

Columbia River Fisheries Project

Production of Wild Fish

FUTURE VALUES OF WILD POPULATIONS
OF ANADROMOUS FISH

Dorien C. Lavier
Washington Department of Game

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ECONOMIC - ARTIFICIAL PROPAGATION

The development of hatchery programs throughout the Columbia Basin has increased substantially over the last few decades. Prior to this there was some contribution to the runs of fish by fish cultural operations, but most of the effort has come since the late forties.

Artificial propagation projects are expensive, the costs beginning long before work on the site begins. Manpower must be used to search out areas which are suitable for a successful operation. Water supply, access, power, and proximity to where fish are needed are but a few of the things which must be investigated, and this pre-construction work contributes to project costs.

Engineering and planning must also precede construction and these costs are necessarily high.

Actual construction costs are well known and need not be amplified here. Once the hatchery is completed the costs continue. Equipment must be maintained. The water supply must be safeguarded. Recently the polluting effect of waste products from the hatcheries has been receiving some attention, and additional costs may be forthcoming for minimizing this problem.

The two most important costs to the hatchery operation are personnel and fish feed. Both of these items are major ones, and it is unlikely these charges will be reduced in the future.

An intangible cost associated with hatchery operations

is the cost of unforeseen losses of fish. Losses of entire ponds or worse yet, series of ponds, while uncommon, do occur. Occasionally water supply failure or introduction of foreign materials into the water system from unknown sources results in excessive mortality. These financial losses must be charged against the operations of the hatchery. More severe is the actual loss of fish which many times cannot be replaced; hence the management program suffers.

Hatchery programs have, in the past, been responsible for creating problems associated with concentrating fish in large numbers at hatchery locations or weirs. Such problems result in too many adult fish at the hatchery; thus a disposal problem is created. This has caused criticism from commercial fishermen and other user groups to be leveled at management. In addition, enforcement officers are hard put to enforce snagging and other laws which have been instituted to protect fish on the spawning beds.

Fingerlings from hatchery operations are difficult to disperse along rivers, but additional effort should be put forth by fishery managers to implement such release practices in order to minimize the problems associated with large releases at the hatchery or at highway bridges.

ECONOMIC - WILD STOCKS

The greatest value of wild stocks of fish lies in the potential capacity of the environment to produce many thou-

sands of pounds of fish at little or no cost to fishery agencies or harvest groups. However, one important cost which should be charged against wild fish production if the runs are to be enhanced is the future temporary loss to the fishery of fish which must be allowed to escape in order to increase the number of spawners on the redds.

Another important value of wild stocks is the adaptability of individual fishes to their environment. The magnitude of the salmonid runs in the 1800's leaves little doubt but that competition among fry and fingerling was extremely severe, much more so than at any time since. Obviously, in spite of this competition, or possibly because of it, the responding adult populations were at their maximum natural levels. The "survival of the fittest" theory was in operation and the native stocks were the result of natural selection over centuries of time and were undoubtedly best suited to maintain the production at so high a level.

As fish grow in size, their territories tend to increase in area; thus, for the same number of fish, the total area occupied must increase, and to provide this, individual fish must be continuously moving to fresh territories (e.g. Kalleberg 1958, for Atlantic salmon). For a given area this process must result in a reduction in the size of the remaining population. While some of the displaced fish undoubtedly die as a result of wandering into unfavorable conditions or through predation, this process does also provide a means of

distributing the species to parts of the system remote from the spawning grounds, and thus ensuring that more of the productivity of the system is adequately utilized.

An examination of the fresh water life history of the salmonids shows quite conclusively that races and species distribute themselves throughout the environment into the niches that their ancestors occupied for countless centuries and which they now occupy. Many of the niches are presently unoccupied by wild fish, and an increase in spawning escapement which would result in additional fry and fingerling being hatched into the rivers would result in the distribution of fish into the waterways which are not now productive of fish.

The wild fish of the Columbia Basin streams could provide the means of substantially improving the numbers of fish available and at much less cost than from artificial propagation. For this to happen the environmental problems and fish passage problems associated with hydro projects must first be solved. If these problems can be surmounted, then the opportunity for wild fish to again be important is present.

Present environmental programs, inspired by, for the first time, the interest of the general public, are providing substantial improvements to the Columbia Basin watersheds. Additional improvements can be looked forward to in the future. Almost all of these programs are supported with funds from sources other than fish and game agencies. And almost without exception the agencies are being consulted for recommendations

for fish and wildlife habitat improvement.

The Shorelines Management Act and the Forest Practices Act in Washington are providing a base for increased protection for fresh water environments. The Washington Hydraulics Law continues in effect. The Oregon Forest Practices Act of 1971 updated the Conservation Act of 1941, and this new legislation sets standards in five major areas which include reforestation, application of chemicals, slash disposal, road construction and maintenance, and timber harvest operations.

