MANAGEMENT SIGNIFICANCE

The Stuttgart mallard weights indicate that land use and resultant foods might affect the size and condition of individual ducks. The larger size mallards from Stuttgart winter in the same climate as the Little Rock ducks, come from the same nesting grounds and, in general, are subject to the same conditions prior to their arrival. At Stuttgart, however, the rice acreage is approximately double that of the Little Rock area. There is a greater acreage of harvested rice fields and bottomland oak woods flooded for hunting in the Stuttgart area than in the Little Rock area. This provides an abundance of choice foods for ducks.

SUMMARY

The weights of 3,425 mallard ducks, collected in 1957-58 and 1958-59 from adjacent areas in Arkansas, showed little seasonal or other fluctuations in weights from the first to the last of the hunting season. A slight decline occurred in weights each year during January.

The mallards were in good condition and compared favorably with mallards reported in other areas by Bellrose and Hawkins and Marshall and Harris. Arkansas mallard males averaged 2.8 pounds and females 2.4 pounds. The largest weighed 3.8 pounds.

Food availability in the Stuttgart area may have influenced the size of the mallards as they were larger at Stuttgart than at Little Rock. Rice, acorns, and other choice foods of mallards are generally more abundant in the Stuttgart area than in the Little Rock area.

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WATER POLICY AND WILDLIFE

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Presentation from Committee on Water Use
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When we consider water policy and wildlife, we view a vast maze of conflict and confusion. In examining the relationship of these resources, we find that, to evaluate water-wildlife problems, we must be concerned with the total pattern of resource use, since all of our resources are related to land and water, and these to human welfare. As we progress with these considerations, we become increasingly aware that we do not have separate and divisible problems, but only one—the determination of the kind of world we are creating and in which all of us must live, now and in the future.

Water is essential to life. We cannot exist without it. But in considering the uses to which we put this necessary resource, we have given first consideration to a few of what we define as priority uses, and have often been more concerned with the efficacy of our water development techniques than with

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comprehending or foreseeing the complexity of our needs or the end results of our actions.

What we have defined as water policy has been premised on the assumption, characteristic of our materialism, that progress and change are one and the same. Only recently, it has begun to dawn on us that our water "developments" are having effects we did not anticipate, and destroying many things which possess great value for us.

Our water program has been based on a philosophy that, to quote Goldwater (1960), sets ". . . the satisfaction of economic wants as the dominant mission of society". In pursuing this "mission", we have produced more cars, houses, more super highways, more of everything, including a massive National debt, tensions and tranquilizers, uncertainty and a lack of direction or purpose beyond the satisfaction of our material wants.

But "(man) . . . is also a spiritual creature with spiritual needs and spiritual desires. What is more, these needs and desires reflect the superior side of man's nature", and certain uses of water contribute to those spiritual needs

In the management of water, we have been greatly concerned with its ultimate scarcity, while we gouge deep ditches in the earth to carry it away to the sea. Of the water we retain, half is polluted by sewage and industrial use. Seventy million Americans drink diluted sewage from their public water systems.

We have been concerned with a few uses, the precedence of which was established under conditions which have radically changed; yet we give relatively little consideration to those uses which lie outside the scope of these previously established practices. At best, our water developments conform to narrow concepts of use. In reviewing our present doctrines and policies in water management, we find that, like Topsy, they just grew. They are the result of attitudes which developed from common law, modified by concepts of "appropriation", which have been extended to the jurisdictions assigned to certain governmental agencies to which we have delegated water management.

Many practices in water management conflict with other resource uses, and these conflicts are acutely apparent as they affect wildlife; but, as we said before, we are not, here, mainly concerned about wildlife, but with the preservation of all those resources which contribute to all the needs of man, including the intangibles which reflect our emotional and spiritual needs.

In the past, there has been an "absence of a realistic analysis of all water uses" (Humphreys, 1957). To understand how we have evolved our present "policies" of water management, we must observe the manner in which these policies developed and came about.

TRADITIONS, AUTHORITIES AND WATER POLICY

The basic doctrines which resulted in the formulation of attitudes toward water use arose from two concepts—that of "riparian rights", and that of "appropriation" for special uses. The first concept originated in "Commor Law" and is retained as the dominant attitude governing our eastern waters. The second originated from the system of agriculture calling for irrigation which developed in the arid west.

