

SCOMM

74:26

CHAPTER IV. FISHERIES MANAGEMENT ISSUES

The success of the state's enhancement program has made managing Alaska's salmon fisheries more complicated. Much of this research project was initiated by a request from the Board of Fisheries to provide clearer legal and policy direction on the issues of

- managing fisheries for a wild stock priority;
- providing sufficient hatchery returns for broodstock; and
- providing cost recovery fisheries for hatchery operators.

These three issues encompass a number of legal questions and are addressed in Chapter V, Legal Issues. In this chapter a variety of other management issues are discussed.

MIXED-STOCK FISHERIES

A fundamental issue facing fisheries managers is how to control fishing effort in mixed-stock fisheries composed of both hatchery and wild stocks. The predominant management concern is that the weakest stocks will be overfished. In cases in which hatchery productivity is significantly greater than natural stock productivity, wild stocks face the risk of being depleted. In cases where hatchery stocks are smaller, these stocks run the risk of being lost among the wild stocks. Smaller stocks are more likely to be in danger of depletion in mixed-stock fisheries because there is a tendency to optimally harvest the larger stocks before quality declines in terminal fisheries.

The Department of Fish and Game has the constitutional responsibility to conserve and manage wild stocks of salmon for sustained yield. In a wild stock fishery, the conservation responsibility entails maintaining minimum spawning escapement levels for wild stocks. However, when hatcheries are established in wild stock salmon producing areas, the department has additional conservation responsibilities:

- maintaining the genetic diversity of wild stocks as stated in the ADF&G genetic policy;
- maintaining fish health and prohibiting the spread of fish disease; and
- providing sufficient returns of fish to the hatchery to provide for broodstock and cost recovery.

Strict regulations govern the selection of broodstock and the transporting and remote release of hatchery produced fry and smolt, requiring a comprehensive genetic monitoring and permitting process (see Biological Issues chapter).

Because salmon runs occur in a short period of time, field managers rely on early test fisheries or initial fishery performance as the indicators of run strength. When runs of hatchery or wild stocks are weak, commercial fishing effort must be reduced or re-directed. *The ability to determine the strength of various stocks requires some capability to distinguish wild fish from hatchery fish, which increases management costs.*

With large scale hatchery enhancement, ADF&G's Division of Commercial Fisheries is concerned that the additional costs of managing mixed stock commercial fisheries composed of wild and hatchery stocks are not always

accounted for in the planning and operation of hatchery facilities, and fisheries managers are often not given adequate funds to properly manage what can become a very complicated fishery.

It should be noted that the problems posed by mixed-stock fisheries are not new. Almost all Alaska salmon fisheries, composed entirely of wild stocks, had some degree of mixed stocks prior to the development of hatcheries. Prince William Sound, however, is the focus of the Division of Commercial Fisheries' current concern, largely because of the scale of the hatchery operations in the Sound, with hatchery stocks now responsible for over 80 percent of the total pink salmon production.

Managing the fisheries in Prince William Sound has also been made significantly more difficult as a result of the 1989 *Exxon Valdez* oil spill. Certain pink salmon stocks were greatly impacted by the oil spill and require intensive stock-specific management measures in order to protect and rebuild these populations. Additionally, most of the information gathered as a result of the recent influx of oil spill damage assessment funds is still confidential, and not available to the general public.

QUALITY

State law requires that fish returning to hatcheries and sold for public consumption be of comparable quality to fish harvested by commercial fishermen in the area. Prince William Sound is the major focal point for the issue of managing hatchery and wild stocks to optimize quality and marketability.

During the planning process for the Prince William Sound hatcheries, the Basic Management Plans that addressed the harvest of hatchery fish were developed cooperatively by the department and hatchery operators. *Returning adults were to be primarily harvested in terminal areas, thereby minimizing harvest conflicts with wild stocks.* Additional harvest management costs were not considered under this strategy. Initially, fish quality was not an issue as terminally caught fish were of high quality. However, as the program grew, processing capacities became fully utilized, sometimes forcing delays in harvesting terminal fish. Such delays resulted in poorer quality fish, and thus, the demand to harvest fish farther away from terminal areas. The 1989 oil spill also contributed to the concern over quality. The spill delayed harvest of the large 1989 pink salmon run, which resulted in an extremely poor quality pack and a public perception of oil contamination of the fish harvested.

Early in 1991, the Prince William Sound Aquaculture Corporation (PWSAC) expressed concern about the processing capacity in the Sound given the large forecasted pink return. PWSAC officials began exploring the possibility of bringing foreign processors into the Sound, but their request was denied when state officials and domestic processors insisted that existing processing capacity would be sufficient. A delay in the return of the majority of the 1991, large pink salmon runs statewide and overall low prices created a major problem for fishermen, hatchery operators, and fishery managers. To maximize the quality of the harvest, processors and fishermen asked to harvest returning adult pink salmon at the entrance areas to Prince William Sound. Fishery managers were reluctant to do so since at these locations, the wild stocks damaged by the *Exxon Valdez* spill are mixed with non-impacted wild stocks as well as the large returns of hatchery fish. ADF&G feared that harvesting in mixed-stock areas, while maximizing quality, would also jeopardize wild stocks through the risk of being overharvested. As a result, fishing was delayed, and

when it was finally opened, the season turned into a disaster with insufficient processing capacity and large quantities of salmon either being destroyed, or processed and given away.

During discussions at recent meetings of Governor Hickel's Salmon Strategy Task Force (see Marketing chapter), it became apparent that there is no definitive information on how close to their spawning areas salmon can be harvested without sacrificing quality. Some people believe that the concern for quality of terminal-area salmon is created by processors as part of a price-setting strategy. ADF&G has suggested a research project be funded to analyze salmon quality at various distances from their spawning areas in an effort to determine how best to manage fishing effort to produce a top-quality and marketable product.

