

were having trouble with the birds. Carbide guns were strategically placed over fields and gauged to fire about every thirty seconds. Men were employed to service the guns and shoot rifles to scare the birds from the fields. Airplanes also flew over the fields about two feet above the rice in an effort to frighten the birds away. The birds did not appear to pay much attention to the noise of the guns or the planes.

Blackbirds not only eat the rice but shell out more than they eat. They also pinch the grain while in the milk stage, causing additional loss. It was estimated that each blackbird will eat approximately its weight every three days (U. S. Department of Agriculture). In the spring they dig up and eat the seed as well as pull up the young sprouts. The birds not only feed on the rice during the day but large numbers come late in the afternoon to roost in some of the fields. Apparently there is no satisfactory control method known at this time but the Bureau of Sport Fisheries and Wildlife are conducting research on the problem.

There is a growing realization that predator and rodent control is an effective tool of wildlife management when used properly and applied diligently by qualified personnel. Success comes only through continuous teamwork and vigilance in judicious application of the most modern methods when and where required.

SPECIAL REPORTS

WATER PROJECTS IN ARKANSAS IN RELATION TO WILDLIFE AND RECREATION *

A SUMMARY REPORT, COMMITTEE ON WATER USE

By HAROLD E. ALEXANDER, *Arkansas Game and Fish Commission*; ROY WOOD, *Fish and Wildlife Service*; H. E. WALLACE, *Chairman, Florida Game and Fresh Water Fish Commission*

INTRODUCTION

The number and scope of water projects in the State of Arkansas, and in the United States as a whole, are so vast and complicated that analysis of the results and effects of the program, or of any of its segments, is nearly impossible. A review of Engineer Reports to 1957 indicates that there were, at that time, a minimum of sixty-eight authorized flood control, drainage and navigation projects, which had been completed, started or were planned for future construction in the State. They ranged in size from the huge Arkansas River Navigation Project, with its numerous dams, levees and channels, to separate levee and drainage projects encompassing the drainages of the lesser streams and bayous. Cost estimates for half of these authorized projects total \$541,574,072.00. A survey of future plans indicates that there are numerous other projects, not yet authorized, but planned for the future.

Certain of these water projects have enhanced wildlife and recreational values. Others have created critical problems in the preservation of wildlife species, in perpetuation of various sports and recreation, and in the preservation of human habitat as we know it. In general, this program has resulted and will result in a vast reduction in lowland lakes, streams and wetlands essential to waterfowl and other wildlife species, and in bottomland hardwood timber through the conversion of these timberlands to croplands.

As of 1950, (see Agricultural Census Rept.), 4,700,000 acres had been drained in Arkansas, and approximately 3,700,000 acres of seasonally flooded

* Presented as a segment of a report to the Southeast Section, Wildlife Society, by the members of Committee on Water Use.

bottomlands remained. Plans have and are being made to eliminate a majority of the remaining wetlands and lowland woods.

In addition to the drainage and subsequent clearing of lowlands, the construction of huge reservoirs in the hills and mountains above lowland elevations is having a separate and additional impact on forests, wetland areas, and on the streams and rivers which they impound. Twelve (12) of these reservoirs of which seven (7) have been completed, will permanently or periodically inundate 385,620 acres of land behind the dams constructed to impound their waters. This list is incomplete. It does not include the great dams on the Arkansas River, and other projects planned which will impound almost all of the principle rivers and streams. Projects in the White River Basin alone provide for the conversion of 764,700 acres of woodland and idle pasture to cultivation.

In addition to these engineer plans for holding or getting rid of water, there is another government program, the watershed program, under jurisdiction of the Soil Conservation Service, which contemplates further management and alteration of the smaller streams and tributaries, and which will, eventually, have its impact on the nature, character and disposition of our water resources.

In addition to these vast Federal programs, States and municipalities have their own programs designed to manage waters in accordance with their separate needs, and individual land owners use and manipulate water in accordance with their own needs and desires. As we said in the beginning, the ramifications of all the programs set up to manage or manipulate water very nearly defy description and analysis.

In view of the enormous impact and cost of this program, the money for which comes from the public purse, it behoves us to take a close and continuous look at all of these programs providing for the management of water. As has been suggested, one of the primary objectives of drainage is to produce more agricultural land which can be put into production. But one of our most critical and acute problems is the disposition and use of surplus agricultural crops. In 1955 the Commodity Credit Corporation, established to buy up agricultural surpluses, had assets totaling \$7,096,490,858, and was paying $\frac{3}{4}$ million dollars per day to store these crop surpluses and hold them off the markets.

In 1956, Soil Bank payments of \$750,000,000 annually were provided for—to take more land out of production and *hold down* crop surpluses. It is difficult, indeed, to correlate the need for more cropland through drainage by government agencies, with the efforts and expenditures by other government agencies to reduce cropland and thereby nullify the effects of these surpluses. Even if wildlife problems were not our concern, it would be to our interest as taxpayers to question these contradictory expenditures of the money we pay into the public till.

