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Records of Harbour Porpoises (*Phocoena phocoena*) in Fishing Nets During the Interwar Period in Poland: Verification of Archival Materials

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Abstract

The Polish fisheries administration registered incidents of harbour porpoises caught by fishermen from fishing bases within the country's borders between 1922 and 1938. These data are unique in the Baltic Sea region. To date, they only have been known from summary reports that have been cited repeatedly in papers regarding the habitat preference and sizes of historical populations of harbour porpoises in the Baltic Sea. Lacking other sources of information, archival data had a great importance in the delimitation of Special Areas of Conservation (NATURA 2000) designated for harbour porpoise in Poland. Analysis of archival source materials suggested discrepancies between fisheries inspectors' reports and the published data. These new data provided detailed information on harbour porpoise bycatch, including the time of capture, gear type utilized, and the location of fishing grounds where harbour porpoises were most frequently caught. In summation, fisheries inspectors registered 691 individual harbour porpoises. The animals were registered primarily in the spring, from March to April, during targeted salmonid catches throughout the Gdańsk Bay region and the open sea off the Hel Peninsula coast. The majority of caught animals were recorded from the Hel fishing district. Contrary to conclusions to date, these instances cannot be attributed to the bounties offered for the "elimination of pests." This paper also addresses and discusses the dependence on the number of registered harbour porpoise catches over a series of years and the maximum ice cover on the Baltic Sea as the factors influencing harbour porpoises' periodic declines (Teilmann & Lowry, 1996).

Key Words: bycatch, harbour porpoise, *Phocoena phocoena*, Puck Bay, southern Baltic, gillnets, fishery reports

Introduction

On 28 June 1919, Poland became independent after signing the Treaty of Versailles and gained access to 144 km of the Baltic Sea coast that had previously been in West Prussia. The transfer of this area did not begin until February 1920, following the ratification of the treaty by Germany. After the departure of the German authorities, Polish officials faced the new challenge of organizing the supervision of fisheries. Issues pertaining to marine fisheries were initially overseen by the Ministry of Military Affairs, followed by the Ministry of Former Prussian Districts, which was liquidated in 1922 and was succeeded by the Ministry of Agriculture and National Patrimony. Continuous change rendered it difficult to design an overall concept for the development of Polish fishery management. In 1927, marine fisheries were placed permanently under the supervision of the Ministry of Industry and Trade. In 1921, the Minister of Former Prussian Districts issued a regulation to create the Marine Fisheries Office (MFO), which was responsible for ensuring that regulations pertaining to both coastal and open-sea fisheries were being followed, fisheries data were recorded, fishermen were assisted with resettlement, and vessels and fishing gear were organized and financed. World War II led to the destruction of many Polish archives. MFO documents were archived thanks to dedicated employees and, in part, to the small-scale destruction Gdynia suffered from the war in comparison to Gdańsk and Warsaw. Because of the long-term process of organizing and cataloguing these archives, they were probably not available to Ropelewski (1957). Currently, these archives are available to interested parties at the Gdynia Branch of the National Archives in Gdańsk.

The harbour porpoise (*Phocoena phocoena*) is the only species of Cetacea that has been recorded as a resident in the waters of the Baltic Sea proper

(Japha, 1908). It is currently protected by stringent international treaties, including the Agreement on the Conservation of Small Cetaceans on the Baltic and North Seas (ASCOBANS), the Helsinki Commission (HELCOM), and national regulations; and it is listed in the *Polish Red Data Book of Animals*. ASCOBANS experts acknowledge that the number of harbour porpoises sighted in Baltic waters has decreased significantly from historic levels, which are presumed to have numbered at least several thousand individuals. The real size of population is not known but is estimated to be low (599 individuals CV 200 to 3,300 as estimated by Berggren et al., 2002; 93 observations CV 10 to 460 as estimated by Berggren et al., 2004). Whatever other factors (e.g., pollution, noise, habitat degradation, severe winter ice conditions, and decrease in prey abundance and quality) may be involved, ASCOBANS experts (2009) have considered that incidental mortality in fishing gear has played a major role in reducing the abundance of harbour porpoise and is now contributing to preventing their recovery. Until the SAMBAH (Static Acoustic Monitoring of the Baltic Sea Harbour) project results are published, the information on harbour porpoises in Poland comes from incidental bycatch and dead animals found onshore (Anonymous, 2012).

One of the only sources of information on historical populations of harbour porpoises off the Baltic coast of Poland is the publication by Ropelewski (1957). These data span the years 1922 to 1935 and refer to harbour porpoise bycatch in fishing gear in the region that overlaps with current fisheries. Authors who cited this publication (e.g., Skóra et al., 1988; Koschinsky, 2002) have accepted its data without verification and equate bycatch statistics with bounties paid to fishermen for the "extermination of pests," which caused damage to fishing nets and reduced the fish stocks available to the fishery. These historical data are significant since these data, along with 25 of the 67 cases recorded between 1990 and 2011 catches today by the Marine Station, Institute of Oceanography, University of Gdańsk (Skóra & Kuklik, 2001; HELCOM Map and Data Service; Poland national reports to ASCOBANS), are the rationale for establishing the Natura 2000 area dedicated for harbour porpoises in Puck Bay (PLH 220032), a part of Gdańsk Bay. The area has been rated as the most important harbour porpoise habitat in Poland, despite the fact the data came exclusively from bycatch. At the same time, there was no mapping of gillnet fishery efforts along the southern Baltic, the primary source of harbour porpoise mortality. Small-scale fisheries in Puck Bay in the period 2005 to 2010 used some 40% of the whole gillnet (GNS) effort in the Polish Maritime Area (data from Polish Fisheries Monitoring Centre). It should be a carefully considered decision as to whether to establish a refuge at that place, taking into account the uncertainty of fisheries-dependent data, published information on harbour porpoise occurrence in the closest areas, and the conservation of the species.

