Management Provoked Conflict in Fisheries

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ABSTRACT / Fishery management concepts incorporate a number of value judgements about what social goals are right for a fishery. These value judgements result in optimizing some goals over others. Since the public, fishermen, and consumers weight goals differently than managers, frustration and conflict result. The correspondence between social goals specified by the public and those inherent in management concepts needs to be evaluated.

Managers and fishermen alike complain about "political" management decisions. Their perspective is that decisions are not based on "doing what is right for the resource." Rather they feel decisions cater to one or more of the parties involved—the government, the public, the managers, or the fishermen. In many U.S. fisheries, conflict seems to be the primary product of management planning. Fishery management councils criticize delays caused by the public hearing process. Fishing groups claim that they are not given adequate time to state their points of view.

In many respects, this is the normal situation in democratic decision-making when competing interests are at stake. Yet the conflict generated is more than just reactions of people displeased by management regulations. Conflict results from the way management concepts are applied.

Goal of Maximum Sustainable Yield

Getting the greatest yield from a fish resource without damage to its long-term renewability is the key goal of maximum sustainable yield (MSY). This concept gives preference to preserving fish for future generations. It is the point on a yield–effort curve where long-term catch is maximized, and is concerned solely with maximizing physical yield. Given logistic growth, management for MSY maintains stocks at one-half the environmental carrying capacity.

Sissenwine (1977) questions whether an adequate estimate of MSY is possible, owing to the fact that estimates often "ignore age-class structure, delays between changes in production and changes in stock size, and environmentally induced fluctuations [p. 93]." These criticisms center on variability in maximum yield caused by favorable and unfavorable environmental fluctuations.

The yield–effort relationship, as typically shown in Fig. 1, fails to indicate variability in data required to construct this curve. Environmental conditions, for example, food supply, water temperature and quality, ocean currents, diseases, habitat alterations, stock density, growth rates, and river flows, affect productivity. The curve shows a smooth relationship between effort and yield. To construct the curve from field data, many observations are needed for each effort level, and each must be controlled according to environmental conditions. Vertical bars in Fig. 1 show variability in yields at four effort points. This variation is often referred to as random, largely because periodic changes in yield are unpredictable.

Walters (1975) evaluated the relation between variance and long-term average yields for the Skeena River. As a general principle, reducing variability in yields lowers the long-term average yield. Accepting higher variability allows higher average yields. Using stochastic dynamic programming to produce variance–mean combinations over 5000-year runs with natural variation in the Ricker stock production parameter, Walters (1975: 1784) developed a simplified catch management strategy that would maintain average catches and reduce the variance.

Acceptable amounts of variability are related to social goals. Hilborn (1975) reports the response to Canadian Fisheries and Marine Service representatives to a proposal that annual variability in Skeena River catches could be reduced 90% with only a 5–10% reduction in the long-term average catch. Government fisheries repre-
sentatives felt that "some interest groups, particularly commercial fishermen, would prefer a high variation between years to a stabilized catch [Hilborn 1975: 2]."

Given that yields vary widely from year to year due to environmental conditions and that there is no technology for predicting these fluctuations, then it is difficult to know where any particular yield-effort point is relative to the idealized yield-effort curve. In Fig. 1, hypothetical variability is illustrated for four effort points. At effort level $E_2$ environmental variability is such that yields in excess of MSY are possible without damage to the stocks. At effort level $E_4$ catches below MSY could do serious damage to the stocks. This would be the case when environmental variability severely depressed stock sizes, and then, a yield on the vertical bar below MSY at $E_4$ would be detrimental.

Management Provoked Conflict

Application of fishery management concepts involves a number of social goals. Often this process results in frustration and conflict. An explanation of why comes from looking at the yield-effort conceptualization (Fig. 1). Effort yielding catches to the left of MSY is inefficient in the sense that additional effort will produce more from the resource without damage to it. To the right of MSY, additional effort returns less because the resource becomes depleted and is slower to renew itself. Clearly it is undesirable to get less than the maximum a resource can provide.

Policy for a fishery with an effort level producing catches to the left of MSY will be stimulated to allow increased effort. Social incentives, in the form of rewards, recognition, and subsidies will serve to expand fishing effort so that effort expands toward MSY.

Given that it is difficult to determine MSY in field situations, then the probability of effort exceeding MSY increases. However, even if MSY is exceeded, fishery managers will have difficulty proving that it has been and stopping the growth pressures that are pushing the fishery to increased effort levels. Lower yields will stimulate price increases which, in turn, will stimulate additional effort. Thus, just at the point where growth is not needed, social pressures are strongest in pressuring additional effort.

As yields decrease with effort to the right of MSY, fewer pounds of fish become available. Thus, if the consuming population remains unchanged, there are fewer fish per capita, and new distributional quotas must be worked out. Allocative decisions are likely to produce conflict among fishermen, consumers, and people whose activities are restricted as managers seek to reduce catches.

To manage for MSY, then, is to manage on the verge of conflict. Data inadequacy and social pressure make it probable that once MSY is exceeded, it will continue to be. Couple this with Beddington and May's (1977: 464) conclusion that "predictability of the catch tends to decrease as catching effort increases." They also show that system recovery time from disturbances increases. "At the MSY point, $T_R$ [recovery time] is twice that for the natural population, and $T_R$ continues to increase as $E$ [effort] increases beyond the MSY point [p. 464]."

Maximum sustainable yield is not just a point on a curve. It is a critical point in the psychology of resource use. Once MSY is exceeded, effort growth in the fishery is no longer productive. Yet near MSY is the point where social pressure for expansion in effort is also greatest. Exceeding MSY means progressively decreased returns from the fishery. Management that aims to reduce yields creates conflict over who gets what and how much.

Although MSY is criticized as being imprecise, because of the difficulty in determining impacts of natural variability, it persists as the dominant concept in fishery management. Management concepts such as allowable biological catch, total allowable catch, equilibrium yield, and total allowable foreign fishing are all based on MSY.