

## Fisheries research in the former Zuiderzee: the report of 1907

*Martien Baars\**

Hundred years ago an extensive study on the fisheries in the brackish Zuiderzee appeared. It was compiled by Dr. H.C. Redeke, director of the Zoological Station in Den Helder, and his report can be regarded as an important precursor of modern fisheries research studies. The description of the Zuiderzee fisheries also became historical: many fishermen lost their job when 75 years ago the 'Afsluitdijk' closed the Zuiderzee.



Ships from Volendam fishing with the 'wonderkuil'

When Dr. P.P.C. Hoek was appointed as Scientific Advisor for Fisheries (and director of the Zoological Station) in Den Helder in 1888, his first task was to report on the Zuiderzee fisheries. Since ages, the fisheries with the 'wonderkuil' had been controversial. This type of trawl net, towed by two ships, not only caught commercial fish but also large quantities of juvenile fish that were discarded. Hoek was unable to make strong recommendations in his report of 1889. Statistical flaws in the landing records, in combination with changes in the fishing effort by an increasing number of fishing ships and gear types, hampered the analysis of the fisheries of the Zuiderzee. Due to Hoek's report, more systematic catch records were started in 1892. After the bad fishing seasons of the years 1903 and 1904, many fishermen messaged the authorities the complaint that the fisheries by the 'wonderkuil' caused severe depletion of fish stocks. The Council for Fisheries charged Dr. H.C. Redeke with a new study on the Zuiderzee fisheries. Redeke was the successor of Hoek as director of the institute in Den Helder. The building hosted both the Zoological Station (owned by the Netherlands Zoological Society) and the new State Institute for Sea Research, dedicated to fisheries.



The 'wonderkuil' on display behind the Zoological Station, Den Helder



Fishing ships (with 'wonderkuil') in the harbour of Volendam



Drift nets for anchovy fisheries, Enkhuizen

During the preparation of the report of 1907, Redeke could analyse the catch registrations in 15 fishing harbours over a period of 15 years, 1882-1906. These harbours were (in alphabetical order) Bunschoten, Durgerdam, Elburg, Enkhuizen, Harderwijk, Hoorn, Huizen, Kampen, Lemmer, Marken, Medemblik, Monnikendam, Urk, Volendam and Vollenhove. Prices per kilogram were lowest for shrimp (2.5 – 4.5 cents per kg) and herring (3 – 10 cents), and highest for eel (12 – 38 cents) and anchovy (14 – 61 cents), respectively. Flounder and sandeel, with intermediate prices, were other important species. Prices varied largely from year to year but also depended on the way of fishing. Fish caught by the 'wonderkuil' was of lower quality and sold for much lower prices than when caught with other gear. In his analysis, Redeke could not confirm the decline for the fisheries as a whole. The complaints after 1903 and 1904 seemed to be due to the low catches of anchovy - the fish with the highest price but also with the most irregular abundance in the Zuiderzee. The total catch of commercial fish species was not particularly low in these years. The statistics presented showed a variation by a factor of 2 in the total amount of fish. Records were lowest in 1895 and 1896 with total amounts of 8.3 and 8.4 million kilograms, and highest in 1901 and 1902, with 16.8 and 16.5 million kilograms, respectively. The fluctuations in the catches were irregular and did not indicate a persistent decreasing trend. However, the high densities of fishing ships and the conflicts between fishing with towed gear versus fishing with static gear, urged Redeke to recommend the building of organisational structures. Until then, the fisheries had no structure whatsoever, and everybody was free in his way where and when what fish to catch. Redeke proposed, among others, to license the fisheries and to form a representative body of fishermen. This would be the official body towards the government but should organize and supervise the fisheries themselves. Redeke suggested an 'extinction strategy' for the 'wonderkuil': permits should be given to the current users but should be withdrawn once the permit-holders stopped fishing.



