Marines

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

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TO: Members of the ICES Working Group on Introductions and Transfers of Marine Organisms

FROM: Carl J. Sindermann
Chairman

SUBJECT: Draft advice to the Council concerning the Norwegian proposal to introduce coho salmon

Attached for your final review and comment is subject draft, as it was prepared at the meeting in Sète.

Please respond by telex or telegram, since the Secretariat needs our final statement for distribution to members of ACFM before their July 1, 1981 meeting.

I will be sending you a draft of the full meeting report within the week. Thank you for your participation; the Sète meeting was outstanding, in my opinion.

Attachments

Meines

Prof. Tiews m. d. Bitte um Kenntnisnahme

NORWEGIAN REQUEST FOR ADVICE CONCERNING A PROPOSAL TO INTRODUCE COHO SALMON FOR STUDIES ON THEIR SUITABILITY FOR MARICULTURE

The request from Norway (copy attached as Appendix I) involves advice on a proposal for use of a disease-free stock of F_1 fish from a UK quarantine facility, or establishing a brood stock in quarantine for life and using the F_1 progeny for sea cage trials. Initial studies will involve relatively small numbers of fish.

The Working Group considered that this request would not pose a risk to the environment or to native salmonids, provided the Norwegian government representative endorsed the desk study statement (Appendix II) supporting the proposal that escape of fish and any non-indigenous pathogens introduced with them could not occur from whatever facilities were used to contain the fish. With such an endorsement, it was recommended that Council accede to the request.

The Working Group assumes that the Norwegian authorities will ensure that the net pens or tanks holding the smolts will be maintained in conditions offering the best prospect for protection from the weather, and that the authorities are satisfied that the chances of escape are negligible during the lifetime of the original import and of the F_1 stock. Under such conditions, the Working Group sees no reason why the trial should not be conducted. If started with eggs in 1981, it will take 3 years to produce the F_1 stock and a further 3 years to evaluate the performance of the F_1 stock in seawater cages, making 6 years in all (a shorter period will be required if UK salmon are used as brood stock).

However, if the proposed experiment resulted in a recommendation for commercial aquaculture of coho salmon, the Norwegian authorities must recognize that a new situation might arise with some risk potential. Commercial development could not take place under the stringent "no escape" conditions of this proposal, and the virtual certainty of escapes raises the question of whether they posed a threat to native fish. The desk study acknowledged that such a threat might exist, yet made no reference to initiating research to settle this question. It was therefore strongly recommended that the Council point this out to the Norwegian authorities and advise them to use some of the F_1 stock to establish if interreactions between coho and native fish were significant and to the latter's detriment. All progress on the coho introduction should be reported to the Council.

APPENDIX I. REQUEST FOR ADVICE CONCERNING INTRODUCTION OF COHO SALMON FOR CAGE REARING IN NORWAY

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22.9.
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Import of coho salmon

The Norwegian fish farming industry investigate the possibility to rear other salmonid fishes than the Atlantic salmon and rainbow trout.

A private firm, SEA FARM A/S, would like to import coho salmon in cooperation with the Norwegian authorities. Prior to any import, however, the Institute of Marine Research would like to listen to advice from the International Council for the Exploration of the Sea (ICES).

Knowing that this question has been discussed in the Working Group on the Introduction of Non-indigenous Marine Organisms and that one of the subjects in this year's meeting in Anadromous and Catadromous Fish Committee would be dealing with the status of Pacific salmon in the North Atlantic Area, we would like to ask ICES how to handle a possible import of coho salmon to Norway.

