Ecologic Relations of Vegetation in Impounded Waters

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The recreational value of a lake is greatly influenced by the relative abundance of fish and other forms of wildlife which inhabit the area. The potentialities of any lake with respect to wildlife production in turn depends largely upon the quantity and quality of the vegetation which it supports.

A major problem in the hydrobiologic development of lakes used for irrigation is presented by the great annual fluctuation in the water level due to the periodic withdrawal of water. This character of impounded waters imposes severe limitations upon those plants which grow attached to the bottom, and they are the types which are of most importance for waterfowl and muskrats. Game fish are less directly dependent upon vascular plants as sources of food, at least in this part of North America, so that the maintenance of a high level of fish production in the lake behind Grand Coulee Dam should not present as difficult a problem as with waterfowl and mammals.

The importance of the larger water plants in providing food for birds and mammals, and in retarding erosion of the periodically exposed aprons, warrants the expenditure of funds on research aimed at getting an abundance of the most desirable species established in the lake. As one phase of the hydrobiologic development of the Grand Coulee area it is recommended that each species known to have high wildlife value be tried in experimental plots to find which are best adapted to the environmental conditions offered by this particular lake.

The Influence of the Grand Coulee Development on Birds and Mammals

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This paper will be limited to a discussion of bird and mammal wildlife. It is obvious that the Grand Coulee impoundment itself will affect fish most of all forms of wildlife. The influence of the land development which will follow the availability of water, however, will be most apparent on birds and mammals.

For the sake of brevity and organization, this discussion will be divided into three man parts; with emphasis upon the third part. This division is: (a) the probable land changes and their influences, (b) administrative problems and (c) procedures which we can undertake in order to be ready when the changes are effected.

Let us now turn to the probable changes and see if we can work out some of their influences on the future of wildlife in the developmental area. At the present time the area is marked by a scarcity of cover for farm game. The bringing of water to large areas of dryland, it is obvious, will automatically provide conditions suitable for more cover. But what kind of cover will we get? A look at the cover possibilities from the standpoint of wildlife management brings three possibilities to light. Will the cover be desirable, will it be merely passable, or will it be definitely objectionable? This is a point of considerable importance and I will touch upon it again.

It is obvious that the vegetation changes are bound to be felt by wildlife; it is also obvious that the effects of human presence are going to be felt as well. Pheasants, hungarian partridges, and valley quail, for example, will undoubtedly be benefitted at the expense of sage grouse. (Inasmuch as there are few sage grouse now existing in this region, I might better say, at the expense of potential sage grouse.)

The cottontail rabbit will no doubt expand at the expense of the jack rabbit. We can sum up the changes that will be felt by game birds and mammals as simply this: open range game will suffer, farm game will benefit. This very fact gives us a clue to some possible undertakings, and I will soon mention them.

It is perfectly obvious that waterfowl will be benefitted to some extent by the mere presence of additional water—but without some management operations, we shall be indeed disappointed. Mere water is not enough for waterfowl. Too many people, especially the sporting brethren, are too prone to believe that water is everything for waterfowl.

On the contrary, many bodies of water—in fact, far too many bodies of water—are but biological barrens, mere wildlife voids. Unless effort, much effort, is made I fear that the Grand Coulee impoundment may become one of the world's great biological deserts, at least so far as waterfowl are concerned.

If we look at the cultural aspects of the Grand Coulee development and their influence on wildlife, we can but foresee a break-up of the land holdings into smaller ones and the attendent multiplicity of complications which this fact involves. The land will change from range and wheat land to gardens, orchards, and towns. This automatically means not only direct influence upon wildlife habitat, but also increased administrative problems. It means more people in the area; consequently, it means more pressure on wildlife. There will be more poaching and more need for law enforcement. There will be less area for game, but it will be of a different type and often of better quality. It is a question, however, if the increased productive capacity of the area, from the standpoint of farm game and fur-bearers, will offset the increased hunting and trapping pressure which, naturally, is bound to be great.