These two basic concepts still dominate our attitude toward water use, but they have been extended and incorporated into vast programs carried out by Federal Agencies. The authorities granted these Agencies have been limited by law to the purposes for which they were established, and the objectives they pursue in the management of water have been determined by the scope of their special knowledge and these authorities. The management of water for these prescribed uses has, quoting Humphrys (1957) ". . . taken priority rights from one group and distributed them to another." Within these limitations imposed on our concepts of water use, our programs for water fail to include, or they ignore, many of the important uses water has for society.

The range of water use extends from what we drink to sustain life, to its use for wildlife habitat, and to the scenic and esthetic values examplified by the extra values placed on homesites overlooking river valleys or the sea. Of those last values, Voigt (N. D.) observed ". . . it may be . . . that this (esthe-

tic value) is the most important fraction (of water demand) in terms of social value." And he commented, further, that the doctrine of appropriation has frozen "water . . . into inflexible patterns for use." The establishment of these "inflexible patterns" imposed drastic limitations on the scope of water use; and prevented due consideration of many values water has for people.

WATER POLICY AND HISTORY

The first actions taken to "manage" water were the result of our concern with the use of rivers for transportation. Expenditures for rivers and harbors work began in 1824. In that day roads were few and travel was difficult. It is easy to understand how waterways, which offered access to wilderness, were looked upon as a most important use of water.

With the development of vast systems of railroads, highways and air travel, the need for water transportation is less evident, but navigation remains as one of the primary "authorized" uses of water, and its appropriation for that purpose often exceeds and is superimposed on and given precedence over all other uses.

In the ensuing years, agriculture became the chief occupation in America. The need for land for this purpose, and the expansion of human populations westward, prompted extensive programs of irrigation, flood control and drainage. These led to present practices and doctrines which recognize these programs as primary uses of water; the first to utilize it to irrigate crops, and the others to get rid of water "surpluses", and create new lands. In certain respects, these purposes have outgrown their intended objectives, and today their application to the creation of more land is contributing to the economic problems arising from our excess of land for crop production.

In efforts to correct this situation we have authorized soil bank and crop subsidies to alleviate this problem of overproduction and the surfeit of the products of land. That these problems are real is evidenced by the 3.9 billion Federal dollars (Federal Budget 1961) budgeted for 1961 to sustain the agricultural economy. The further extension of efforts to create more land, through irrigation, drainage, or other means, appears highly questionable under these circumstances. It should be noted, for example, that further drainage reduces habitats for waterfowl for which we have an acknowledged need, and which are in short supply. Ducks and geese are becoming a scarce commodity, but the demands for this resource increase; and its importance to our welfare is recognized. Our water policies do not, however, acknowledge any major obligation to the perpetuation of this resource, where the preservation of water for waterfowl conflicts with other uses. It is also true that the swamps, marshes and wetlands essential for ducks act as sources for underground water for human use, and that their preservation is important to maintenance of these supplies.

The use of water for power came about as we, as a country, became industrialized. This use is admittedly important, but the total appropriation of water to meet this need is in conflict with other uses. This is particularly evident in the northwest, where dams constructed for power and other purposes have and are continuing to destroy the salmon runs, a great and needed resource. The Supreme Court decision which acknowledged the right of the Federal Power Commission to grant licenses for construction of power dams, without reference to state water laws or other needs, is another example of the total appropriation of water for a single purpose, within the narrow concepts defined by a single purpose agency, without consideration of other important human needs. In recognition of this problem, Senator Newberger, before his death, introduced Bill S. 3185, to require consultation with wildlife agencies before power dams were authorized. I believe this bill failed to pass.

The need for more dams for power is questionable. Penstocks built into dams many years ago are still unused. Also, we have the production of atomic power at hand. Five atomic power plants are in operation and five were under construction in 1959 (Conley, 1959). As economic methods of producing atomic power are developed, the dams we construct may shortly become obsolete. Leslie Miller has pointed out that power can be produced from steam more cheaply than through the turbines of a public power dam. (Miller, N. D.) The future needs for power dams, and their effects on other resources should be

determined before we spend vast sums on these concrete monuments to engineering skill.

Another use, the dilution and disposal of waste, has been defined as an appropriation of water. Certainly, when other uses are drastically limited or destroyed, pollution must be defined as a use of water. Our indifference to this situation is examplified by the failure of the city of Kansas City, Missouri, a city inhabited by over a million people, to take action to treat or reduce the raw sewage it dumps into the Missouri River (Anon. 1960). This is in keeping with our attitude which recognizes only our traditional rights to use resources as we see fit—to our ". . . belief in the inalienable right to despoliation." (Ogburn, 1960) The pollution of our water affects men and wildlife, but in 1959 we appropriated only $50 million of Federal funds to abate pollution. By contrast, we appropriated over $1,200,000,000.00 for water projects to those principal agencies assigned to water "management".