The aim of the present paper is to review the statistical data on the number of harbour porpoises bycaught along the Polish coast between 1922 and 1938 which were reported in the official MFO documents and to compare them with the data used by several authors in relevant publications. Corrected data is being used in this current study concerning the harbour porpoise population and conservation in the southern Baltic.

Methods

The archives of the MFO are catalogued as archival set 98/217. The identification codes of the archived units included in the analysis are presented in Table 1. Monthly reports filed by fisheries inspectors consist of completed forms and tables, which are the basic source of information on harbour porpoises caught in fishing nets. The monthly reports archived include 1922 to July 1939, with the exception of 1930, 1934, and 1935. Secondary source materials included the following: (1) monthly reports (and from January 1933, weekly reports) compiled by the MFO that were submitted to the corresponding ministry as typescripts relatively quickly following the reporting period; (2) annual reports detailing the activities of the MFO, which were submitted to the ministry 2 to 3 mo following the end of the reporting year; and (3) reports covering longer periods of several years which were published as typescripts in the "Fisheries Library" (Hryniewicki, 1925; Anonymous, 1928, 1931, 1933, 1936).

Information on harbour porpoise bycatch from all sources was compared for consistency and coherence. If inspector reports (the primary source materials) were unavailable, then data were obtained from the MFO periodic reports.

Results

The format of the fisheries inspectors' monthly reports during the analysed period was fairly uniform. The first page included information on fishing conditions (i.e., number of storm days, ice cover, etc.) and data on the occurrences of seals and harbour porpoises, with the exception of 1922, when this information was included in tables about catches. Inspectors received detailed guidelines from the MFO for how the reports were to be written, and the information to be contained

Table 1. Numbers and descriptions of archival materials analysed

Identification number	Description of materials (title and period of time)
93/217/0/68	MFO Report (descriptive and numerical monthly report on catches) 1921-1931
93/217/0/69	Periodic MFO Report (weekly) 1933-1936
93/217/0/70	MFO Report (fisher statistics and annual report) 1933-1936
93/217/0/71	MFO Gdynia Report (weekly) 1936
93/217/0/72	MFO Report (weekly) 1937
93/217/0/73	MFO Report (weekly) 1938
93/217/0/74	MFO Report (periodic) 1939
93/217/0/75	Incomplete material for writing the VII MFO Report for the 1936-1938 and 1939 periods
93/217/0/204	Monthly Reports from Fisheries District Supervisors1922-1925
93/217/0/205	Monthly Reports from Fisheries District Supervisors 1926-1927
93/217/0/206	Monthly Reports from Fisheries District Supervisors (01.02.1930) 1928-1929
93/217/0/207	Monthly Reports from Fisheries District Supervisors 1931-1932
93/217/0/208	Materials for fisheries statistics 1933-1934
93/217/0/209	Materials for fisheries statistics 1935
93/217/0/210	Materials for fisheries statistics 1936
93/217/0/211	Materials for fisheries statistics – Monthly Reports of Fisheries Inspectors
93/217/0/212	Materials for fisheries statistics – Monthly Reports of Fisheries Inspectors 1938
93/217/0/213	Materials for fisheries statistics – daily, weekly, monthly 1939
93/217/0/214	Statistics and Annual Report (and relevant correspondence, including published fisheries statistics) 1936-1938

included the dates on mammals by species when they occurred in "large numbers" and the number of animals killed, location, and type of fishing gear. In practice, this information was not always recorded in full; and during the analysis, it was sometimes unclear whether the handwritten numbers referred to dates or the numbers of individual mammals. All these records were analysed and included. Additional data recorded by the inspectors included fishing base names and even sometimes the names of the fishermen reporting harbour porpoise bycatch and quantities. Sometimes the reports included additional information on the numbers of harbour porpoises that were "presented for bounty payments"—that is, those for which individual reports were submitted and thus entitled the fisherman to payment of bounties. The reports typically lack information, however, on the payments that were actually made. In March 1923, the MFO transferred funds for eliminating pests to the Ministry of the Treasury, so one may assume that from this time on the bounties were to have been recorded at the MFO. The monthly financial reports for the 1922-1923 period indicate, however, that this mechanism was not implemented as the funds remained untouched. None of the analysed documents includes descriptions of these bounties after 1923.

All of the information relayed by the inspectors to the MFO was obtained directly from the leaders of fisheries associations or from individual fishers. These data, especially those referring to catch statistics and fishing losses, such as damaged vessels and gears, were subsequently verified at the MFO as is evidenced in archived correspondence to the inspectors.

