QUALITY CONTROL IN FISH HUSBANDRY
Part II Approaches to Achievement of Better Quality - Resource Management [1/]

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My assignment is to discuss quality of hatchery fish from the viewpoint of a resource manager. My comments will apply particularly to Montana. In this case, the resource is a sport fishery, so we must of course keep the fisherman in mind.

What is it Montana fishermen seek? To the majority it makes no difference whether a fish is a wild fish - that is born in the wild - or a hatchery fish. Nevertheless, fishermen use wild fish as a standard in judging hatchery fish for appearance and fighting ability and for the color, taste and texture of the flesh. So if the hatchery fish is to be considered a quality product, it had better be good.

Montana fishermen seek a variety of fish including rainbow, brook, cutthroat and brown trout; Dolly Varden; grayling; kokanee; whitefish; yellow perch; largemouth bass; northern pike; sauger; walleye; channel catfish; and paddlefish. When diversity can be provided in an area without sacrificing other values, it adds to the quality of a sport fishery.

Fishermen also relate the size of fish to quality - the larger the better. And although often contradictory to achieving a large size, quality fishing includes a high rate of catch.

So much for some of the criteria fishermen use in determining quality. The fishery manager must consider these, as he is serving the public. But, he has additional considerations as well.

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For one thing, the fishery manager is interested in disease-free fish. This is an easy statement to make but a difficult one to put into practice. What is a disease-free fish? I suspect a trace of disease organism could be found in any hatchery fish or wild fish if the search were intensive enough. But a trace of disease organism does not necessarily mean a contageous fish. On the other hand, we as managers are occasionally asked to accept fish which have a disease such as furunculosis which has been suppressed with antibiotics but which may flare again if the fish are stressed. We are asked to accept these on the basis that when planted in the wild they are not as apt to be stressed as in the confines of the hatchery. It is to be assumed this particular strain of furunculosis is already present in the drainage anyway. We risk being arbitrary, but I feel we are correct in not accepting diseased fish even when the disease is suppressed by drugs unless there is essentially no chance of endangering wild populations.

Butler and Borgeson start their chapter on "Catchable" Trout Fisheries in the book INLAND FISHERIES MANAGEMENT with the statement:

> "Increasingly, those who work with catchable trout programs are recognizing them for what they are: recreation pure and simple, largely unrelated to resource management."

In other words, planting catchables for put-and-take fishing is recreation management; whereas, planting fish of any size for put-grow-and-take fishing might be considered resource management. There is a fine line here, but I feel the distinction is worth noting. For much of the emphasis in trout culture to date has been in developing catchables for put-and-take planting, and as Dr. Wright indicated earlier on this panel, strains have been developed that in the hatchery are healthy, hardy, thrifty and have high fecundity. Yet,

studies in Montana and elsewhere show that once planted, put and take catchables give only a short stimulus to the fishery. Their survival in the wild is poor and those not caught in 90 days for practical purposes must be considered dead. Then too, in Montana preliminary studies on Madison River and Odell Creek indicate that substantial plants of catchables cause increased summer mortalities in wild trout populations.

There is no question but many catchable trout are quality fish in terms of what they are being used for. But it is my opinion that although put-and-take may be the only way to provide fishing in some waters, this is not high quality fishing.

Further, it is my contention that there has been enough emphasis on development of put-and-take fish to meet present needs. Emphasis in fish culture should now be switched to the more complex problem of improving stocks planted for survival and growth in the wild, that is, improving stocks for resource management. So far this approach has been given lip service, however, there has never been a sufficient amount of field testing. Some of the testing that is being conducted will be described by Dave Leith, the next speaker on this panel.

A quality fish for resource management might be defined as the optimum fish for the specific water needing planting - or more directly - the right species or strain, and the right size, at the right time. Most of this put-grow-and-take planting will be in lakes, and I will agree with fish culturists that a fingerling planted in a lake and caught a couple years later when it weighs a pound and a half is a quality fish.

I haven't found the concept of the right size fish planted at the right time hard to sell when such factors as predators, water temperatures, plankton blooms and cost are presented for consideration. But the fisheries manager had better be able to back his requirements with facts when the hatchery has

problems coordinating production with his request.

The right species is obviously important. This is not just a matter of diversity for diversity's sake for in a particular water brook trout might do better than rainbow or vice versa, or perhaps still another species will do better than either. Rainbow trout, however, have proven to be our most useful hatchery fish in Montana.

At the risk of dwelling on the obvious, I would like to mention cutthroat trout. The Montana westslope cutthroat trout has been designated as an endangered species. We realize that when a wild strain of fish is retained in a hatchery for several generations the final product is not exactly the same as its wild counterpart, especially when dealing with fish as genetically plastic as trout. Yet, our fisheries managers have long felt a need for a cutthroat trout that can be planted in waters in the original westslope cutthroat range. We feel a hatchery cutthroat developed from the best wild stock we can find will do less harm to wild cutthroat through cross breeding than rainbow or a hybrid cutthroat. At the same time, by planting pure strain cutthroat we may enable them to regain some of their former range. This could be important as cutthroat apparently produce better than other trout in many of these waters.