We recognize certain other uses of water, including its use for domestic purposes, industry and recreation, but these uses are considered secondary, or may utilize water only after it has been "appropriated" for the uses to which we have referred, which have been the outgrowth of tradition, circumstances which are being altered, and the special attitudes and aptitudes applied by the agencies who are authorized to manage water.

The uses of water which have, heretofore, been considered subordinate to or by-products of other uses are rapidly becoming of supreme importance, as 8,000 new individuals are added to our population each day (Seaton, 1960), as civilization pressures drive us to seek escape from stress and confusion, and as recreation, on which we spend 16 billion dollars each year, becomes increasingly necessary. With the impact of industrialism even the intangible value of water, the scenic and esthetic values, which have been defined as those qualities which "give meaning to life" (Shomon, 1960), are becoming an essential factor in determining the relative significance we assign to the human uses of water. We need to revise the relative worth we have assigned to the objectives of water management and rcognize the changing needs of these changing times.

WATER AND LAW

Various Federal laws have determined and fixed water resource policy. They include the "Desert Lands Act of 1877", the "Carey Act of 1894", the "Rivers and Harbors Act of 1909", the "Federal Power Act", of 1920, and the Flood Control Acts of 1936, 1944, and 1954. These laws have, as established, followed the pattern of government policy and the trend water uses have taken. They were principally designed to implement the use or appropriation of water for the purposes of irrigation, power and flood control. Eventually, it became apparent that these criteria governing policy did not consider all the uses of water. Such acts as the Wildlife Coordination Act, of 1946 and amendments, Public Law 660, to provide for pollution grants, the "Watershed Protection and Flood Prevention Act, as amended, and "Federal Aid to Wildlife" Acts, have been attempts to rectify some of the limitations and shortcoming of our water laws.

Numerous other bills, recently introduced, have been directed at further recognition of the uses of water and other resources for purposes beyond those for which priority is recognized. Such acts as the Wilderness Bill, the Blatnick (pollution) Bill, the National Conservation Policy Act, S-2549, and S-1420 to provide for wildlife in power dam considerations, have been designed to furnish a legal base for a broadened concept of resource use. including water. Most of these bills have not passed, or are pending. They do, however, indicate that all our needs cannot be satisfied through existing legislation, and that legislation is essential to bring about changes in the precedence of other water use.

Over the years the interest and the concern with water problems, on the part of the Federal Government, was evidenced by the establishment of various commissions ("Water Resources Activities, 1959"), to review and recommend policy. During his term as President, Theodore Roosevelt appointed three committees to study water use. Each of these committees stated that, ". . . all the uses of a stream should be considered and included . . ." in any development plans. These early committees were followed by others, includ-

ing the "Joint Committee on Reorganization of Executive Dept." The first "Hoover Commission" of 1932, the "National Resources Committee of 1935", the (Hoover) "Committee on Reorganization of the Executive Branch of Government (1947)", the President's "Water Resources Policy Commission" of 1950, the 2nd "Hoover Commission of 1953", and the "Advisory Committee on Water Resources", 1954. In extensive reports, most of these committees made reference to the need for "attentiton to all uses of water". They recommended, among other things, the transfer of all water resource activities from the Engineers to the Department of the Interior, and the establishment of a Board of Impartial Review to correlate all aspects of the government's program of water management. These recommendations were not acted upon by Congress.

A review of the reports of these Commissions indicates their concern with the conflicts over water use, and their interest in a policy which would consider all aspects of water use including ". . . the social as well as economic benefits." They also called attention to ". . . other values (of water) not readily expressed in monetary terms", and suggested establishment of a "Department of Natural Resources". Of their recommendations, the establishment of an "Independent Board of Review" for water projects, is probably the most pertinent, and remains as one of the greatest needs to alleviate conflicts in policy pertaining to uses of water. That we have continuing problems in management of water is evidenced by the activities of the present "Select Senate Committee on Water Resources", which has recently conducted hearings throughout the U. S.

WATER, RECREATION AND WILDLIFE

As we have pointed out, the primary considerations in the use of water have been concerned with certain priority uses, which were established in an earlier period of our history. The preservation and perpetuation of wildlife resources was not and has not been one of these "priority" objectives. In fact, as has been noted, fish and wildlife resources and their use, have had to depend on the "leavings" of water. (Water Resource Activities, 1960).