Ship from Enkhuizen for anchovy fishing

The report by Redeke in 1907 also documented the Zuiderzee fisheries visually. Photographs were taken of various types of fishing ships and fishing techniques. The collection of pictures in the report became well-known and several examples are depicted here. Besides the description of the fishery data and methods, also a series of research cruises was executed in the Zuiderzee. Main ships were subsequently the 'Zeemeeuw', the 'Amsterdam' and the 'Kampen', but small fishing ships were also used. The research group under the leadership of Redeke comprised Dr. P.J. van Breemen (fish and plankton studies), Dr. W.E. Ringer (hydrographic observations and the photographer), Dr. G.J. de Groot, Dr. J.J. Tesch and several other people from universities and the navy. The catches and measurements during these cruises contributed

to the knowledge of the biology of the six commercial species. There was an innovative research experiment with marked flounders. The fish were marked with numbered copper plates. These were attached with a silver thread to the dorsal side of the fish. A total of 514 flounders were marked and released at several sites between September 1905 and April 1906. No less than 284 (55%) were recaptured by fishermen by the end of December 1906. Most recaptures occurred in the Zuiderzee itself but 17 marked specimens were caught along the North Sea coast. Nine of these fishes were reported as far as the French Channel coast, including 2 fishes in the Seine estuary near Le Havre. The hydrographical studies during the cruises involved temperature and salinity, oxygen concentrations, nutrients (nitrogen compounds and silicate). Van

Breemen found very high densities of diatoms and copepods compared to the North Sea. The diatom abundance was regarded responsible for the large numbers of bivalves in the sediment (preyed upon by the flounder). These first observations of the short food chain in the Zuiderzee, suggested a very high productivity of this shallow sea. However, it soon became clear that the productive Zuiderzee and its fisheries would persist only for another twenty five years after the appearance of the report by Redeke's report in 1907.

### The closure of the Zuiderzee

The first idea to close the Zuiderzee dates back to Hendric Stevin (son of the famous engineer and mathematician Simon Stevin) in 1667 during the Golden Age. A realistic design for a closure dike was made by Cornelis Lely in 1891 as the first step for the subsequent reclamation of new agricultural land in the Zuiderzee. However, there was no governmental budget for the construction of the ambitious 'Afsluitdijk' ('Enclosure dike'). The plans revived when some real disasters had occurred. A storm flood during 13 and 14 January 1916 caused casualties and a lot of damage around the Zuiderzee. At several sites the dikes broke and a number of polders flooded. A subsequent storm flood in the night of 22 to 23 February that same winter caused another 16 casualties at the Island of Marken. Besides these disasters, the famine in The Netherlands in 1918 at the end of the Great War urged the government to look for new reclamation areas for agriculture. The bill on the Zuiderzee Works passed the Dutch parliament in 1918. A first dike from the mainland of North-Holland to the island of Wieringen was built during 1920-1924 and thereafter the building of the 30 km long 'Afsluitdijk' started. The work was accomplished on 28 May 1932. The bill on the Zuiderzee Works intensified the hydrobiological research in the area. The Netherlands Zoological Society (NDV) made a plan to describe the present state in a series of monographs on the Zuiderzee. Redeke again played