Gunnar Sætersdal

APPENDIX II. DESK STUDY BY DR. E. EGIDIUS ON A PROPOSED INTRODUCTION OF THE PACIFIC SALMON TO NORWAY

INTRODUCTION OF PACIFIC SALMON (ONCORHYNCHUS SPECIES) TO NORWAY - DESK STUDY FOR THE CONSIDERATION OF THE ICES WORKING GROUP ON INTRODUCTIONS AND TRANSFERS OF MARINE ORGANISMS AT ITS 1981 CONSULTATION

INTRODUCTION

A considerable interest in the introduction of different species of Pacific salmon (Oncorhyncus) has been appearent in Europe the latter years. In Norway the interest in fish farming is steadily increasing. The species are Atlantic salmon (Salmo salar) and rainbow trout (Salmo gairdneri) both grown to the size of several kilos over a 1½ to 2 years period in sea water. Norwegian fish farmers wish to consider the inclusion of Oncorhyncus species for eventually filling niches in their marketing range of farmed salmon.

The opposition to such introductions for farming purpose is the concern to conservation and to sports-fishing interests. This concern is mostly linked to the uncertainty of the effect of possible escapes from the farms to native populations of Atlantic salmon and sea trout.

EARLY TRANSPLANTS

The salmonids always seem to have attracted man with a special fascination. First of all this is due to their interesting and complicated life cycle: their migration from the rivers to the sea as young fish, their rather obscur growing years in the sea, their abundant return and their ability to find the way back to their parent river to spawn with at least for the Pacific species a dramatic end. And secondly not to forget their long cherished value for sports-fishing and in later years market value.

There are records of early attempts to transplant members of the salmonid family from all over the world. Some examples: Mazeaud (1981) described the introduction of Quinnat or chinook (O.tshawytscha) to French rivers in 1880-ties. Pink (O.gorbuscha) was transplanted to the Great Lakes already in the nineteenth

century (Parsons, 1973) and according to Lear (1980) was attempted to New Zealand around 1915. Joyner (1980) reports the early introduction attempts of both Oncorhyncus and Salmo species to South America and Waugh (1980) refers attempted transfers of Atlantic salmon to New Zealand a hundred years ago.

RECENT INTRODUCTIONS

Recent attempts of introductions are abundant and widespread and leave at least some reliable reports as to transferred numbers, mortalitiy, recatches etc. Nearly all of these transfers concern the Pacific species.

Pink salmon

The last twenty years the USSR has carried through intensive assays to acclimatize pink salmon to the Barent and White Sea releasing the fry at the Kola peninsula (Bakshtansky 1980). Some years have given good recaptures, but the climate of this region seems to be too hard for natural runs to become established. Some of the fish, however, have found their way to Norwegian rivers mainly in the Finnmark region were stray natural reproduction has been recorded (Bjerknes 1977). The USSR has recently stopped their efforts on stocking pink fry in the Kola region and if the Norwegian runs have developed to the permanent ones, still remain to be seen.

Similar Canadian introductions of pink salmon to Newfoundland obviously have been unsuccessful (Lear 1980).

Rainbow trout

Steelhead or rainbow trout has been extensively transplanted to Europe for farming purpose. Since the early sixties the farming of rainbow trout in several European countries and on the North American Atlantic coast, has extended into sea water, in many cases resulting in large salmon like fish. Today rainbow trout as a candidate for introduction to European waters, would most probably have been prohibited due to its biology, ecology etc. being rather similar to that of the Atlantic salmon. But - with all the escapes sometimes of whole cage-loads - that have occurred along the Norwegian coast, wild, reproducing speciemens have never been reported.

Coho salmon

Coho (O.kisutch) is the main candidate for introductions to Europe today, and unfortunately, information from real large scale implantations are scarce. The implantations to South America of several trout species and a variety of landlocked Atlantic salmon readily adapted to their new environment. All efforts on transplantating seagoing populations, however, failed in the same region. Recently substantial effort is put into the release of coho in the Gulf of Ancud, Chile, the results of which remain to be seen.

Also in the New England States numerous introductions of coho have been attempted mainly for sports-fishing, but also for commercial fisheries. There is evidence of some natural spawning with low survival sustaining a small sports-fishery in some parts of the region (Solomon 1980).