Of all of what we define as water developments, intensive drainage has, perhaps, been the most damaging to wildlife. Wetlands have been reduced to one-sixth of their original extent, and reductions of waterfowl and other wildlife dependent on water-associated habitats has been in ratio to these losses. The effects of drainage of potholes on waterfowl breeding grounds, carried out through governmental subsidy programs, has, in the past few years, resulted in the destruction of one-third of the duck breeding grounds in the north-central states. With vast crop surpluses, much of this drainage to produce more land at public expense cannot be justified.

The construction of vast impoundments has had multiple effects; sometimes creating wildlife habitats and recreation water; but the consideration of these recreational and wildlife resources had been secondary to and the indirect result of developments for other purposes. The extent to which this program has been carried out, and planned, is destroying certain other resources, such as migratory fish, and the esthetic and special recreational values of natural streams, but these values have been disregarded as relatively unimportant or inconsequential. Recent court actions, in the State of Wisconsin, have declared the worth of scenic and other recreational uses of water, and have given these uses a priority status by law, but in many places the primary consideration has been the attainment of monetary rewards, without regard for less tangible but very important values.

In the West, irrigation has progressed without due consideration of recreational or wildlife values. In some states, appropriation of water for this use has denied the significance of any other use. Wildlife has not even been accorded the use of "surplus" water in many instances, since all water has been used for irrigation. The pattern of water use for irrigation has extended eastward, and is now in conflict with the "riparian rights" doctrine in many areas.

Channelization, dredging, and other activities associated with flood control and navigation, have and continue to reduce wetlands available to wildlife, alter the type and character of streams, result in deposition of silt in estuaries,

and change bottom types and the character of water and its ability to sustain wildlife.

Pollution from sewage, industry, insecticides, and atomic wastes, are destroying the quality of water for many other domestic and recreational uses. The use of water to carry away various forms of pollution is a recognized priority use, and the acknowledgement of this priority is attested by the difficulties encountered in effecting laws to control this problem.

It has been pointed out that the other uses of water, including its use for recreation, wildlife or its relation to scenic or esthetic values do, under the riparian rights concept, have a legal status, and that rights to these uses are guaranteed under the Constitution of the United States (Humphrys, 1957).

It is past time that we should give the values water has for us, for recreational, wildlife and esthetic purposes, their proper due, and effect laws and policies to see that these values are recognized and given "priority" and equal status with other recognized uses.

The dollar ratio for determining the worth of water for wildlife or other purposes, as compared with accepted economic uses, is no longer a valid criteria for making value determinations. Today, man's impact on the earth is of such scope, that the problem has become that of preserving a world which provides all the needs of man, which includes preservation of water for wildlife, and for its other values, including the intangible, scenic or esthetic. These values, somebody has commented, include ". . . those perceptive qualities of mind and body, which . . . give meaning to life." (Shomon, 1960).

WATER POLICY AND ATTITUDES

Heretofore, the priority uses of water, to which we have referred, have been satisfied before any other uses have been considered. Because of the technological means we have devised for changing our environment, it is time we took stock of what we are losing before it is too late to save these other values and uses water has for us. Many of these benefits are social, and cannot be measured by the dollar yardstick we commonly use to define things of worth, and these social values are of great significance. We have failed to analize realistically all significant water uses.

In view of our vast National debt, which stands at $284 billion, and in recognition of both the immense cost to us and effects of water projects, we need to slow down our development programs until our other needs become better foreseen and understood by the public. New developments and attitudes and the impact of more people on water resources make this imperative. This does not require making an end of change, it means ". . . introducing a steering wheel and brakes before the machine runs away with us." (Ogburn, 1960)

As biologists we are concerned with the human use of resources. In reality, the subject of our conservation efforts is man, and the preservation of a wholesome environment. We cannot keep this objective in view by placing "all our eggs in one basket" or governing our actions by strictly limited motives.

To achieve the conservation of man we need radical changes in what we call water policy. For one thing, its management to create more and more land at this time is generally undesirable in view of our surpluses of agricultural land. To achieve these ends, we need to work toward the elevation of recreational and intangible values to priority positions. We need to recognize that government agencies can and do appropriate water for their delegated purposes, just as surely as other water users appropriate it to meet their special uses.

To achieve changes in general policy concepts, we will need to take definite actions. These should include:

1. The determination of the legal rights of water users, for any purpose, including intangible uses.
2. The survey and evaluation of all types of uses, and their relation to our many and varied recreational uses.
3. Research on the effects of water development programs on fish, wildlife, water quality, and chemistry, land uses, underground waters, and all their ramifications.

