

IMPLICATIONS OF THE 1981 GEORGES BANK AND GULF OF MAINE
COD AND HADDOCK ASSESSMENTS
FOR FUTURE MANAGEMENT STRATEGIES

by

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Introduction

The current status of the Georges Bank and Gulf of Maine cod and haddock stocks has recently been reviewed based on updated commercial, recreational, and research survey information available through 1980 (Serchuk and Wood 1981; Clark et al. 1981). These assessments provide separate evaluations of the impacts of future annual catches on stock sizes for the FCZ cod and haddock populations. On Georges Bank and in the Gulf of Maine, the assessments indicate disparities in relative stock biomass between cod and haddock. Since both species are commonly taken together in the mixed trawl fisheries operating in each region, it is important to consider the potential interactions that may result from establishing optimum yield levels for each species-stock independently from each other. This consideration is of value since exploitation rates implied by future harvests of one species (based on a single species assessment) may not necessarily be compatible with the target exploitation rate of the other jointly harvested species. Hence, a real risk exists that specification and implementation of optimum yield predicated on a single species basis will result in increased vulnerability of failure to attain management objectives related to other jointly exploited species.

This report attempts to analyze the results of the 1981 Georges Bank and Gulf of Maine cod and haddock assessments with respect to current and future management strategies of these species stocks. Attention is focused upon the probable impacts of present optimum yield levels on stock sizes and possible future managerial actions that may be necessary to address the biological consequences of these impacts.

Georges Bank

Since 1976, total annual reported commercial landings of cod and haddock from Georges Bank have generally increased yearly. The 1980 total reported commercial cod catch (45,681 mt) was 129% larger than in 1976 and was the highest annual harvest since 1966. Commercial landings of haddock in 1980 (26,968 mt) were sixfold larger than in 1976, and the highest since 1968. Combined 1980 USA landings of both species totaled 56,500 mt, the highest in 14 years.

During the past four years, abundance of both species increased as a result of strong recruitment. For cod, the 1971 and 1975 year classes have dominated the population and sustained the recent fishery. For haddock, the 1975 and 1978 year classes have been important in increasing total population stock size and supporting increased fishery landings levels. In 1980, both Georges Bank cod and haddock stocks were dominated by 1978 year classes, although the 1978 haddock cohort appears to be much stronger than that for cod. The 1979 cod and haddock year classes are both relatively weak, while the 1980 year classes presently appear average in strength.

The 1980 autumn NEFC offshore survey catch per tow indices for cod and haddock indicate significantly different stock conditions between the two species. Relative biomass of cod sharply declined in 1980 from 1979; the 1980 autumn weight per tow index was the lowest in six years, and was among the lower third of values in the survey series. Contrariwise, the 1980 haddock autumn weight per tow index, although slightly less than in 1979, remained relatively high indicating that haddock biomass has maintained itself despite recent landings levels. Assuming that the sharp decline in survey catch rate of cod is indicative of a comparable decline in stock biomass, these data suggest that continuation of the

1979-80 fishing year optimum yield (OY) levels for cod and haddock in 1980-81 will result in a further decline in Georges Bank cod stock size while haddock stock size will increase due to body weight growth of the strong 1978 haddock year class.

Pragmatically, the 1980-81 cod and haddock OYs will remain as they were in 1979-80 since implementation of OY changes would require an amendment to the Fishery Management Plan (FMP), an adjustment that realistically could not occur before the end of the 1980-81 fishing year. Hence, it is assumed that the 1980-81 commercial allocation for cod will remain at 35,000 mt while the commercial haddock allocation will continue to be 22,900 mt. Given the harvesting capacity of the present groundfish fleet and previous performance of the fleet relative to the 1979-80 allocations, the 1980-81 allocations are expected to be harvested. This is particularly true for haddock in which the 22,900 mt OY approximately corresponds to the $F_{0.1}$ fishing mortality rate, a rate that can easily be generated by the present commercial fishery. To obtain the cod allocation, more effort will probably need to be expended than in 1979-80 since all of the 1980 autumn survey indices (offshore and inshore) imply that cod biomass is significantly less than it was during the 1979-80 fishing year. While the autumn 1980 survey indices differ in trend from spring 1980 survey values (which generally remained stable or increased from 1979), the consistency of decline in all of the cod weight per tow values observed in the 1980 autumn surveys (including the Massachusetts and NEFC inshore surveys) are suggestive of real stock size reductions rather than reduced availability. Verification of the apparent decline must await future research surveys and events in the fishery.