Another objective of these water projects provides for clearing of many thousands of acres of bottomland hardwoods. But our need for forests and their products, in the future, is more apparent than the need for crops. As one example, we cite the use of 6,000,000 tons of newsprint in 1950 as compared with 1,000,000 tons in 1910. Newsprint is made from wood products. Forests are converted to croplands much more rapidly than croplands can be reconverted to merchantable timber.

We also need to observe that many water projects were planned and approved years in the past, and that they need to be evaluated in terms of new and different problems in these changing times. One of our major problems is that of providing recreation, and escape from the mechanistic and material world which is enveloping us, as new and increasing numbers of people crowd the land.

THE WETLANDS

Prior to their extensive development for agricultural purposes, the lowlands supported myriad forms of wildlife. As drainage progressed, the reduction in numbers of ducks and geese and other wildlife was in direct ratio to their loss of habitat. Much of this drainage was inevitable and essential. As we have suggested, the extensive and continuous reduction of these remaining wetlands,

in view of the effects of their loss on wildlife forms and on our own economy is questionable. We may have reached a point of diminishing returns.

As has been indicated, 4,700,000 acres had been drained by 1950, and some 3,700,000 acres of overflow lands remained. Of these remaining acres, only a portion can be classified as high quality lands for wildlife.

The future program to produce and protect more agricultural land and for flood control is extensive. It involves the dredging of ditches, construction of levees, channelization for more rapid run-off, pumping of water from sump lands, and other procedures. These plans will effect the remaining bottomlands along the lowland reaches of every river system in Arkansas. A review of approved projects demonstrates plans which will effect extensive drainage along the Cache, St. Francis, L'Anguille, Black, Red, White, Bayou Meto, Arkansas and numerous other bayous, streams, and their tributaries. Many of these plans are complete and under way, others are deferred because appropriations have not been made for their execution.

A complete review of the effects of drainage on the remaining bottomland timber and wildlife habitat is not possible in this brief report. It is only possible to present a few examples which will indicate the extent and degree of the effects of these water projects on particular areas. A brief review of project plans and surveys of their effects indicates that at least 1,200,000 additional acres of bottomland hardwoods will be cleared. The result will be drastic for wildlife and may acutely effect future wood products industries.

Among the most valuable remaining lowland streams are the Cache and Bayou De View rivers in east Arkansas, whose drainages merge before they run into the White River. These streams overflow into hardwood bottoms, which attract many thousands of ducks and geese each fall. These streams are, to a considerable extent, in their natural state and furnish sport fishing of the highest quality. The adjacent overflow lakes furnish both sport and commercial fishing. These streams and adjacent woods provide many thousands of hours of recreation to the States citizens, and revenues from hundreds of visitors who come to this locality for its famous waterfowl hunting.

If planned projects are carried out, the Cache and L'Anguille Rivers will become ditches 40 to 160 feet wide and 10 to 12 feet deep over most of their courses. It is estimated that the woods above the backwater area will be reduced from 230,600 acres to 129,300 acres. In the backwater area woodlands will shrink from 310,000 to 187,500 acres—a 40% reduction. Most of the remaining woods will be protected from overflow, and the area's famed duck hunting and fishing will be destroyed forever.

Completion of the St. Francis River drainage project in east Arkansas will provide for ditches, floodways and increased levees along this river and its tributaries. These plans acutely affect 268,000 acres of woods left along the lower St. Francis; many thousands of acres of which will be cleared; and this clearance will, to a large degree, eliminate the waterfowl, deer and other wildlife which inhabit the timbered bottoms.

Like projects, authorized for almost all the remaining lowland streams will produce similar results throughout the State, and will drastically change the character of the land.

One of Arkansas' greatest resources and potentials lies in her outdoor recreation opportunities. Many of these potentials will be lost if all these water projects are constructed. The quantity of food is more than sufficient, while recreational facilities are being steadily restricted in amount and quality.

Times change, and many of these projected plans might well be deferred until future needs for crops, timber and wildlife are more clearly apparent. Certainly, these needs are only partly understood in this day and at this time.

THE RESERVOIRS

In the hills and uplands of Arkansas, the construction of massive concrete dams to create reservoirs for purposes of flood control, navigation, and power, are inundating the swift flowing clearwater streams for which this mountainous region of Arkansas is famous. Reference to those projects which have been

constructed or approved, and those planned into the future show clearly that this program, if completed, will flood out of existence a major portion of every large stream in the Ozarks and Ouachita regions.

