install more food plots for duck hunting, and 97.4 percent indicated they would return to the project to hunt ducks next season.

In 1976, thirteen of the 26 hunters (50 percent) who purchased season permits returned the mailed questionnaire. The returned questionnaires indicated 68 percent of the 79 ducks reported bagged in 52 hunt-days were mallards and 32 percent were wood ducks. The average daily kill was 1.51 ducks per hunter for those hunters who returned questionnaires. Twenty-two of the 26 hunters who hunted in 1976 had duck hunted on the project the previous season. All of the 13 hunters who returned questionnaires indicated they enjoyed the hunt and would duck hunt on the area again next year if opened. Weekend hunts were preferred by 54 percent (7) hunters, the other 6 preferred a continuous season.

Table 3. Green-tree reservoir financial statement during 1974-1975 and 1975-1976.

| Item | 1974-1975 | 1975-1976 |
|---|---|---|
| Expenses | | |
| Surveying | $ 100 | $ |
| Water control structures | 836 | |
| Food plot clearance | 150 | |
| Food plot development | 250 | |
| Advertising | 154 | |
| Administration | 200 | 100 |
| Total | $1,690 | $100 |
| Returns | | |
| Hunting permits | $ 990 | 910 |

The total two-year cost for the project through the 1975-1976 hunting season was $1,790 (Table 3). Of this expense, $1,336 were non-recurring construction costs. If hunting permits continue to return $910 annually and future costs (administration and maintenance) are $200 annually, as estimated, the net profit over a 10-year period will be $5,790, a return of $4.71 per year per ha of flooded bottomland.

## MANAGEMENT IMPLICATIONS

Green-tree reservoirs appear to be economically feasible in bottomland hardwood forests of eastern Texas. Small initial investments may be recouped within two years with an expected annual profit of approximately $4.71 per ha. Administration costs can be reduced by selling season permits instead of day permits. When food is available, ducks can be attracted to the green-tree reservoir. Hunts should be planned to coincide with the expected high and most stable populations, which usually occur from mid-December through mid-January in eastern Texas.

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