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POOL FLUCTUATION IN CORPS IMPOUNDMENTS IN RELATION TO FISH SPAWNING

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ABSTRACT

Each spring and early summer the Corps of Engineers and the associated conservation agencies of the various states work together to program and operate the Corps' reservoir levels so that a minimal alteration of environment will occur during the spawning period of game fish in these reservoirs. The demands of flood control, navigation, hydro-electric power and fisheries resources must be coordinated to produce a condition in which these varied interests are working together to produce the required results to the benefit of all.

Communications between all involved agencies during the time of gamefish spawning, and notification of operational procedures is the major contributor to failure or success at this time. Public awareness of the problems involved as well as the action being taken by all agencies decreases the usual rash of complaints against both the conservation agencies and the Corps of Engineers.

In spite of coordinated efforts, this reservoir level manipulation has not been proven to have either a beneficial or detrimental effect on the fisheries resources. In areas where such activities have taken place desirable fish populations have continued to increase and maintain high populations. This correlation between the fish populations and intensive water level management is such however, that it will be continued until proven to have no effect. The high fishing effort-catch ratio is such that it would not be prudent to alter the present system of management and in any way jeopardize the success of the fishermen utilizing these areas.

POOL FLUCTUATIONS IN CORPS IMPOUNDMENTS IN RELATION TO FISH SPAWNING

In the southeastern United States the springtime brings forth dogwood, azaleas, mosquitoes and the sports-fish ball game. Like a professional game of basketball the fish conservation agencies are trying to run out the clock as opposed to the spawning to the spawning plays of fish populations. The problem of stalling is further complicated by two factors, the first being that the game can be shortened or prolonged according to the desires of the fish population team. The conservation team is limited by a strict set of rules while the opposition can and does play according to the exigencies of that particular point in the game.

Regardless of the percentage of wins or losses by either team, the game is scheduled every spring when neither side is too anxious to enter the contest. Each year the conservation team sends out detailed information on its game plan, while the fish population team, coached by Mother Nature, retains the right of complete security concerning its intentitons.

The game is further confused by a system of unlimited substitutions by the fish team, who can use an unlimited number of players at any time, whereas the conservation team can use only a specified and limited number of players during the entire series. It has long been established that the fish team allows no psychological infiltration into its locker room, while the conservation team is continually exposed to factors which are introduced for the sole purpose of creating friction and dissent within its ranks.

With these considerations in mind the game is played, and even with the conservation team being required to use a soft, unbalanced ball, the series show a fairly equal distribution of wins and losses for each side.

For those of you who do not have this annual contest within your state, perhaps a more direct description is in order.

Some of the Corps of Engineers' impoundments support internationally known populations of game fish. These impoundments have been constructed for the primary purpose of hydro-electric power, navigation and/or flood and water quality control. During the winter months of high rainfall the water level at some of the impoundments is dropped in order that flood storage is available to prevent the spring floods downstream. Without this storage drawdown, the heavy spring rains would crest over these impoundment structures and flood condititons would be as bad as they were prior to the construction of the dam.

During the late spring months the Corps starts to fill the impoundments to have adequate water for power, navigation or low flow augmentation during the summer and fall months. Over the many years of operation the Corps has observed and computed the average filling rate so that when the abundance of rainfall comes to an end the reservoir is full. Minor alterations during the summer can keep the reservoir at the desired level except in the case of severe drought or rainfall. At the same time that the reservoirs are being filled by the spring rains, the water temperature is also rising, and when the temperature reaches the lower limits of spawning conditions, the ball games starts.