The fact that there will be small holdings indicates to us that some form of cooperative effort among the land owners is essential if the game crop is to be substantial. The pooling of acreage for game purposes has proved to be a solution to many of the problems attendant upon small holdings, and game pools have succeeded well in some parts of the country. They require considerable technical assistance, however, if they are to function successfully. The source of such technical help in other parts of the country is the state game departments and public colleges and universities. The source of technical help for the Grand Coulee project is the State Game Department and the State College. I may say frankly and with candor that neither agency is yet prepared to supply this technical assistance, but I sincerely hope and expect that both will be ready when the time comes.

The possible undertakings which we can start now, in order to be ready when the time comes, can be classed primarily as research and demonstration, and I should like to speak for a moment about these.

The most elementary undertaking in wildlife management is a wildlife survey and we need such a survey of the Grand Coulee development area. We need not merely a game survey, but a complete survey of all the wildlife and its habitat as it **now** exists before any changes have taken place. This information will be invaluable later when we are dealing with changes after they have occurred. This wildlife survey should be under way already, but it is still not too late to start.

In order to improve the environment for wildlife, it is going to be necessary to establish food and cover plants, especially in waste areas, along roadsides, along canal banks, and in similar areas not needed for agriculture. Right now we should start an experimental nursery for the purpose of finding out what kind of trees and shrubs are best for wildlife food and cover in the area and at the same time which will grow rapidly, which will be hardy, which will require little water, and which will be easy to handle. We need to know a lot more about propagation of waterfowl food plants and the experimental

nursery should be so situated as to include these. The nursery should expand into a permanent wildlife food and cover plant nursery analogous to the forest tree nursery at Pullman.

Future food for wildlife in the area will undoubtedly be low in proportion to the amount of cover because of dryness. We should set up experiments to determine the use of food patches, to determine the best varieties of food-patch plants best adapted for the conditions of the developmental area, and to work out methods of growing food-patch plants.

We need a waterfowl study very badly in Eastern Washington and the development of Grand Coulee makes it even more imperative that we conduct such a study. I now have a student making a beginning on a waterfowl management research project, small though it may be. The first job to tackle in a waterfowl research study so far as Grand Coulee is concerned, is an investigation of factors bearing upon the productivity of the area in order to obtain data for the making of a management plan. Such information will be of tremendous value when water is at last loose on the land. There are many ponds and channels which no doubt could be kept in marsh for waterfowl with but little effort.

The effect of fluctuating water levels in the Grand Coulee impoundment is bound to be enormous from the standpoint of waterfowl. Few aquatic plants are able to withstand long and pronounced exposure. The production of waterfowl foods by plants, therefore, will undoubtedly be low. On the other hand, the "draw-down" may make it possible to plant quick-maturing grains or other plants, especially greens, in order to provide waterfowl with food after the surface of the water rises again.

If the irrigation ditches themselves as well as the Grand Coulee impoundment do not produce as many more waterfowl as the increased kill by hunters, the area becomes definitely unfavorable to waterfowl by virtue of the fact that it has increased the kill without proportionate increase in the production. It is logical to assume, therefore, that refuges will be in order. It may be that waterfowl hunting along irrigation canals and around Grand Coulee should be prohibited entirely because the kill may be far and above the production. In that case, it will prove easier to close the canals and Grand Coulee to waterfowl hunting **before** the influx of settlement.

There are many other problems involving game birds and game mammals. We know little about the ecology and life history of game birds and mammals in the region. We know little about the life history and habits of fur-bearers, yet they may become an important economic resource in this area. We do have some information on the hungarian partridge and pheasant in the Palouse region because of the fine work of the State Game Department biologists and the students at the State College. It is likely that much of this information will be applicable to the Grand Coulee area.

It seems to me that a cooperative arrangement shoud be entered into by the three agencies so intimately connected with the Grand Coulee development—namely, the State Game Department, Reclamation Service, and State College of Washington for a program of research and demonstration in advance of the actual settlement of the area.

I would list the subjects of immediate investigation under four headings: (1) a wildlife survey of the area as it now stands, (2) the study of the life history, ecology, and management of certain species:

a. waterfowl
b. fur-bearers
c. valley quail
d. sharp-tailed grouse
f. hungarian partridge
g. pheasants
h. sage grouse
i. rabbit
j. antelope

(3) experiments in the production of food and cover nursery stock and in the use of food patches, and (4) studies on the use of cooperative game pools.