TAGGING NEEDS

Since hatchery-produced fish often complicate fisheries management, a way to simplify management is to determine the mix of hatchery and wild stocks in a mixed-stock fishery. For most mixed-stock fisheries composed of hatchery fish, an adequate program of tagging, recovery and analysis is required.

The tagging method most commonly used now is the coded-wire tag (CWT). The CWT is typically a 1.0 mm long by 0.25 mm diameter stainless steel wire which has been etched with notches that represent a code of information. The CWT can be injected into the nasal cartilage in salmon smolts. Tags from returning fish are recovered by fishermen and field biologists and sent to a lab in Juneau for analysis. The Juneau lab has extremely poor working conditions, and ADF&G for years has attempted to improve lab conditions and expand its capabilities. In spite of these conditions however, the lab produces quality data.

Scale analysis is another technique that has been used for years to reliably identify the country of origin for salmon in the north Pacific. However, the use of scale analysis has so far not been able to provide the detailed level of information necessary for management of specific fisheries.

Otolith marking is seen as the most viable mass marking technique on the horizon. Otolith bone development provides a daily record of the internal and external forces affecting fish growth beginning at the eyed-egg stage. This growth occurs in rings somewhat similar to the circuli of a fish scale or the rings of a tree. Growth of the otolith is in alternating rings of high and low concentrations of protein calcium carbonate. The optical density of these rings is easily manipulated to make an obvious visible change in structure. One way to do this is by thermal marking - causing a rapid drop or elevation in water temperature. The benefit of otolith marking is that virtually *all* hatchery fish can be marked at the same time.

FRED Division is also actively pursuing genetic stock identification (GSI) research and applications using both protein electrophoresis and deoxyribonucleic acid (DNA) analysis. This approach can be used for a variety of purposes, including measuring the contributions of unmarked but genetically identifiable hatchery fish to commercial fisheries. Biologists are already doing extensive work using this technique on salmon from the Yukon River.

Although otolith marking and GSI hold promise for the future, coded-wire tags will probably always have a place in the state's marking program. The CWT Lab currently supplies information for hatchery and natural stock evaluation, as well as for evaluation of U.S./Canada salmon interceptions. The CWT Lab is a vital link in the in-season management of fisheries in Southeast and Prince William Sound. Using coded-wire tag data, fishery managers are able to take in-season advantage of the hatchery add-on clause of the U.S./Canada Pacific Salmon Treaty. In 1991 the CWT tag lab processed over 76,000 heads, using a large number of seasonal staff because of the short salmon season and the need for in-season hatchery contribution estimates.

The extent of any particular tagging program is determined by funding. The general assumption is that the people who tag the fish pay for the tagging. In the case of hatchery operators, that usually means the state or the PNP operator. However, *the greater expense lies with the recovery and analysis of tags by the state, and the issue of who pays for that portion has never been resolved.* Commercial fisheries managers would like to see more tagging to enable increased management precision. The Board of Fisheries would like to see additional tagging in order to provide information for allocation disputes. Hatchery operators have been reluctant to pay for the recovery and analysis program. This issue has been debated for the past decade and is still unresolved.

At the time of the *Exxon Valdez* oil spill, the hatchery/wild stock assessment program in Prince William Sound was not fully developed nor was the funding for such a program in the Commercial Fisheries Division's base budget. As a result, the program was unable to assess the oil spill damage or provide the stock-specific information needed to protect and restore damaged pink salmon stocks. Fortunately, Natural Resource Damage Assessment funds provided ADF&G with sufficient resources to assess the population level response of Prince William Sound pink salmon to the oil spill. However, once oil spill funds expire, additional state money will be needed if a stock-specific harvest management program is to be implemented and maintained.

FRED Division is informing hatchery operators that new increments of hatchery production will be permitted with a requirement that the operator pay for tagging and analysis. Whether or not to require that of existing production is being debated. Some people, including some members of the Board of Fisheries, advocate for a requirement that all hatchery production be categorically tagged and analyzed. However, existing operations have permits that do not require tagging. These operations were planned, permitted and funded without accounting for tagging their costs. It is likely that imposing a tagging requirement on permitted facilities would be subject to legal challenge.

Another issue, however, is whether an all encompassing tagging requirement is necessary. In some cases, a multi-year tagging study to show migration patterns and run timing would be sufficient. In other cases, where tagging is intended for in-season management, a large tagging program would need to be maintained. Not all hatchery production results in complicated, mixed-stock fisheries that would necessitate extensive tagging, and would even be used. Although CWT data has been supplied to Prince William Sound fisheries managers on a daily and weekly basis for the past two years, it has yet to be used for in-season management.

OPTIONS FOR POSSIBLE CONSIDERATION:

- Development of a state policy on managing mixed-stock fisheries composed of hatchery and wild stocks.
- Requiring hatchery production to have tagging, recovery and analysis programs. This could range from a blanket requirement for all production to site-specific requirements.
- Development of a policy regarding funding for tagging, recovery, processing and analysis.
- Funding a study to analyze salmon quality at various distances from terminal streams to determine the effect of fishery management effort on product quality and marketability.
- Direction to the Board of Fisheries on how to factor managing for quality into fisheries management plans.
- Funding research and development of new tagging and marking techniques suitable for mass marking.
- Clarifying the roles and uses of tagging--for biological information, allocation, or management purposes.
- Expanding tagging and stock identification studies of wild fish stocks for the purpose of comparing wild and hatchery stocks.