In the Mobile District office of the Corps of Engineers there is continual liaison between the Reservoir Regulation Section, the District Biologist, Hydro-Power Branch, Reservoir Branch, Reservoir Managers and the State Conservation Department. When the dailly reported water temperature gets to the middle sixties the Conservation Department is notified to alert its fisheries personnel for the first sign of spawning activity. In the meantime the reservoir filling continues under normal operational procedure. At the first sign of fish spawning activity the biologists in the field report to their office, who in turn contact the Corps and notify them of the condition. The pool elevation on this date is then established as the normal minimum elevation to be allowed during the spawning season. For the purpose of this discussion we may assume that the level on the first day of observed bedding was 100 feet. Under normal conditions therefore, the Corps will allow filling to continue to 102 or 103 feet but little more. This will in no way expose the fish beds to an extremely low level with the risk of stranding, or submerge the nest under more than an additional two or three feet of water.

During the spawning season, and until the spawning is completed, a level between reasonable limits is maintained. This condition is in effect for about two to three weeks and upon the conclusion thereof the fluctuation resumes its normal variation.

This in essence, is the game plan of the Conservationists, but as with all game plans its fulfillment depends on the ability of the coach to second-guess the opposition. The coaches in this case have a combined experience totaling over 50 years of trying to second-guess the behavior of the fish team, coached by Mother Nature. So far the only thing that has kept the conservation team on the scoreboard is the coach's ability to do some fast foot-work and the developed adaptability to unforeseen developments. If everything went according to plan there would be no problems, but it never does.

Changes in the program are brought about by a number of factors. Assuming that rainfall was normal during this period, the inflow into the reservoir would be high enough to permit an adequate navigational depth below the reservoir. What happens if an unseasonal dry spell hits the area and the inflow is reduced to 1,000 cfs, when the channel downstream requires 1,200 cfs to maintain navigational depth. This means that there is a flow deficit of 200 cfs that must be provided from the impounded waters.

At the time of the initial deficit the hypothetical pool elevation is assumed to be 103 feet. The level starts dropping towards the minimum 100 feet. After three or four days of deficit flow augmentation the level is now down to 100.5 feet. Late spawning fish were bedding at the time pool elevation was at 103 and might be in danger of being stranded. The fishermen, being emotional about the problem, can only see their summer's fishing being lost, and starts inferring that the Conservation Department is either staffed by idiots or is unaware of the problem. The Conservation Department starts getting phone calls from the local representatives. The local fishing authority writes editorials which agree with the local cheering section, and the coach is told by the Board of Regents that unless he produces a winner he should put out some feelers for re-employment next season.

The Corps of Engineers in the meantime is praying for rain, a reduction in river traffic and the fish to stop spawning. Not only one at a time, but all at once. Being required by Congressional direction to maintain adequate navigational depth, they can only keep supplying the deficit and watch the level drop.

Friends of 20 years of conservation work between the Corps and the Conservation Department begin to question the sanity, morality and progenitors of each other. Then the rains come, the pool refills and the game is over.

It is of interest to note, that in spite of the hue and cry and the calls for closer coordination, the pool elevations have yet to fall below the minimum established at the beginning of the spawning season. All complaints have been based on observation of those fish that have started spawning after the first observations, and not too many of these are lost when compared with the total success.

The second problem and the one most frequently encountered is a heavy rainfall after the pool elevation has reached 102 or 103. If this rainfall exceeds normal amounts, the pool must be lowered to make flood control possible. It is never lowered more than the agreed upon minimum of 100 feet. When the flood fills the impoundment to 102.5 and the water is still coming down at a greater rate than the discharge, the gates are opened further. At once the fishermen downstream give vocal opinions that they are being flooded out, and the impoundment fishermen feel they are being washed down the drain.

If the flood stops, the game is over again. If the flood continues the elevations will rise and fall as many times as necessary, but the levels will be maintained between the minimum 100 feet and maximum 103 feet. Again there are going to be fish that spawned late in the season between those higher elevations and are going to be caught in shallow water where they are readily observed and quickly reported. It is too

bad that this occurs, but the very nature of the situation is such that there is going to be some loss of bedding sites, but never to the magnitude so often reported.