In Idaho the Stream Channel Protection Act administered by the Department of Water Resources requires permits for alterations to streams or channel, and these are submitted to the Department of Fish and Game for their review so that fish protective recommendations may be made. Presently, the only cost to the fishery agency stems from the reviews of applications that must be made.

With the advent of such environmental protection legislation comes the opportunity for fish managers to improve the lot of wild fish. In addition to the opportunities afforded by such activity comes the added obligation for fish managers to restructure management plans for wild fish so as to best take advantage of the natural rearing and values that may be forthcoming.

ECONOMIC - REARING PONDS

Associated with the high costs of hatchery operations

and the difficulty of increasing the wild runs of steelhead came the development by the Washington Game Department of the semi-natural rearing ponds. The natural rearing ponds can be used to produce excellent steelhead smolts. Capital construction costs are much less than for hatchery facilities of similar capacity. The quantity of flowing water required can be a fraction of the amount needed for hatchery operations. The use of supplemental feed provides a rate of production ten times or more greater than on natural food alone. This is a very important factor in promoting growth and the production of a maximum percentage of smolts.

The natural environment produces a migrant which more typically moves seaward of its own volition and some experimental evidence shows that survival to adult may be greater than for hatchery reared smolts.

Finally, as a supplement to a hatchery program, these areas may be used to enhance a fishery for nominal capital expenditures and low operating costs.

Other species than steelhead are presently being reared in semi-natural areas with considerable success, and it would be of value to the upriver runs of anadromous species to investigate the use of the semi-natural rearing ponds on many of the rivers in that area.

AESTHETICS

The aesthetics of wild versus hatchery fish are more

important to a sport fishery than to a commercial fishery.

There appears to be, in recent years, much more interest on the part of sport fishermen to place a higher value quality-wise on fishing activities. Because of this, there is a need for management agencies to discern the preferences and behavior of sport anglers (Barnhart, 1975). It is quite possible that fishermen will accept a more restricted fishery to protect an endangered stock. An angler survey by Idaho in 1968 revealed that 42 percent of steelhead anglers favored reduced limits, and 30 plus percent favored season reductions. Questionnaires by British Columbia and Oregon showed that steelhead anglers were willing to pay more for a fishing license. The surveys also revealed that steelhead anglers are concerned about aesthetics. In the British Columbia survey, the desire to fish in an unspoiled environment was number one in importance. The Oregon survey showed that steelhead anglers were very concerned about the problem of crowding and both Washington and Oregon are presently recognizing a conflict between boat and shore-based steelhead anglers on certain streams.

In the past there has been some criticism, justified or not, of the hatchery product. In the case of steelhead, Oregon managers feel that hatchery steelhead are more vulnerable to the angler than wild steelhead, and biologists believe that statewide about 25 percent of the wild steelhead runs are harvested (Barnhart, 1975). This may be partly due to the

fact that wild runs tend to be spread out over a longer time period during any one season than hatchery runs. There may be other behavioral characteristics of wild steelhead which make them less vulnerable.

Also in the case of steelhead, and this may apply to the other species, there seems to be some evidence to indicate that the length of the fishing season has gradually been reduced because the adults all tend to enter at one time period. This happens primarily because the hatchery manager tends to spawn the fish returning to the hatchery that will insure an adequate egg supply so that he can rear his smolts to proper size within the time frame available to him.

Another criticism some steelhead fishermen have is that steelhead which originated in hatcheries are inferior to wild steelhead in fighting qualities and stamina (Barnhart, 1975). One small experiment by steelhead anglers on the North Umpqua River, Oregon indicated that some experienced anglers could distinguish a hatchery fish from a wild fish with fair accuracy by its behavior on the end of a line. There may be some inherited factors present in the wild fish which would tend to increase the strength of that fish. Most anglers could not differentiate between a wild steelhead and a hatchery steelhead on sport tackle, and it is doubtful if they could make that distinction with salmon either.

There is some evidence to suggest that individuals of wild strains or races of salmon and steelhead were consid-

erably larger than those developed or propagated through the hatchery systems. Also, it appears that jack salmon account for more of the total run with hatchery fish than they do in wild populations. To the commercial fishermen such changes in fish size are a matter of economics, and to the sport fishermen they are aesthetic.

In considering the commercial harvest of the species involved on the Columbia River the origin of the fish may not be as important as it is in relation to the sport fishery. Numbers are the name of the game in the commercial fishery, but quality of the product must not be overlooked. In the sport fishery, the criticisms listed above may or may not be valid, but the social and management impacts introduced by such criticism must be given attention.

REFERENCES

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