

Managing Scotland's Herring Stocks:

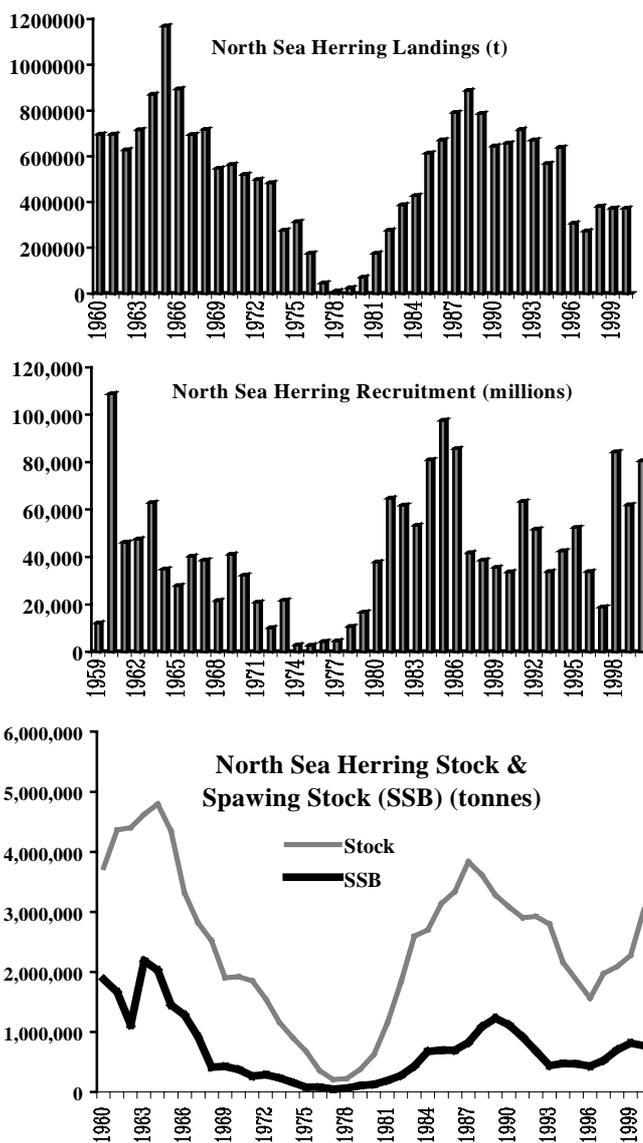
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Herring occur throughout the northern coastal marine areas of the Atlantic and Pacific Oceans and parts of the Arctic. Throughout their entire range, they have been used for food and commerce for centuries, but it is only within the last 100 years that nearly all stocks have been subjected to intense fisheries. During this period most stocks have experienced periods of abundance, collapse and recovery. In the Northeast Atlantic the major northern stocks collapsed due to excessive fishing in the 60s and 70s and have recovered at varying rates. The more northerly stocks such as the Atlanto-Scandian herring and Icelandic summer spawning herring produce more variable recruiting year classes (the number of herring joining the population in a year) and the populations are therefore more unstable. The more southerly stocks produce more stable recruitment and with a carefully executed fishery should provide a more reliable supply of herring. In most instances when fishing decreases the stocks recover, though sometimes, as in the case of Atlanto-Scandian herring, this has occurred slowly. However, in the case of one large Japanese stock, which had nearly a million tonnes of annual landings, 50 years ago overfishing caused a collapse from which it has never recovered. Scotland has access to three major stocks, North Sea, west of Scotland and Atlanto-Scandian herring. These populations are discrete, each showing different patterns of recruitment, and growth. They need to be managed and allocated TACs separately; if all the North Sea TAC was taken in the west of Scotland the stock would collapse.