Of twenty (20) major dams already constructed or approved for construction, the water impounded behind twelve (12) of these will permanently or periodically inundate 385,600 acres of land. These streams, above these mighty structures, have or will become lakes subject to drastic fluctuations resulting from the multiple uses to which they are put. Below the impoundments the streams are altered as the result of holding back water for navigation, power, or other purposes, or as the result of changes wrought by radical temperature alterations or sudden prolonged releases of water from these reservoirs.

In the upper White River basin alone, five major dams have been approved, four of which are complete or are under construction; and five more have been planned or are being seriously considered. The dams which are under way or completed have, or will convert all of the upper White and its tributaries into vast lakes subject to extensive and rapid fluctuations. The upper White River, once famous as float fishing stream, will soon no longer exist as a free flowing river. Its boiling rapids, shoals, and gravel bars will have been covered up forever; its famed float fishing a thing of the past, and its natural beauty sacrificed to the economic objectives for which these dams are prescribed. There are additional and similar projects constructed on, or planned for all the other major Ozark streams, such as the Eleven Point, Spring, Buffalo, Little Red, Kings, and Strawberry. Not a single major stream has been left out of current or future consideration for impoundment.

In the Ouachita region, such dams as Blakely, Mufreesboro, Narrows, DeGray, Benton and others are destined to convert the Ouachita, Little River, Caddo, Saline and other clearwater streams into impoundments; and recently enacted legislation provides for additional dams on all six of the swift flowing mountain streams which will flow into the gigantic Millwood reservoir, on Little River, which was recently approved for construction.

One purpose of these impoundments is to hold water off the lowlands, further contributing to the drainage and clearance of these lowlands, where periodic overflows have filled the lakes and created habitat for ducks and geese.

In addition to these planned impoundments, there is the Arkansas River navigation project, with a cost estimate of \$1,200,000,000, which provides for construction of Dardanelle and Ozark dams, additional low water dams, channels and levees. Dardanelle, alone, will back water up stream for a distance of 45 miles, and will cover 37,000 acres at normal pool stage.

It is not our purpose to criticize all of this reservoir construction. As in the case of drainage, much of what has been done has been the result of certain economic demands, many of which have already been satisfied. The large lakes which have been constructed have provided extensive waters for certain types of fishing and other recreational use. These uses have, however, been incidental to the purpose for which these impoundments are prescribed. It is our belief that, with 40,000,000 hunters and fishermen and millions of others interested in types of recreation provided by water, the management and use of water for recreation should not be merely a byproduct of other water uses.

It is our contention, too, that the reservoir construction program is rapidly reaching a point of diminishing returns. The economic values of certain projects need to be seriously questioned in terms of their conflict with other costs and other needs. From a recreational standpoint, we have already provided and made available vast facilities for those people who are interested in the types of water recreation provided by these impoundments. In this respect, many of them have and will continue to contribute to the State's recreational facilities. They provide facilities for numbers of people, and commercial returns calculated in terms of those numbers. They do, however, (result) "—in a fast diminishing rate of returns of recreational benefits, and it doesn't require many large reservoirs to supply the demand—for that type of recreation."

In contrast to the reservoirs, the unique and beautiful clearwater streams in the State have values which cannot be calculated in dollar terms and which, once lost, *can never be replaced*. Their isolation, beauty, and solitude provide

recreation and escape from the pressures of civilization, and the special sporting facilities they present are preferred by certain segments of the public. The esthetic values alone are sufficient to warrant the preservation of a number of these streams; and these special values will increase in relation to their ultimate scarcity. Certainly, in our diffuse economy, we have a need for and room for the preservation of some of these streams where "the handiwork of God has not been obscured by the heavy hand of man." But if we do not make a specific attempt to save some of these streams they will be gone before we are aware that they are passing out of existence.

Certain States, recognizing this trend, have made provisions for preservation of certain high quality streams, and plan the organization of special recreational features around them contingent with their extraordinary and special values.

The preservation of some of our better streams is one of our most critical needs, in view of the vast scope of the projects which have been outlined for the future, and which will eventually destroy most of them.

ARKANSAS WETLANDS PROJECTS FOR WILDLIFE

We have painted a black picture of water management in its relation to the preservation and future welfare of woodlands, water and wildlife. But in that dark view there is a bright spot. The brighter view is the extent to which Arkansas has progressed with its land purchase projects, to obtain and set aside particular areas, primarily wetlands, for waterfowl and other wildlife. Arkansas' efforts in this respect probably exceed those of any other state. A total of 112,256.24 acres of wetlands, in 13 separate large tracts have been obtained, through purchase, and these areas are being maintained and managed for ducks, geese and other game. The following table lists these areas, their location and their respective acreages.