There were three fishing districts in the 1922-1937 period: (1) Hel, (2) Puck, and (3) Gdynia. The fishing bases under the jurisdiction of the districts during this period are presented in Table 2, while the location of the fishing bases is presented in Figure 1. In 1938, another district was established: Władysławowo, or Wielka Wieś, that encompassed all of the fishing bases located on the open sea within the Puck district. The fishing bases varied in the numbers of fishers, boats (Table 2), and fishing gear. The largest fishing base was in the Hel fishing district.

The report detail from the period analysed was not uniform. For some fisheries districts and the reporting years, the data traced the precise time and location of bycatch, including the type and amount of fishing effort (especially in 1922-1923); while in other periods, only general information on the dates or numbers of animals recorded could be found. Bycatch of harbour porpoises was not recorded in Puck fishing district reports, even though its jurisdiction included fishing bases in the open sea until 1938. The lack of information on harbour porpoises in this area might have resulted from this inspector having too many responsibilities. In response to a charge of unreported information regarding fishing gear losses at the Dębki fishing base, the inspector replied in a letter dated 10 December 1926, among others, that problems at the hatchery in Puck prevented

Table 2. Areas monitored within the fishing districts, fishing bases, and effort measured in numbers of vessels according to data from 1921 and 1935

		1921 (Anonymous, 1922)			1935 (Anonymous, 1936)		
Fishing district	Fishing base	Number of full-time fishers	Motorized cutters	Other boats	Number of full-time fishers	Motorized cutters	Other boats
Hel	Hel	180	42	176	224	56	127
	Bór	140	1	108	155	11	47
	Jastarnia	180	6	126	202	14	21
	Total	500	49	410	581	81	195
Puck	Kuźnica	110	5	78	150	24	84
	Chałupy	55	--	45	91	--	60
	Wielka Wieś	71	--	30	48	2	28
	Chłapowo	55	--	21	56	2	25
	Tupadła*	8	--	7	7	--	4
	Ostrowo*	8	--	4	6	--	4
	Karwia	41	--	15	58	1	14
	Dębki	8	--	4	6	--	6
	Swarzewo	27	--	15	16	--	20
	Puck	20	--	25	20	2	19
	Osłonino	10	--	8	12	1	11
	Mrzezino*	8	--	2	3	--	1
	Beka	2	--	2	2	1	2
	Rewa	66	1	40	73	2	53
	Mechelinki	23	--	24	45	2	32
	Obłuże*	5	--	3	8	--	17
	Gnieżdżewo*	2	--	1	4	--	1
	Total	519	6	324	605	37	381
Gdynia	Oksywie	4	--	7	--	--	--
	Oksywskie Piaski*	22	4	48	--	--	--
	Gdynia	41	2	26	110	45	25
	Orłowo	7	--	14	12	1	27
	Kolibki	14	--	25	--	--	--
	Total	88	6	120	122	46	52

* Fishing bases not denoted in Figure 1

him from personally collecting information from fishermen other than those working out of Puck Bay. Since fishermen from locations farther afield, such as those on the open sea, came to Puck relatively infrequently, his information was limited to that in reports on catches and fishing gear that were delivered to him. No other archived documents suggest there were similar problems in other districts.

Inspector reports were not found in the archive between 1930 and 1934. Reports from 1935 lack any data on harbour porpoises, and there are no records at all of marine mammals in the monthly reports from 1938 and 1939, even though the same reporting protocol was still being used at the time.

The fisheries inspectors' monthly reports provided the basis for compiling the monthly MFO reports that were forwarded to the appropriate ministry in Warsaw. In January 1933, weekly reports were also sent. In addition to overall fishing statistics, these reports included detailed descriptions of the conditions under which the fisheries were performed, changes in fishing effort applied in a given month (e.g., number of vessels, fishing gear, and chosen fishing grounds), and insight into the effectiveness of catches and movements of fish. A separate section refers to marine mammals, the so-called pests, and included variable amounts of information recorded by inspectors in their monthly reports. Even during the early stages of analysis, discrepancies were found, especially in years in which fewer numbers of harbour porpoises were recorded. The inspectors' reports also include data on occasional sightings of harbour porpoises as well as their entanglements in fishing gear. In March 1924, a harbour porpoise was