The North Sea and west of Scotland herring stocks have experienced excessive fisheries in the past leading to collapse. The North Sea stock declined in the late 60s and early 70s leading to a closure. Following a diversion of the fishing fleet after the closure in the North Sea the west Coast stock collapsed in the late 70s. Both of these stocks have recovered, reaching peaks in their spawning stocks around 1990. Since then the west of Scotland stock has remained rather stable and sustained a fishery at about 30,000 t. In contrast, the North Sea experienced an excessive fishery, and the TAC was halved in 1996. Since then the stock has increased, and recruitment has generally remained high, with a single poor year in 1997 followed by three relatively good years (see figure). Poor year classes always occur when the stock is low. However, they can also occur at any time due, for example, to environmental effects such as storms, which disturb spawning sites; or plankton bloom changes leading to shortages of food in early life. The North Sea spawning stock declined in 2000 due to the poor 1997 year class as it matured and entered the adult population and fishery. The figure shows how sensitive the stock is to recruiting year classes. Two small year classes in a row could very quickly change the relatively healthy state of this stock. In the last 20 years the North Sea herring has had eight really good recruiting year classes and a single poor one. Thus the fishery has had an excellent potential supply of herring for most of this period.

Currently the TAC for the North Sea adult stock is 265,000 t with the UK share at 40,570 t. It is anticipated that this TAC will continue into 2002. Survey data indicates that the last three year classes (1998-2000) have all been excellent. Provided these come through into the fishery the prospects are good for the next few years. The west of Scotland stock (which has been difficult to estimate due to difficulties in estimating landings by all countries) has a 2001 TAC of 36,360 t with a recommended catch level of

30,000 t in 2002 of which the UK would receive a TAC of over 18,000 t.



The management of herring stocks relies on information from a number of sources. Each year in the North Sea there are plankton surveys for herring larvae (young herring within 3 months of spawning time), trawl surveys for young herring in the first and second years of life and an acoustic survey for the adult population. The FRS Marine Laboratory Aberdeen participates in the trawl and acoustic surveys. For the west of Scotland we have only an acoustic survey directed at the adults. The relatively greater survey effort for the North Sea results from the larger value of the fishery. Samples of herring are also collected from the fish markets and fish factories to give information on the size and age of herring caught. In addition, we depend on reported landings to estimate the total fishery. We also rely heavily on the good relationship and co-operation of the pelagic industry to provide help with a small number of observer trips and confidential information on more accurate fishing locations and amounts of landings. All of this information is used together to assess the total population. The catch is used to estimate overall historical level of the population and the surveys provide information on the recent changes in abundance. This assessment is carried out annually in co-operation with other EU countries

and Norway. Advice on a safe, or precautionary level for the future fishery is based on what we think the stock abundance will be in one or two years time, compared to the extent of the fishery and the size of the stock in the past.

One of the major areas of uncertainty in herring management is estimating the total landings. Historically there have been opportunities to misreport both location and quantities of landings. For example there were possibilities to land additional catch to Klondykers in the 80s and more recently to misreport North Sea herring to the west Coast. This misreporting has an effect upon herring stock management. However, its not the missing landings that causes problems, rather it the change in amounts of misreporting from year to year. For example, if the missing landings were equal to the TAC we would underestimate the catch by half which would result in an underestimate of the stock and all its stock reference points by 50%. However, all the management decisions would be correct, we would correctly detect increases and decreases in the stock by the correct proportions, and provide appropriate advice on catch (assuming continued misreporting). The stock size might look wrong to a fisherman or fish processor who sees the true catches, but the suggested changes to catch would be of the right proportion at the correct time. We can say with some certainty in the last 20 years that we have seen the North Sea herring stock rise to a peak abundance in 1990, decrease to a dangerous level in 1995, with the 1996 TAC reduced accordingly, and have observed a subsequent rise in total stock. In

retrospect, although these management measures were at least a year late, they were necessary, and have contributed to a sustainable fishery. The delay in introducing the reduced TAC was partly due to uncertainty in the total catch at that time, as well as a natural reluctance to introduce painful measures unnecessarily. However, in practice the effect of reduced catches was offset by an increase in price.

Currently there are strong indications of an increase in the under-reporting of catches (not by area but in total). If this is the case than the management information will deteriorate and the possibilities for stock collapse increase. It is important to ensure that this does not happen. There have been recent moves to reduce the possibilities for under-reporting landings and this must be in the long term interests of fishermen, processors, and fisheries managers. However, better information on both the past and present under-reporting would help us to understand what is happening to the stock and reduce the chances of stock collapse. Currently we obtain helpful information in recording real catch locations and amounts from many members of the Pelagic Fishermen's Association and we would welcome continued help with confidential exchange of information about the current and past catches. The key to success in management is accurate information. If this can be obtained by co-operation between fishermen, processors and scientists, it will deliver management advice that will lead to a sustainable herring fishery.