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**INTERNATIONAL COUNCIL FOR
THE EXPLORATION OF THE SEA**

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Mariculture Committee



**PRELIMINARY REVIEW OF INTRODUCTIONS OF NON-INDIGENOUS FISH SPECIES
IN THE NETHERLANDS.**

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S.J. de Groot
Netherlands Institute for Fishery Investigations
P.O. Box 68, 1970 AB IJmuiden
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Abstract

A total of 27 non-indigenous fish species has been introduced into the waters of The Netherlands, mainly during the 19th and 20th centuries. These were 12 European-, 11 North American-, 3 Asian- and 1 South American species. Also 5 North American species were considered. Most of the introductions were deliberately, some accidentally. Nearly all of the introduced fish were true fresh water species (23), the others anadromous (4). All attempts to restock our waters with indigenous salmonids as well as non-indigenous species has never met with success. The release of rainbow trout, a non maintaining species in our waters is a poor substitute. The most successful introduction, besides the carp since mediaeval times, is the pikeperch. Four North American non-commercial species, likely accidentally released are at present fully acclimatized.

Introduction

The problems associated with introductions and transfers of non-indigenous marine organisms has been studied since 1969 by ICES. At first via its Fisheries Improvement Committee, at present via the Mariculture Committee. The Working Group on Introductions and Transfers of Marine Organisms, coming under the head of the Mariculture Committee is dealing with the various consequences of introducing and transferring marine organisms. Recently to reduce the risks for adverse effects arising from the introduction of species, the "Guidelines for implementing the ICES-code of practice concerning introductions and transfers of marine species" was published by ICES in her Cooperative Research Report-series (130, 1984).

The present review provides an overview of data which were retrieved after an extensive search in the literature of the late 19th century and early 20th century, supplemented with recent information. The full study, with the references will be reported elsewhere (DE GROOT, 1985).

Results

An overview of the results is given in tabular form (Table I). Of each of the 27 introduced species, the year of introduction, country of origin, unsuccessful, moderate successful, very successful, no self maintaining population and stray species is given.

Discussion

Most of the 27 species which could be traced were released, deliberately or accidentally around the turn of the last century. Nearly all introduced species were freshwater species (23), the others anadromous (4). The continents of origin were Europe (12), North America (11), Asia (3) and South America (1). Considered for introduction were 5 North American species. The aim of all these activities was either to restock declining populations of commercial important species, to introduce new species as substitutes for the former category, to base a new fishery upon or for culture. The culture served the production of consumption-, ornamental- and game fish. A few species just entered as individual specimens our waters and play no important role.

Summarizing the results, it can be concluded that the large and prolonged attempts over many years, with various salmonids to restock the inland waters of The Netherlands with for the fisheries commercial attractive species, of which the natural stocks were at that time on the decline was never met with any success or even observable impact. The changing environmental conditions by various pollution factors were not recognized at that time. For the same reason the attempts to replace the vanishing salmonids with non-indigenous species with similar characteristics (e.g. chinook, lakewhitefish) was a failure. As a poor substitute, inland waters are today stocked with rainbowtrout on a regular basis. The species is not self-maintaining. They only serve recreational fishing. It might be a profitable enterprise to supply the fish. The most successful introduction was that of the pikeperch. It became a valuable species for the inland fisheries and ranking as 2nd, following only the eel in importance. The result laid in the fact that geographical distribution factors put a limit to its spread over Europe. The release of the species west of the Elbe river (Germany) - the water shed - into rivers flowing to the North Sea (e.g. the river Rhine) opened up a vast area for the species.

It is curious to note that no studies were undertaken to evaluate the impact of the release of this non-indigenous species in the environment. The concept "ecosystem" had still to be discussed when the introductions took place, and nobody ever expressed an objection against the release. The new habitat of the pikeperch with all the characteristics of its native habitat was the basis of its success. In 1980 e.g. the fisheries on pikeperch in Lake IJssel produced 133 ton with a value of Dfl. 1.125.000,-.