However, the usual hatcheryman rates himself and is rated by others by the pounds of fish his hatchery produces. As a result he would prefer raising rainbow trout which have been long domesticated, grow well and are comparatively disease-free in hatcheries to raising a wild strain of cutthroat trout. Wild cutthroat are difficult to feed, prone to many diseases, and more expensive to raise. My point is that, in spite of hatchery production records, when cutthroat are needed the proper cutthroat is a quality fish whereas rainbow or an inferior cutthroat is not. In essence it is up to agency administrators to put the emphasis on quality instead of quantity.

Even the strain of a particular species of trout may be a consideration in their growth and survival in certain environments. California has been a leader in investigations along these lines. Calhoun summarized California's studies in a chapter on The Importance of Considering the Strain of Trout Stocked in the book INLAND FISHERIES MANAGEMENT. The evidence he cites demonstrates marked differences between various genetic strains of trout.

Up to this point I have dwelt on my feeling about the quality of fish which result from the production phase of fish culture. This phase involves sources of brood - either captive brood stocks or spawning stations that are readily accessible. There is, of course, a limitation on how many brood stocks and spawning stations can be maintained. Yet, as pointed out by Dr. Wright, there is much that can be done within this structure to develop strains for improved survival under various environmental conditions - that is, to develop higher quality fish for fish management.

Outside of this production phase, there is another area of need for high quality fish produced by fish cultural methods. In some states such as Montana there is the problem of managing the state's fishery without eliminating separate strains or stocks of indigenous trout still found in isolated drainages. Simon stated the problem well in his 1969 paper on Genetic Implications of Stocking and Improvement of Brood Stock:

> "On the one hand is the desire to produce and distribute the greatest number possible of high quality fish. On the other hand rests an uneasy feeling that indiscriminant introduction of non-native species may obliterate highly adapted and perhaps unique (= rare or endangered) populations which may in fact have never received sufficient study to be recognized as being different."

In Montana these are mostly cutthroat trout. The hatchery westslope cutthroat I mentioned will be used primarily for fairly large-scale planting in waters west of the Continental Divide where there will be little mixing with indigenous strains. Still we are faced with planting waters where there will be mixing of planted and indigenous trout. Apparently there are genetic differences, if only slight, between many of these strains and according to Calaprice in his 1969 paper on Production and Genetic Factors in Managed Salmonid Populations:

> "It is conceivable that the continuous stocking of hatchery fish ill-adapted to natural environments might result in a continuous lowering of the fitness and, if continued, the extinction of local populations."

In a 1971 paper on Genetic Control in Lakeward Migrations of Cutthroat Trout Fry, Raleigh and Chapman admonished:

> "Quite often a fishery manager will attempt to bolster a depleted population of fish by introducing transplants from another source. Unless he has carefully chosen the donor population, he may dilute the gene pool of an indigenous, genetically adapted population."

With these admonishments in mind, we feel that if it is necessary to stock into a drainage containing indigenous cutthroat it would be advisable to artificially spawn wild cutthroat from the drainage, hatch the fry in a hatchery, raise them to the required size and return them to the part of the drainage where they are needed. In past years this approach was followed at Yellowstone Lake, Yellowstone National Park. Spawn for planting the lake was taken only from the immediate drainage. Regardless of the merits of planting this lake, Yellowstone Lake today still provides a nationally renowned fishery

based on the original cutthroat. On the other hand, due to the ease of getting spawn from Yellowstone Lake, Yellowstone Lake cutthroat have been distributed widely in the western states, sometimes to the detriment of indigenous trout. I might mention spawn-taking operations were phased out at Yellowstone Lake about 15 years ago.

Obtaining spawn from a particular wild stock is often a hard problem. It is difficult to get men and equipment into a remote area at precisely the time when both male and female fish are ripe. Perhaps the future will disclose an easier answer, but for the present we need the understanding and assistance of fish culturists in obtaining quality fish for planting that will not damage indigenous stocks.

Comparable needs arise when we require distinct strains for planting in special situations. For example, in lake-tributary systems where the streams are inadequate nursery areas, it might be desirable to introduce trout with the hope of establishing a reproducing population that would spawn in the streams but whose fry would descend rapidly to the lakes after hatching. On the other hand, there are systems with good nursery tributaries where it would be desirable to introduce strains whose young would stay two years in the tributaries before descending, and thus be a better size to face predators in these lakes. These are special situations where again it might be desirable to take spawn from the wild.

To sum up, from my viewpoint as a fisheries manager, it appears that trout culture has been overwhelmingly dedicated to developing trout that mature and grow rapidly in the hatchery, have high fecundity and are easy to handle. The outcome has been production fish for the hatchery and at

the same time quality fish for many waters. But there are many other management situations where the need for quality fish has not been met. I believe emphasis in fish cultural research and development should be realigned so management requirements can be better fulfilled.