So much for the consideration of the sport fish, which by its very nature is a predatory species. What can be done about the next species in the food chain?

Most of these species do not spawn at the same time as the more desirable sport fish. Some spawn earlier and some later and provide food for the more dominant species. This extended time of spawning is nature's way of providing an adequate supply of food, and most of these other species would overpopulate themselves were it not for the predatory nature of the more dominant species. This is a rather sloppy balance, and a variation in numbers would not have a dramatic effect unless the reduction would be severe. This is not to say that the bedding losses to the less dominant species is a negligible factor in the over-all management and welfare of the total fish population. Any population loss due to induced unnatural circumstances should be avoided. A point to consider however is that the marginal loss that may occur to the sport fish due to water fluctuation may be compensated for to a certain degree by the reduction of the food or game species. It may well be that these losses balance one another and may maintain an artificial balance somewhat in harmony with a natural balance.

The policy of the Corps of Engineers on the mnagement of the game and fish resources involved in the development of its projects is a dependence on the associated state fish and game agency for such management activities. This method, from the Corps' point of view, has many advantages but mainly that of letting the states maintain development and management of such natural resources which were originally their responsibility and should remain such responsibility. It has the disadvantage however of the necessity of a continual liaison between the two agencies for a cooperative program and mutual understanding which is not always the easiest to maintain.

In the Mobile District there are two impoundments which have exhibited characteristics of production that are contrary to the generally accepted pattern of impoundment fisheries populations. Instead of the normal rise in production for the first years followed by a marked decline to below normal populations, the fisheries production and harvest on these two reservoirs has consistently increased, and shows no indication of a future decline in production. Fishery biologists have, as yet, to come up with a satisfactory explanation of this situation. These are the only two impoundments in this district that have exhibited this condition. It is of interest to note that these same reservoirs are the subject of this willy-nilly ball game previously described. It might, and I emphasize the word *might*, be that our frantic manipulation of water levels and our exposure to factors over which we have little or no control, may be keeping the fish predator-prey relationship at that level which not only maintains these populations but actually increases them.

Biologists, in spite of which we might be prone to believe to the contrary, are subject to the same human foibles as the rest of the human race. We are somewhat reluctant to assume responsibility for mistakes, conditions or reactions which might adversely affect the wildlife and fisheries populations for which we are responsible. On the other hand we are only too happy to assume responsibility for a set of circumstances that might favor these same responsibilities. We may have to stretch a point here and there to be able to do so, but there is no greater manipulator of fact and/or fancy than the ego of the human race. We even become so accomplished at this juxtaposition of facts and figures that we begin to believe our own analysis and summation, especially if it comes out to our personal advantage.

The above considerations notwithstanding, there is still what I believe an honest question to the belief that water level fluctuation might have a positive effect on fish populations on these reservoirs rather than a negative effect. Some fisheries biologists are sure to scoff at the very possibility of this being so, but they cannot prove the negative any more than we can prove the positive. Fisheries biologists have been known to have arrived at wrong conclusions, although admittedly far fewer times than in other professions. I beg to point out the reliance and authority placed on fish population sampling on large bodies of water for so many years. Only recently has any attention been placed on the obvious fallacies of the method such as the minute statistical sample, the depth selection and the fish population movement involved. Prior to this time such samples were used as basic truths when actually they are hardly worth the rotenone used. This is just talk within the family and therefore we can be distastefully honest.

Another point to consider in the pool fluctuation problem is the results obtained in a number of attempts to limit rough fish populations by the manipulation of pool levels.

In a number of instances pool elevations have been lowered at the time of rough-fish spawning activities in an attempt to limit hatching success with a subsequent reduction in the adult and juvenile rough fish populations. To my knowledge there elevation fluctuations have never been reported as having any effect on the total rough fish populations, so is it not logical to assume there would be significant total effect on game fish population. This is even more apparent when it is remembered that with the game fish population every effort is made to protect the nesting activities, whereas with rough fish every effort is made to destroy the nesting and bedding sites. While humans cannot claim many attributes there can be little doubt that they are most effective as destructive agents.