It is notable that the other non-indigenous species, all from North America, fully acclimatized in our waters are species without any value or use (perhaps as ornamental fish). These species are the eastern-mudminnow, black bullhead, brown bullhead and pumpkinseed. It is likely that their native habitat hardly differs from the present one.

Reference

Groot, S.J. de, 1985 - A review of introductions of non-indigenous fish species for release and culture in The Netherlands. Aquaculture, (in press).

TABLE I - Introduced, released or considered for introduction fish species in The Netherlands.

<u>INTRODUCED</u>		Year of introduction	Country of origin	Unsuccessful	Moderate successful	Very successful	No self maintaining pop	Stray species	
1	Allis shad	Alosa alosa	1923	France	+	-	-	-	
2	Sea trout	Salmo trutta trutta	ca 1920	Denmark	-	+	-	-	
3	Rainbow trout	Salmo gairdneri	1897	Germany	-	-	-	-	
4	Arctic charr	Salvelinus alpinus 1)	1900	France ?	+	-	-	-	1) doubtful record
5	Brook charr	Salvelinus fontinalis	ca 1900,1980	Belgium	+	-	-	-	
6	Grayling	Thymallus thymallus	1980	Germany	-	-	-	+	
7	Salmon	Salmo salar (Sebago) 2)	1887 ?	Belgium	+	-	-	-	2) doubtful record
8	Chinook salmon	Onorhynchus tshawytscha	1877	USA	+	-	-	-	
9	Coho salmon	Onorhynchus kisutch	1982	France ?	-	-	-	-	
10	Lakewhitefish	Coregonus clupeaformis	1907	USA	+	-	-	-	
11	Povan	Coregonus lavaretus	1927, 1937	USSR/Poland	+	-	-	-	
12	Eastern-mudminnow	Umbra pygmaea	1920 ?	USA	-	-	+	-	
13	Carp	Cyprinus carpio 3)	1899	Germany, Austria	-	-	+	-	3) Culture varieties, indigenous since medieaval times
14	Grass carp	Ctenodaryngodan idella	1966	East Germany	-	-	+	+	
15	Silver carp	Hypophthalmichthys molitrix4)	1983	East Germany	-	-	-	+	4) stock destroyed, no further experiments
16	Bighead carp	Aristichthys nobilis	1983	West Germany	-	-	-	-	
17	Golden ide	Leuciscus idus	ca 1900	France, Germany	-	-	+	-	
18	Asp	Aspius aspius	1984	Germany	-	-	-	-	
19	Tench	Tinca tinca 5)	1905	Poland	-	+	-	-	5) Culture variety - Masurian-tench
20	Wels	Siluris glanis 6)	1970	Hungary	-	+	-	-	6) Hungarian subspecies, no further experiments since 1980.
21	Black bullhead	Ictalurus melas	ca 1900	USA, France, Germany	-	-	+	-	
22	Brown bullhead	Ictalurus nebulosus	ca 1900	USA, France, Germany	-	-	+	-	
23	Guppy	Lebistes reticulatus 7)	ca 1950	Unknown	-	+	-	-	7) In heated effluents
24	Pumpkinseed	Lepomis gibbosus	ca 1903	Unknown, Belgium	-	+	-	-	
25	Large mouth bass	Micropterus salmoides	1884	USA	+	-	-	-	
26	Small mouth bass	Micropterus dolomieu	1884	USA	+	-	-	-	
27	Pikeperch	Stizostedion lucioperca	1901	Germany	-	-	+	-	
<u>CONSIDERED FOR INTRODUCTION</u>									
28	Redbreast sunfish	Lepomis auritus	----	USA					
29	Rock bass	Ambloplites rupestris	----	USA					
30	Lake trout	Salvelinus namaycush	----	USA					
31	Black crappie	Pomoxis nigromaculatus	----	USA					
32	Bowfin	Amia calva	----	USA					