BIOLOGY OF COHO AND ATLANTIC SALMON

As the interest of Norwegian fish farmers now is focused on the potential of coho, we have to compare its biology to that of the Atlantic salmon and sea trout

Such a comparison of the biology, environmental requirements, food and feeding, stream behaviour etc. of the two species has been complied by Solomon (1979) in connection to introduction plans to the U.K. From his work the following can be summarized:

> The coho salmon has a rather similar biology to Atlantic salmon and sea trout. The young coho spend a year or two in fresh water before migrating to sea as smolts. They are aggressive and territorial, but the species differ somewhat in their microhabitat pattern, where Atlantic salmon keep to the streams, coho feed in pools and margin situations. In fast running water and during school-forming at higher densities the pattern of aggression is similar in coho and Atlantic salmon. The three species in fresh water feed on

available invertebrate drift. The sea trout returns from the sea to fresh water after a few months, the Atlantic salmon after one to several years and coho mostly returns after two years at sea. All coho die after spawning.

Also from Solomon the following can be summarized about inter-specific interactions:

Stream tank interaction studies on Atlantic salmon, coho and brook trout (Salvelinus fontinalis) showed that Atlantic salmon and brook trout were both more aggressive than coho, and brook trout more often displaced coho than did Atlantic salmon. The distribution and behaviour of coho was modified by the presence of the other species, where as the presence of coho had little effect on the distribution of Atlantic salmon and brook trout. The coho in this experiment however, came from hatcheries while the two other species originated from wild populations.

The interactions between coho and rainbow trout have been studied in the wild and interactive segregation between a 1 000 speciemens was noted in summer, the time of greatest potential competition. The survival of each species was found to be largely independent of the other species with the exception that high densities of rainbow may slightly depress the coho. Among the Pacific salmonides, the rainbow is suggested to have most ecological similarities to the Atlantic salmon.

Again from Solomons conclusions we can summarize:

It appears that all salmonid species considered have rather similar natural histories. Where two species occur together, the slight interspecific differences in behaviour become exaggerated and the two species occupy different, narrower niches. It is in the aspects of most similar habitat re-requirements that this interactive segregation takes place most markedly. A dynamic equilibrium is set up, with one species in one series of microhabitates and the second in another.

Although the productivity of each species is probably reduced by interactive segregation, it is likely that overall stream productivity will be increased as two or more species, with slightly different ranges of microhabitates that they can occupy will be more efficient at exploiding the whole stream habitat than one species alone.

In the case of Coho and Atlantic salmon where observations on interactions have indicated that they segregate spatically into different microhabitat types, it is unlikely that one species would exclude the other.

Taking the precaution that the evidence leading to the conclusions is sparse, fragmented and in some cases weak, circumstantial and even anecdotal, Solomon concludes that the accidental or intentional introduction of a spawning Stock of Coho salmon is unlikely to have a dramatic effect on native salmonids.

CONCLUSION

One can always argue that there is not sufficient knowledge about the biological interactions between the salmonid species. However, the rather extensive amount of reports on implantations of foreign species throughout the world, all point out the lack of success in creating natural sea-going runs. There is one exception: the Chinook implantation in New Zealand.

The intended introduction of Coho salmon to Norway is for farming purpose only, and not for release. Until more knowledge is gathered about this species under our conditions, special efforts will be made to avoid its escape. The risk of introducing a free-living coho population in competition with the native Atlantic salmon and sea trout seems negligible.

Pink salmon has been introduced to the rivers in Northern Norway without our cooperation, and also this species may be revived for fishfarming purposes.

The risk on introducing disease agents together with transfers of

new species are not taken into consideration in this study, as this point has been treated previously for the Working Group (Munro 1979, Munro et al. 1980). Eventual Norwegian imports will include certified diseasefree populations or will be kept under quaratine conditions for at least one generation.

We bring this case to the ICES for giving the organisation an opportunity to test the workability of the Code of practise to reduce adverse effects arising from introduction and transfer of marine species. However, we feel it necessary to emphasize that, from our point of view, this seems far to late. We have to accept that several of the Pacific salmon species, including Coho has already been introduced to European waters.

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