The increased effort expended for cod in the 1980-81 commercial fishery will likely generate a higher fishing mortality rate for cod than was generated during 1979-80. Given the joint harvesting relationship between cod and haddock, increased fishing mortality for cod will result in additional landings of haddock above those produced at $F_{0.1}$, the desired fishing mortality rate under Draft Amendment No. 5 to the FMP. Moreover, since yellowtail flounder allocations in 1980-81 may be attained by June 1981 (based on present projections), it is likely that effort from the flounder fishery will be redirected toward cod if and when this occurs.

Overall, projected fishing patterns for Georges Bank cod and haddock in 1981 under current OYs will in all probability result in a fishing mortality for cod beyond F_{max} and a fishery mortality for haddock above $F_{0.1}$. Landings from both stocks will likely be dominated by fish from the 1978 year class. Resultingly, at the start of 1982, residual biomass of both stocks will be comprised of only one or two principal year classes. If the 1980 year classes for both species remain as average in strength upon recruitment to the fishery in 1982, the 1982 cod and haddock fisheries will again be largely supported by only a few age groups. Spawning potential will thus be dependent on a few cohorts rather than on a heterogeneous mix of age groups. Since fecundity generally increases with size and age of fish, egg production will likely be reduced, particularly for Georges Bank cod since total spawning stock biomass in 1982 will likely be much lower than it was in 1980 or 1981. Although stock-recruitment relationships have yet to be defined for Georges Bank cod or haddock, they no doubt exist

particularly at very low levels of stock size, and, over the long-run, reduced spawning stock levels composed of only a few age groups normally can be expected to increase the probability of producing poor year classes.

As a consequence of these potential fishery developments, the 1981-82 cod and haddock OY levels will need to be altered to achieve the goals of the present FMP. The cod OY will need to be reduced substantially. The magnitude of reduction will depend on the actual removal levels in 1981 (i.e., if landings greatly exceed OY as occurred in 1979-80) and the associated fishing mortality rate. Based on previous trends in autumn survey indices for cod and related fishery landings, a 1981-82 cod OY of about 25,000 mt may be appropriate to stabilize cod biomass. A 1981-82 haddock OY of 32,000 mt ($F_{0.1}$ level) based on present information would appear to be compatible with the fishing mortality generated by the cod OY and minimize by-catch effects (i.e. discarding of haddock).

Gulf of Maine

Reported 1980 commercial landings of cod and haddock from the Gulf of Maine were among the highest in the history of the respective fisheries. The 1980 cod landings were the fourth highest ever; the 1980 haddock catch was the highest in over 20 years (about equal to that recorded in 1958). Autumn 1980 NEFC survey indices indicate that cod biomass has continued to remain at historically high levels while haddock biomass has recently declined.

The Gulf of Maine cod population has had a succession of average or better year classes since 1977; the 1978 and 1979 year classes appear to be above average. The 1975 and 1976 haddock year classes have appeared as better than average although subsequent year classes (1977-1979) have been relatively weak. The 1980 year classes for both species seem to be at least average and possibly stronger.

Continuation of the 1979-80 OY levels during the 1980-81 fishing year will result in a maintenance of cod biomass but a further reduction in haddock biomass. The fishing capacity of the Gulf of Maine commercial fleet is such that attainment of the commercial allocations is expected although fishery mortality on haddock will need to be increased since population biomass has declined. This will result in fishery mortality on haddock exceeding the F_{max} level. Since the 1977-1979 haddock year classes are relatively poor in strength, the fishery will have to be sustained until 1982 by the 1975 and 1976 cohorts. Hence, the 1981-82 fishery will be strongly dependent on the incoming 1980 year class. To the extent that haddock are jointly harvested with cod, it is expected that either cod will be discarded after the cod OY is attained or that additional haddock landings will ensue if the cod fishery is not limited after attaining the commercial allocation. The resultant effect will be that the exploitation rate on haddock will be higher than is probably sustainable in the long run.

At the beginning of the 1981-82 fishing year, the Gulf of Maine haddock population may have declined below the stock levels observed during 1964-1968. Hence, a reduction in the 1981-82 commercial haddock OY from the 7,600 mt level will need to be considered if further stock declines are to be curtailed. The large disparity between the probable cod and haddock biomasses at the start of fishing year 1981-82 suggests that separate OYs for cod and haddock will be incompatible with presently observed fishing practices. A joint cod and haddock OY might allow exploitation rates on both species to reflect their relative abundance.

LITERATURE CITED

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