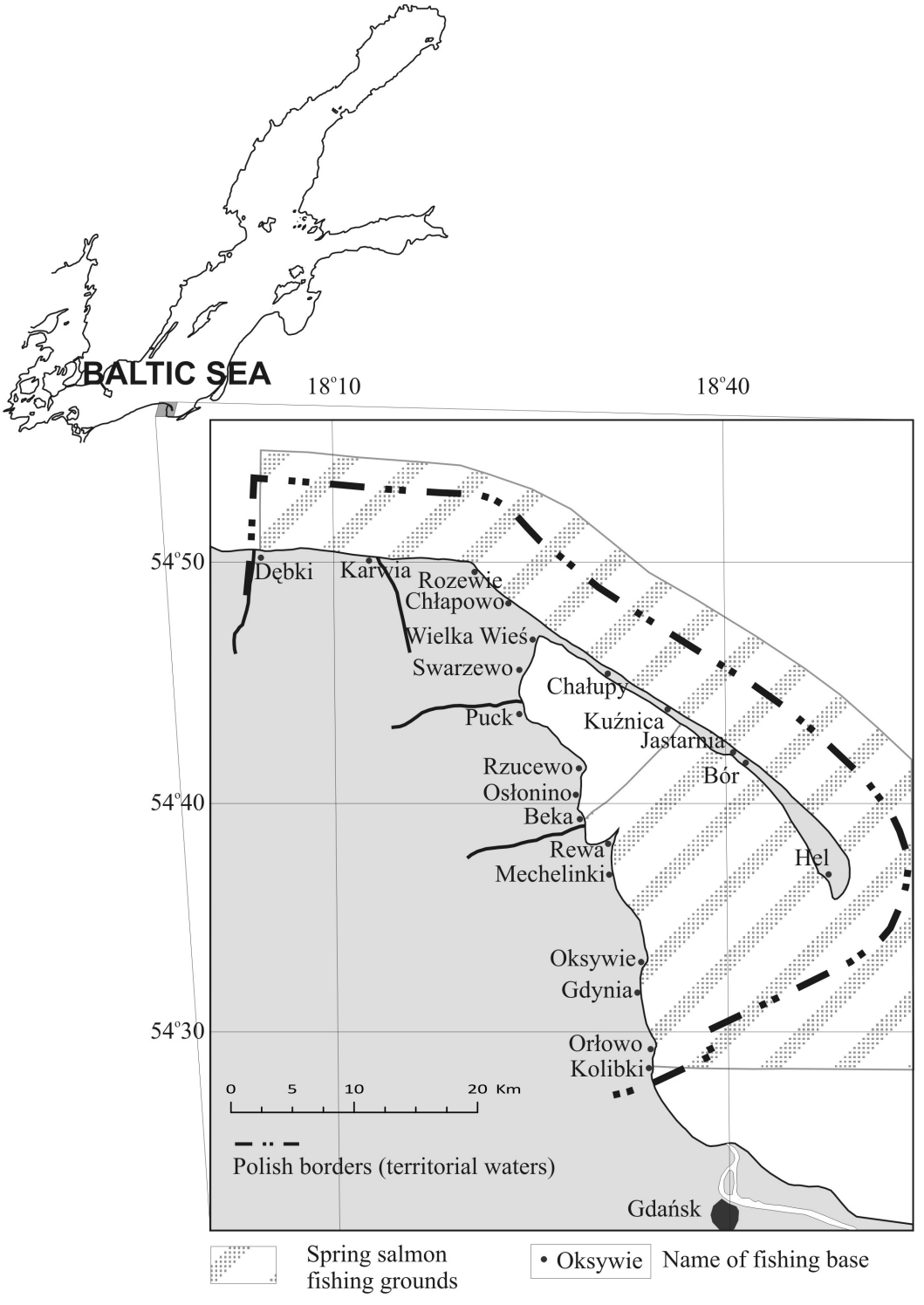

Figure 1. Approximate areas of spring salmon catches (based on MFO Annual Report Identification Number 93/217/0/68)

reported in the Gdynia district, which was not mentioned in the monthly MFO report. The opposite was noted in 1935 when the monthly MFO report for April stated that during salmon catches made with drift nets, fishermen caught a "large quantity" of harbour porpoises, which were sold in Jastarnia and Kuźnica; however, no such information is found in the inspectors' reports.

In the first quarter of the year, the MFO in Gdynia compiled annual reports based on the previous year's monthly reports. From 1922 to 1924, when the first tri-annual report was compiled, the typescripts were attached to the documents submitted in the first quarter of 1925. The number of harbour porpoises mentioned in this document is inconsistent with the information recorded by the inspectors, as well as that in the monthly MFO reports for given periods. The reports published as part of the *Bibljoteka Rybacka* (Fisheries Library in English) are copies of the typescripts the MFO submitted to the ministry.

Table 3 is a compilation of all recorded harbour porpoise catches in 1922 through 1939 based on the analysis of all the documents discussed. When the corresponding inspector reports were archived, or information on harbour porpoises was lacking, the data quoted were taken from annual MFO reports (1930, 1934, and 1935).

A total of 691 records of harbour porpoises were found in the fisheries inspector reports. Of these, 82% (573 individuals) were reported by the Hel district inspector, while the other 118 individuals were in the Gdynia district reports. In most instances, the type of fishing gear is mentioned, while the fishing grounds are included less frequently—Wielkie Morze (Great Sea in English), Gdańsk Bay, the Baltic, or, more precisely, 6.4 to 8.0 km east of Hel. In 1930, 23 harbour porpoises were documented in the annual MFO report, while no monthly fisheries inspector reports for 1930 were available. Data for 1934 and 1935 were obtained from written descriptions in weekly MFO reports. In the weekly MFO report of 9 March 1935, there is a note regarding the catch of "a few harbour porpoises," while the report of 13 April 1935 reads, "during salmon fishing with drift nets in the bay, fishermen caught large quantities of harbour porpoises, which were sold in Jastarnia and Kuźnica." These were years in which catches were especially high, which is why the figure of 400 individuals should be treated as an estimate. The least reliable data are from 1936; in the reports from the fisheries inspectors, as