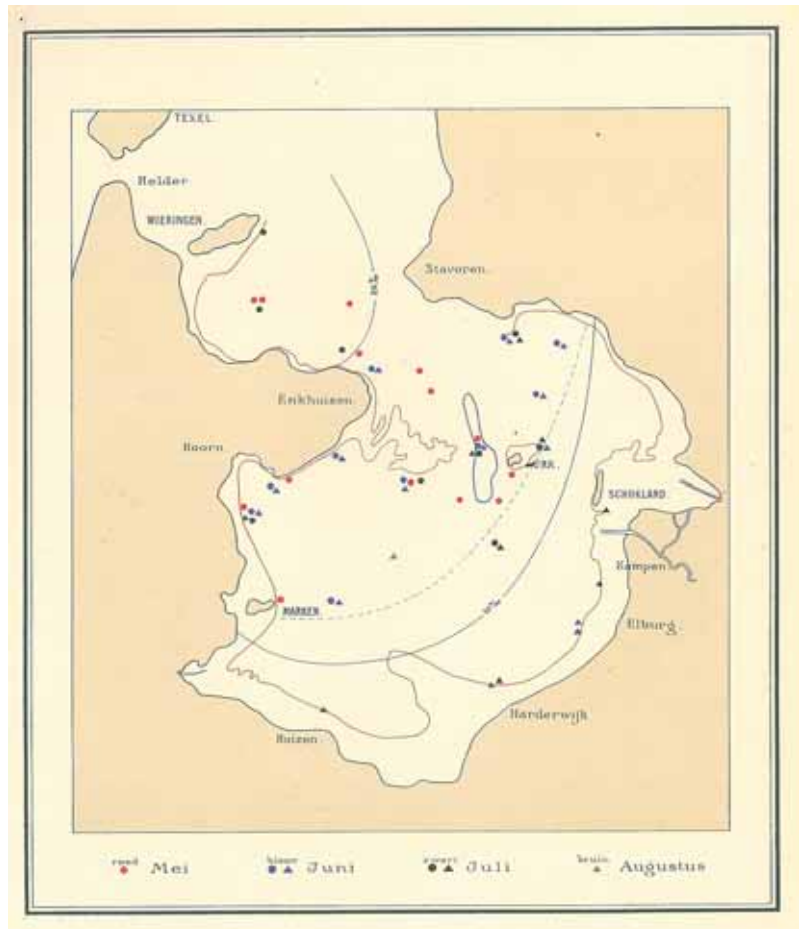


Men from Lemmer preparing bait for fisheries on flounder

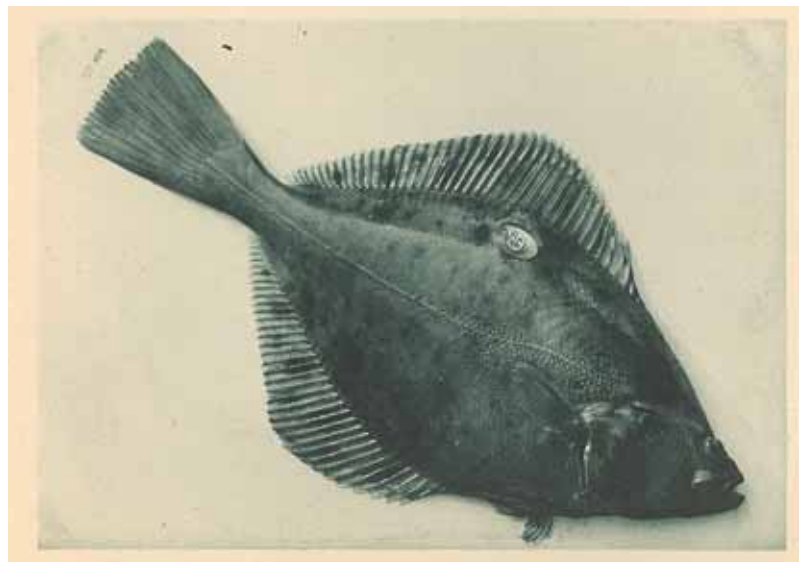
an important role in the research and the processing of the data. A first report was already published in 1922, followed by other reports in 1929 and 1936. A final report in 1954 described the whole transformation of Zuiderzee into IJsselmeer. After the closure, the new IJsselmeer turned from brackish into a completely freshwater body in a number of years. The marine species herring, anchovy, sandeel and shrimp, all disappeared. During the many years of planning and construction of the 'Afsluitdijk', the fishermen of the Zuider Zee had often protested against the closure since most of them would have to look for another job. Eibert den Herder in Harderwijk was their most active leader and he used film, photography and paintings to illustrate the uniqueness of the Zuiderzee fisheries. Once the battle for the Zuiderzee was lost, the fisheries on eel was the only branch that remained and this fishery grew to about ten-fold the former size. New fisheries on the freshwater species pike-perch and perch could not replace the other important old fisheries and only part of the fishermen kept their profession. Den Herder and his sons went into the tourist business and founded the Dolfinarium in Harderwijk. In the current plans for renovation of the 'Afsluitdijk', also ideas are discussed to create large openings, which would result in a more regular change from fresh- to seawater than the abrupt changes at the two sluices now present. In this way part of the former brackish character of the Zuiderzee area could be restored.

**Acknowledgements**

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Map with the distribution of anchovy eggs and larvae in 1905



Marked flounder