4. Establishment of programs in the states, to effect needed surveys, research, and coordination of efforts with other interests.

5. Classification, by watershed, of the appropriate uses of water in relation to all needs, now and in the future. (Actions of this type have been taken in several states, including Michigan, Wisconsin and Missouri).

6. Recognition of the urgency of this problem in terms of the rapid changes that are being effected.

7. Realization that there are a lot of people thinking about these water problems, and that many of them are concerned with the extent, scope and limitations of programs now in progress.

8. Recognition that acknowledgment of intangible, social and cultural values and concepts, associated with traditional or other uses, is just as meritous as the use of this great commodity for navigation or carrying away sewage.

9. And lastly, have the courage to declare our honest beliefs, which is an essential right in our democracy. As biologists, we are qualified to expound a perspective, gained from our special knowledge.

CONCLUSIONS

In summary, I think we can say that our water policies are based on narrow foundations, which fail to recognize many values of great worth, and that appropriation of water for a few uses may exclude other uses. In view of our changing needs, we need to re-evaluate our attitudes toward water use, and give intangible uses values equivalent to traditional and previously declared priorities, which are limited in scope and intent.

The question of water and its relation to wildlife is not one of whether we should have power or salmon or drained land or ducks, but, whether we want and need the variety of resources necessary to a full existence and whether we are willing to acknowledge their importance in our lives.

In a recent popular magazine (Look, 1960) there is an account of a conversation between an American and a Frenchman, who were, at the same time, viewing the Seine River. "How deep is this river?," the American asks. "I'm sorry, I don't know." "How fast is the current?" "I don't know that either." "Well, how far is it across?" "I'm sorry." "You don't know much about this river, do you?" "It has beauty and it moves", the Frenchman replies. "On gray days, the river, too, is gray. Yet, when the sun sets, the water looks golden. This much I know. This is important to me."

I think we need to apply some of that Frenchman's philosophy to our own thinking about the rivers, swamps and marshes of America.

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COASTAL MARSH IMPOUNDMENTS FOR DUCKS IN LOUISIANA

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INTRODUCTION

The Gulf Coast is a major waterfowl wintering area. The Louisiana coast alone winters over 4,000,000 ducks annually (Smith, 1959). However, industry and agriculture are gradually reducing the acreage of the Gulf Coast waterfowl habitat, and as a result of man's activity the quality of much of this habitat is diminishing. As more canals are dug and stream channels enlarged each year for navigation, pipelines, and drainage, problems of tidal action and salt water intrusion become more and more severe. Only with carefully planned management will this wetland habitat be preserved.

Realizing the need for intensive waterfowl management, the Louisiana Wild Life and Fisheries Commission in 1954 began constructing marsh impoundments on refuge areas. Since that time a total of 26,200 acres have been impounded with waterfowl management the primary objective. Of this total 18,200 acres are on the 84,000-acre Rockefeller Wildlife Refuge in Cameron and Vermilion Parishes, Louisiana. On Rockefeller Refuge nine impoundments have been constructed with sizes ranging from 480 acres to 5,680 acres. A contract was let in August, 1960, for impounding an additional 4,400 acres on Rockefeller Refuge and placing a tidewater barrier around another 13,500-acre block.

DESCRIPTION OF THE AREA

Rockefeller Refuge is situated between the Gulf of Mexico and the Grand Chenier ridge complex, a stranded beach ridge located seven miles inland from the Gulf. The entire refuge consists of low marshland with an average elevation of 1.1 feet above mean sea level. Tidewater enters the refuge from the Gulf of Mexico through five separate channels then spreads to all parts of the refuge, outside the impounded areas. The average tidal fluctuation is one foot; however, high tides frequently inundate the marshes with salt water.

The impoundments were completed by 1956 and in 1957 Hurricane "Audrey" (Ensminger and Nichols, 1957) badly damaged the levees and filled the impoundments with salt water. However, the salt water was soon drained out and all levee breaks repaired.

In 1958 a study was begun to determine the effectiveness of the impoundments in waterfowl habitat management. As a part of this study the impoundments and adjacent control areas were sampled to determine the vegetative composition and vegetative coverage. Sampling was done annually to determine plant succession and measure the effects of different impoundment management techniques.

STUDY METHODS

Line transects were used in sampling. Using marsh buggies permanent markers were placed and labeled at 100-foot intervals along a line through the center of each impoundment. The line ran in a north-south direction. A five percent