In a report relative to our predictive ability concerning fisheries resources on these reservoirs I wish to quote conclusions and recommendations submitted prior to dam construction in 1954 concerning Lake Walter F. George by an associated conservation agency. There were four conclusions submitted in the review document and are as follows, and I quote:

CONCLUSION 1 BY THE REVIEWING AGENCY

If the fishing is of average quality, which is an optimistic assumption, the reservoir may attract up to 135,000 fisherman-days annually.

Comment: I quote from the April 1968 issue of the Alabama Conservationish. "Most fishermen have read stories about bass fishing and have had visions of fishing a lake where the bass are plentiful and try their best to take the plug away when they hit. Would you like to fish a lake such as this? Would you like to fish in the hottest bass fishing lake in the south and possibly the Nation? If so, then you should visit and fish beautiful Lake Eufaula".

Comment: Last year there were 521,760 fisherman-days on Walter F. George Reservoir as opposed to the predicted 135,000.

CONCLUSION 2

Adequate facilities for normal park use should be planned on the basis of a total design-load of 5,000 users.

Comment: Peak day attendance at Walter F. George was 18,000, normal week-end attendance 9,000 per week-end.

CONCLUSION 3 BY THE REVIEWING AGENCY

About three-fourths of the expected use will be local in character, drawn from counties closely related to the reservoir.

Comment: On Saturday, 26 April 1969, there were no hotel or motel reservations to be had in the entire city of Eufaula. The available establishments for commercial lodging consist of six large motels and one hotel. Just about every parking space was occupied by an out-of-state automobile with a fishing boat on a trailer.

CONCLUSION 4

It appears improbable that state authorities will be interested in installing and operating reservoir-side parks.

Comment: At Cowikee Creek, Lake Walter F. George, the Alabama Department of Conservation is proposing to develop a multi-million-dollar recreation complex, perhaps the largest in the State.

From the above conclusions it can be seen that the predictions were logical and would have been correct, except the fish and the people did not bother to observe the predictions.

The point to all this is that we just don't know enough about the fish dynamics in lakes such as these to either predict the future fisheries conditions, or to accurately pin-point what is right or wrong with existing conditions of impoundment management. It is difficult to argue with success, and the fisheries resource at these lakes can be classed as a success. To be honestly frank about the situation, this success may be because of our manipulation, or it may be in spite of our manipulation. The Corps does not know for sure, but we are carrying out the procedures given by the fish and game agencies.

In the meantime, the Corps and the fish and game agencies will continue to manage pool elevations for what they believe to be to the benefit of the fisheries resources. So far we have been able to have flood control, power generation, navigation, recreation and good fishing. It will take a lot of doing to come with a better program with greater benefit to all concerned.

PRELIMINARY RESULTS FROM STRIPED BASS TAGGING IN VIRGINIA, 1968-1969 [1]

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ABSTRACT

A total of 8525 striped bass, *Morone saxatilis* (Walbaum), were tagged and released in Virginia during 1968 and 1969. Releases were grouped in three periods: (1) 3195 in winter 1968, (2) 2439 during summer-fall 1968, and (3) 2891 in winter 1969. Streamer disc tags, employed in winter 1968, were subsequently replaced by internal anchor tags (Floy Tag No. FD-67). This substitution shortened application time and eliminated a source of bias introduced by the entanglement of disc tags in gill nets. Releases were made in the James, York, and Rappahannock rivers in all three periods. Rewards of one dollar have been paid for return of tags.

Percentages of returns within tagged year-classes increased with age, indicating change in fishing mortality rates of striped bass during their initial 3 to 4-year residence in the lower Chesapeake Bay system. The

[1] Virginia Institute of Marine Science Contribution No. 350.