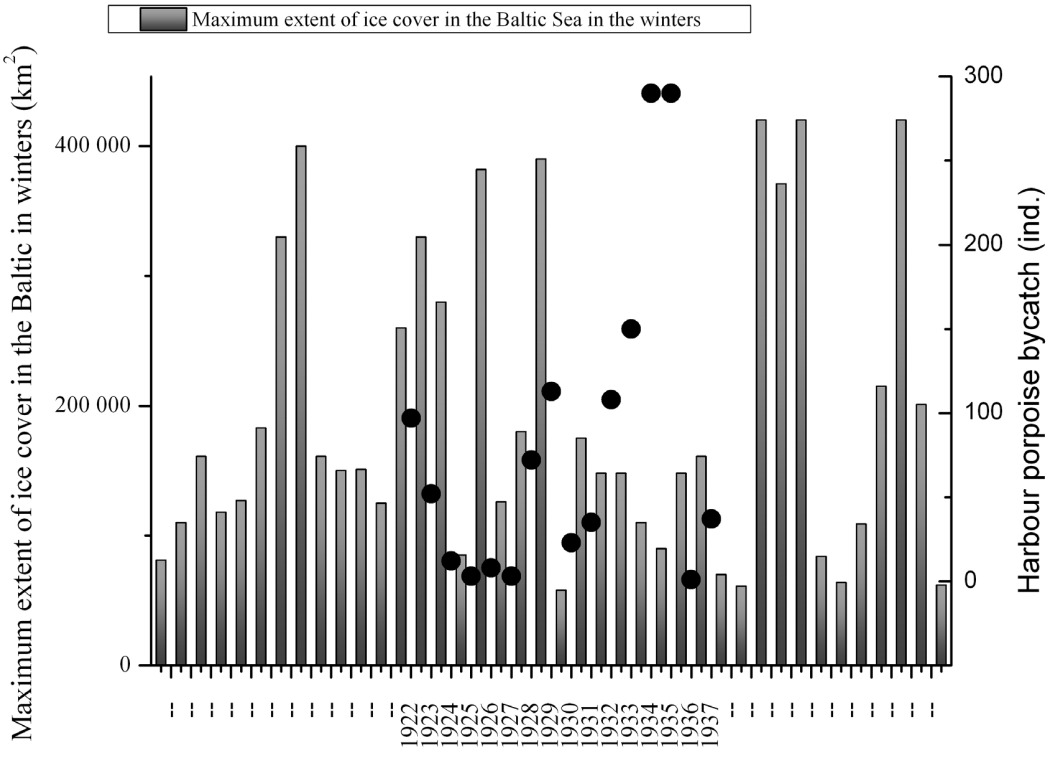

Figure 2. Maximum extent of ice cover in the Baltic Sea in winter vs harbour porpoise bycatch

Table 3. Number of harbour porpoises caught in fishing gear according to information in district fisheries inspectors' reports from 1922 through 1939 (When no data were available, data from monthly or annual MFO reports was supplemented.)

Year	Number of harbour porpoises	Additional information
1922	97	For 1922-1923, the bycatch recorded in fisheries inspector reports is highly detailed and includes the fishing base at and type of gear with which harbour porpoises were caught.
1923	52	Monthly MFO report for April 1923 reads, "from 10 April there was a great number of harbour porpoises in the Gdańsk Bay."
1924	12	Monthly MFO report for April 1924 reads, "there were few harbour porpoises in April."
1925	3	The annual MFO reports for 1925 and 1926 read, "Very few seals and harbour porpoises were recorded in the reporting years, and the slight damage done by them to fishers is not worth mentioning. Only a few of these animals were killed or caught in fishing gear."
1926	8	
1927	3	--
1928	72	--
1929	113	"The mass occurrence of harbour porpoises and seals in our waters is noteworthy. They have caused serious material damage to the fishers, but the fishers have exterminated them in large numbers. More than 100 harbour porpoises have been caught and presented for bounty payment."
1930	23	No fisheries inspector reports; data drawn from annual MFO reports.
1931	35	--
1932	108	--
1933	150	A letter from 15 April 1933 (weekly MFO report to the Head of the Fisheries Department, Ministry of Industry and Trade, Warsaw) reads, "The fisheries inspector for the Hel fishing district presented a protocol to this office confirming that in March and half of April the total catch of harbour porpoises was 104, for which the bounty paid was a sum of 342 zloties."
1934	[400]	No fisheries inspector reports found in the archive; data estimated from weekly MFO reports: "As in the previous year, harbour porpoises were caught in very large numbers. Bounties were paid for nearly 200 individuals, which is barely half of the number of harbour porpoises caught since not all fishers claimed bounties."
1935	[400]	No harbour porpoises are recorded in the monthly fisheries inspector reports in March or April, but according to the weekly MFO report of 13 April 1935, the number of harbour porpoises caught was comparable to that of the previous year.
1936	1	With the exception of December, no harbour porpoises are recorded in the monthly fisheries inspector reports, and no data were found in the MFO annual report. Note in the MFO annual report reads, "in addition, drift nets were torn by vessels and harbour porpoises."
1937	37	--
1938 - July 1939	No information on harbour porpoises was found in either fisheries inspectors' reports or in MFO monthly reports. There is no annual report.	

well as those of the MFO, there is no information regarding bycatch records. The same applies to data from 1938 and 1939.