ARKANSAS WETLAND PURCHASE AREAS

<i>Name of Area</i>	<i>County</i>	<i>Size in Acres</i>
Bayou Meto	Arkansas and Jefferson Cos.	33,512.34
Big Lake	Mississippi Co.	11,642.05
Black River	Clay, Randolph and Green Cos.	14,369.54
Dagmar	Monroe Co.	6,472.92
Bois D'arc	Hempstead Co.	5,663.37
Petit Jean	Yell Co.	6,223.07
Cut-Off Creek	Drew Co.	8,205.02
Harris Brake	Perry Co.	2,899.35
Shirey Bay—Rainey Brake	Lawrence Co.	9,695.46
St. Francis Sunken Lands	St. Francis Co.	1,862.90
Sulphur River	Miller Co.	9,404.11
Weiner Tract	Poinsett Co.	1,586.11
Désiré	Prairie Co.	720.00

In addition to these lands the State has 4,205 acres in the Camp Robinson area, set aside for upland game, and McIlroy tract encompassing 8,278 acres, set aside for forest species. The State has, likewise, constructed a number of lakes for fishing, which furnish additional habitat for game.

These extensive lands are being developed for wildlife and recreational uses, and it is intended that they serve these purposes into perpetuity. Because proposed drainage may have adverse effects on the waters held in these tracts, and because these effects must be considered, they may serve as "controls" to prevent the complete loss of adjacent wetlands. If all other lands in Arkansas were drained these lands would continue to provide wildlife habitat and recreation.

Land values are increasing rapidly, and the Game and Fish Commission has used a major portion of available funds to acquire these lands before they were gone. Other States might well consider the immediate necessity of acquiring similar lands.

Beyond such a program, however, we need to recognize the need for the conservation of wetlands for their values as natural drainage systems, as storage

reservoirs for underground waters, as lands producing valuable timber which cannot be replaced, and as habitat for forms of wildlife which provide recreation and make more interesting the surroundings in which we live. In view of the conflicting values which now affect land use, much drainage should be deferred until its impact is understood and its need determined. In addition, the Commission is developing waterfowl, quail, and turkey habitat on Corps of Engineer holdings adjacent reservoirs.

The Fisheries Division is carrying on trout research and management in cold waters below impoundments, and is studying and managing reservoirs through drawdowns and other methods. The following sums of money are allocated to research and management objectives annually:

Fish Research	\$66,000
Fish Management	58,000

THE "OTHER" VALUES OF WATER

Water has many uses. We use it for such diverse purposes as drinking and carrying off our sewage. Our bodies are largely composed of it, and we could not grow crops without that water which falls from the clouds onto the earth.

Many of our problems in water use stem from the narrowness of our concepts of water use for human needs. We have been largely concerned with getting water off the land, or retaining it for a very limited number of specified uses. The management of water has been, primarily, delegated to specialists whose scope of interest lay within the limitations of their particular field of operation. We have not recognized that intensive management of water has effects far beyond the predetermined purposes of such management. We are now beginning to realize many secondary effects ensuing from the large objectives we have set up.

In the management of water we believe that recreational use, and what we might define as "a recognition of esthetic values" may, in the long run, be considerations which are primary to the future welfare of mankind. Rest, recreation and escape from a confused world are essential to the physical and mental health of man, and woods, waters and wildlife can contribute much to these human needs.

WHAT NEEDS TO BE DONE

In the broadest sense, we need to re-evaluate our water management programs and their objectives. The conflicting aspects of crop surpluses, price supports, budget deficiencies, drainage and land clearance make such a course of action essential.

We need to question critically our system of values to determine whether certain values we are destroying may not, in the long run, be greater than the values we plan to create.

We need to study our water problems more thoroughly, and enlist the aid of all land use agencies and specialists in making such studies. Pollution control and ground water problems are, for example, two problems which have received far too little attention. We need to re-evaluate our water management in terms of future needs, not now wholly apparent.

In each State, because of the scope of water management in progress and projected, we need to assign *at least* one man to a full time study of water management and its relation to wildlife and recreation.

And finally, we need to recognize a right that belongs to future generations, the right to make some determination as to the kind of world in which they will live. We are forcing upon them a completely changed and altered world which we are creating in terms of our short term and particular needs. They may not like the kind of legacy we will leave behind.

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 Southeastern Association of Game
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 Louisville, Kentucky
 October 20, 1958

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OPPORTUNITIES FOR FISH AND WILDLIFE ENHANCEMENT THROUGH WETLAND AND WATER USE STUDIES

A REPORT TO THE SOUTHEASTERN SECTION,
WILDLIFE SOCIETY

BY THE COMMITTEE ON WATER USE

By HAROLD E. ALEXANDER, *Arkansas Game and Fish Commission*; ROY WOOD, *U. S. Fish and Wildlife Service*; H. E. WALLACE, *Chairman*, *Florida Game and Fresh Water Fish Commission*

At the last year's meeting of the Southeastern Section of the Wildlife Society in Mobile, Alabama, your Water Use Committee submitted a report which discussed the futility of a committee which changed membership each year. Such change required that each year the committee had to become completely