Most of the bycatch was recorded between February and May, with the peak in March and April (Table 4). However, 13 and 1 harbour porpoises were reported in November 1933 and December 1936, respectively.

Table 4. Number of harbour porpoises recorded from 1922 through 1937 by month according to data from fisheries inspectors' reports

Month	Number of individuals	%
February	14	2.3
March	203	29.4
April	371	53.7
May	89	12.9
November	13	1.9
December	1	0.1
Total	691	

Harbour porpoises were caught most frequently in drift nets. The fisheries inspector reports indicate that of the total number of 691 harbour porpoises recorded, 638 were caught in gear targeting salmon (92.3%), while the following 13 were caught in set gear: in February 1923, five harbour porpoises were recorded in sprat gear in the Gdynia fisheries district; in March 1923, three were caught in herring gear; and in March 1936 and April 1937, one and four, respectively, were caught in herring gear. There is insufficient information for determining definitively how the other 40 harbour porpoises were caught.

According to information provided by fisheries inspectors, salmon drift-net gear was used almost exclusively for fishing in the spring period when this fish occurred closer to the coast. Depending on ice cover, the season for deploying salmon hooklines ended in February-March, and fishermen began deploying drift nets. In May, most fishermen gave up this type of fishing and began targeting flatfishes; eel fishing season began in July. In fall, fishermen targeted sprat and herring, although gear was also deployed that targeted salmonids migrating into river mouths. Hooklines were used the most frequently, however. Fishing in winter was limited by ice cover. The herring and sprat fishing season varied and depended on the migration of shoals. Catches of salmonid fish, which was divided into catches of "large" and "small" fish (the latter of which was referred to in Polish as *mielnica*), are well-described in the annual MFO report of 1923:

> [Translated from the Polish] The largest and most valuable fish caught by the fishermen working our coastal waters is undoubtedly salmon. The quantity of these catches are not large, but salmon is in demand and customers willing to pay premium prices, which encourages fishermen to practice salmonid fisheries. Not infrequently, when catches are good, a fisherman can earn more in a few months than he can in a whole year of fishing for other species. Salmon occur close to the coast in October, initially in the Baltic at a fairly significant distance from the coast. In early spring, they move closer to the coast when they are caught in the Baltic and Gdańsk Bay. Small salmon, which are known [in Polish] as *mielnica*, are usually caught only in Gdańsk Bay in spring and often occur in significant quantities. Up to 50% of all fishermen from the entire length of the coast participate in spring catches. Fishermen from Hel and Gdynia, and some from other villages, fished most frequently with drift nets. The mesh opening of drift nets for salmon catches is from 8 [to] 9 cm from knot to knot. The nets are made of hemp yarn, are 40 m in length, and [are] 8 m in width or depth. One fishing set combines from 40 to 60 drift nets. The nets for fishing small salmon, or *mielnica*, are much smaller mesh at 4 [to] 5 cm from knot to knot. These nets are often made of cotton yarn, and they are narrower, or less deep, and do not exceed 2 [to] 3 m in depth. Drift nets are often used as stationary gear, which the fishermen refer to as "roundabout nets"; then, the bottom edge of the net is weighted. Two or three of these nets are joined together, and one end is anchored or fastened to a pole near the shore. The other end is left free so the wind and water currents move the gear around the anchor or pole, which is why they are called "roundabout nets" [end of translation].

The same annual MFO report for 1923 also includes a map illustrating regions where gear was deployed that targeted salmon (Figure 1). Reports by district supervisors and MFO reports contain additional information regarding preferred locations in specific years and/or months. Depending on catch results, fishermen would choose fishing grounds either in the open sea, which they referred to as the Great Sea, or in Gdańsk Bay. These areas were largely outside of Polish territorial waters. A note from a monthly MFO report (April 1929) in which 82 harbour porpoise catches are recorded and which refers to salmon fisheries is significant, reads as follows: "[translated from the Polish] Salmon were caught exclusively with drift nets, in the first half of the month in the bay, particularly along Ryf Mew, and in the second half of it in the open sea throughout the region from the German border [in the west] all the way to Pilawa [end of translation]."

Discussion

The data series on the bycatch of harbour porpoises in Gdańsk Bay in the interwar period is unique in the Baltic region. The only other data available include fragmentary information on the number of harbour porpoises that were caught off the Danish coast (Møhl-Hansen, 1954; Andersen, 1982) and observations of the bycatch in a Prussian fishing village (Benecke, 1881). No other country during this time systematically collected information on bycatch. However, we should refrain from concluding that the "scale of the threat" to harbour porpoises in the Gdańsk Bay was exceptional in comparison to that in other Baltic Sea regions. Rather, we should consider the contemporary geopolitical situation. Poland regained access to the Baltic Sea but lacked knowledge of administrative procedures and supervisory bodies for marine fisheries. The first step undertaken by MFO staff was to collect information and generate policy for the government to manage the marine fisheries. During this time, the tables for fisheries inspector reports were devised and, since in the first reporting year a relatively high bycatch of harbour porpoises (97) was recorded, this information was moved to the first page of the report, which clearly indicated that this factor might impact the conditions of fisheries. Thanks to this decision, we have today a notable series of archival data.

Ropelewski (1957) used as his source five MFO reports that were published as part of the Fisheries Library: (1) 1922 to 1924 (Hryniewicki, 1925), (2) 1925 to 1927 (Anonymous, 1928), (3) 1928-1930 (Anonymous, 1931), (4) 1931-1932 (Anonymous, 1933), and (5) 1933-1935 (Anonymous, 1936) to summarize the bycatch of harbour porpoises. These reports were secondary to the documents analysed in the current work. Data from source material (e.g., the inspector reports) are not always fully reflected in the final publications. The first collective report prepared for the 1922-1924 period is exceptional. The typescript referring to these years was attached to the documents in the first quarter of 1925. The number of harbour porpoises reported in this document (250 in 1922) does not correspond to the information recorded in either the inspector reports or to the data in the monthly MFO reports from the period, which both reported 97 harbour porpoises. Since the monthly inspector reports are the most detailed and were created immediately after collecting data at the fishing bases, this author is of the opinion that the number of harbour porpoises indicated in them as caught is closest to the actual number. Table 5 presents the comparison of the numbers presented by Ropelewski (1957) with those from the analysis of source materials from the present study.

The conclusion that these numbers reflect the number of bounty payments made for captured harbour porpoises is cited frequently from Ropelewski

Table 5. Numbers of bycaught harbour porpoises according to Ropelewski (1957) and the current analysis of source materials

Year recorded	Number of harbour porpoises according to Ropelewski (1957) [indiv.]	Number of harbour porpoises according to source data [indiv.]
1922	250	97
1923	16	52
1924	20	12
1925		3
	"a few individuals"	
1926		8
1927		3
1928	48	72
1929	114	113
1930	23	--
1931	34	35
1932	95	108
1933-1935	"several hundred individuals"	150
1934		--
1935		--
1936	--	1
1937	--	37

(1957) (see Skóra et al., 1988; Koschinsky, 2002) and requires correction. The inspectors recorded all of the information regarding harbour porpoises that was reported to them and sometimes included additional commentary about porpoises being "presented for bounty payment," which probably required completing additional forms and procedures. Unfortunately, this documentation was not found in the archive. The fund from which the bounties were paid was initially included in financial means because the MFO was required to account for these funds in reports submitted to the ministry. However, these funds were not touched between 1922 and 1923. Simultaneously, in the report published for 1922-1924, Hryniewicki (1925) wrote that five bounties were paid for harbour porpoises during the period in question. This number of paid bounties does not correspond to the inspector records or the number of harbour porpoises reported bycaught in that publication (286 combined). Information about harbour porpoises were communicated to the inspectors in the same manner as the size of fish catches. In this context, it also remains unknown why records ceased to be kept in 1935 (and probably in 1936 since only one instance was recorded in December). The MFO report indicates that between 1934 and 1935, many more harbour porpoises were observed in Gdańsk Bay waters than had been observed in previous years. It is not known whether the fishermen stopped informing inspectors about harbour porpoise bycatch or if the inspectors omitted this information from their reports.

The data presented identify the months in which catches of harbour porpoises were most numerous; thus, it cannot be concluded whether or not these animals occurred in the Gdańsk Bay in other periods of the year. The occurrence of salmonids in fishing grounds open to Polish fishermen (from March to June) resulted in maximum fishing effort targeting these fish. Nets were not deployed in other seasons in such large numbers; however, other nets in which harbour porpoises also could have become entangled were deployed at this time, including those that targeted flatfish, cod, herring, and sprat. The possible explanations for spring catches of these mammals could lie in the specific characteristics of the gear targeting salmon catches as well as the seasonal occurrence of harbour porpoises in Gdańsk Bay. Fishermen from the interwar period favoured the second explanation and linked catches of this mammal with the fact that "harbour porpoises were after the salmon that occurred along the coast" (Anonymous, 1928). Confirmation of such seasonal occurrence of harbour porpoises in Gdańsk Bay was also found in the initial results of a project entitled "Active Protection of Harbour Porpoises (*Phocoena phocoena*) Against Bycatch" that is underway at the Marine Station of the Institute of Oceanography, University of Gdańsk (SMIOUG). The initial results of monitoring of harbour porpoise noises recorded by hydrophones deployed along a transect stretching from Hel to Gdynia along the border of Puck Bay between March 2009 and December 2010 indicated that harbour porpoises occurred in the greatest numbers in winter and spring (Anonymous, 2012).

It is indisputable that harbour porpoises occur in Gdańsk Bay in variable numbers. In the 1924-1927 period, only a few individuals were recorded; while in the 1933-1935 period, "several hundred individuals" were caught (Anonymous, 1936). Ropelewski (1957) and Wołk (1969) attempted to explain the phenomenon of high bycatch by attributing it to very cold winters during which large areas of the Baltic were covered with ice forcing animals to move into restricted ice-free zones. Ropelewski (1957) attributes the catches in 1922 and 1929 to the severe winters of 1921-1922 and 1928-1929, when large areas of the Baltic were covered with ice, forcing the animals to move into restricted ice-free zones. Wołk (1969) postulated that in years when there was extensive ice cover, the migration of harbour porpoises into the Baltic Sea through the Danish Straits was delayed. The analysed maximum extent of Baltic ice cover (European Environment Agency [EEA], 2012; Figure 2) does not permit confirming the hypothesis. It is possible that the larger number of harbour porpoises recorded in the springs of 1933 through 1935 was the consequence of several mild winters, beginning with that of 1929-1930. A similar situation could have occurred in 1922, which was preceded by mild winters beginning in 1917-1918; however, the lack of data precludes drawing such a conclusion. The low bycatch in the 1924-1927 period could have resulted from several severe winters interrupted by only two mild winters (1921-1922 and 1925-1926). Despite the severe winter in 1928-1929, the preceding two seasons had been relatively mild. This might explain the relatively high bycatch of harbour porpoises recorded in 1929, despite the extent of ice cover in the preceding winter season. This variability in bycatch probably could be explained via knowledge of harbour porpoise migration patterns in the southern Baltic during mild and severe winters.

Decreases in the numbers of harbour porpoises in the southern Baltic were noted in previous historical periods. During regular summer holidays in a fishing village, Benecke (1881) noted a decrease in harbour porpoise bycatch from five to six monthly in the 1850s to very rare catches in the late 1870s along the then Prussian coast, which largely corresponds to today's Polish coast.

In light of the increase in bycatch in the 1920s and 1930s, it could be concluded that the population of harbour porpoises in the southern Baltic decreased and then recovered, although the possible reasons for this remain obscure today. The increasing and varied anthropogenic stress exerted upon the natural environment throughout the 20th century, including chemicals such as PCBs, DDTs, and trace metals (see Read, 2005, for literature), indicate this natural fluctuation could have been disturbed in the previous century.

The lack of other sources of information meant that archival data was of great importance in designating the Special Areas of Conservation (NATURA 2000) for harbour porpoises in Poland. Historical data cited in Ropelewski (1957) were supplemented with meagre information pertaining usually to one to two individuals reported annually as bycatch and strandings from the 1950-1986 period (Skóra et al., 1988; Skóra, 1991). Since 1990, information regarding bycatch has been reported voluntarily by fishermen, and reports of strandings and incidental sightings have been sought by SMIOUG. This is the only Polish data base reported to HELCOM and ASCOBANS. Information about strandings and incidental sightings come from various sources, and not until 2010 was monitoring of the occurrence of marine mammals on the Polish coast implemented through co-operation with the World Wildlife Fund (WWF) as part of the Blue Patrol Project (Anonymous, 2012). However, no analyses have been performed to date regarding the possible dependency between the size of the bycatch and the distribution of the set gear fishing effort. This is significant because the Puck Bay was and is an area where this type of fishery is intense. Without analysing bycatch records in light of fishing effort, the data do not validate designating Puck Bay as an area in which harbour porpoises occur frequently. This is certainly an area where there is conflict between migrating harbour porpoises and set gear fisheries. The lack of biological information that would permit designating a SAC should prompt decisionmakers to undertake efforts to determine scientifically the distribution, behaviour, and abundance of harbour porpoises in Polish waters. Unfortunately, it has been decided that the historical data and current information regarding bycatch, which have been collected under similar principles, are sufficient and thus negate the need for spending further public funds to designate SACs for harbour porpoises.

Currently, the restrictions linked to the NATURA 2000 dedicated to harbour porpoise in this basin could result in considerable conflict with the current use of the area. Puck Bay is the traditional fishing ground for small-scale fishing (boats < 15 m). The main fishing gear for 115 units (in 2010) registered in fishery bases along Puck Bay were various kinds of gillnets. This fishery cannot be relocated, and the use of other kinds of gear (e.g., trawl and hooks) is banned or restricted because of limited space, bottom protection, and other type of human activity (e.g., maritime transport and tourism). It would be reasonable to establish a refuge if the harbour porpoises used Puck Bay during a sensitive life phase (e.g., aggregation, reproduction, or nursing of calves), but there have been no observations of such behaviour in that area. In this case, the use of other methods should be considered to reduce fishery-dependent mortality that are not allowed in NATURA 2000 sites. The current (2005 through 2011) rate of harbour porpoise bycatch in Puck Bay is zero (mean for 1990 to 2011 = 1.1). This fact corresponds with a reduction of fishery effort (due to European Union Common Fishery Policy) and the implementation of a linear barrier of acoustic pingers at the entrance of Puck Bay ("Active Protection of Harbour Porpoises Against Bycatch" project).

To date, there is no Polish monitoring program or basic knowledge of harbour porpoise in Polish Marine Areas. Therefore, the data analysed in the present work have become the foundation for Polish efforts to designate habitats for harbour porpoises rather than just documentation of the overall historical background of this species. This is also why it is essential to verify these findings using existing source materials that have yet to be analysed.

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