Western Indian Ocean
JOURNAL OF
Marine Science

Special Issue 1/2018 | Jul 2018 | ISSN: 0856-860X

Chief Editor José Paula

Humpback Whales in the Western Indian Ocean

Guest Editor Olivier Adam

Western Indian Ocean
JOURNAL OF
Marine Science

Published biannually

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ISSN 0856-860X

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Editorial Note

Humpback whales are well known especially for their very long migration routes and also because of the songs that males emit during the breeding season. In 1971, in their famous article published in the journal 'Science', Payne and McVay describe these songs as "a series of surprisingly beautiful sounds"! Since 1971, more acoustic data have been collected and more knowledge generated; we now know that the song 'leitmotiv' is different from one geographic area to another, and from one year to the next. We also now know how they produce these sounds from their respiratory system.

In the last two decades, different techniques have been deployed to observe humpback whales in all the oceans. Not only have passive acoustic monitoring techniques been used, but also visual observations, electronic devices, and genetics. The objectives of these studies have been to better understand whale activities, behaviors, and also the underwater environment in which they live, and the potential effects of anthropogenic activities on their societies. This has involved many different research teams, with their own skills, methods and programmes. Results have been published in the scientific literature and presented at different international conferences.

However, three things have recently become apparent: Firstly, the study of humpback whales is a wide subject requiring people with complementary skills. It was apparent that it was necessary to bring these people together to discuss this species of whale for several reasons: a) because it would highlight the major results obtained thus far; b) because it would be interesting to share experiences (especially on the data and methods used, but also on common challenges); c) to co-design future projects and identify priorities; and d) because it would provide an opportunity to start new collaborations.

Secondly, before 2015, no international scientific conference or workshop existed with regular annual sessions especially dedicated to this species of Mysticeti whales. In order to address this, we initiated the creation of the Humpback Whale World Congress (HWWC, http://www.hwwc.mg/). The first session was held in Madagascar in 2015 and the second in La Réunion Island in 2017. Our idea was to bring together researchers and technicians from universities, research institutes, government organizations, and industry, dealing with all aspects of the biology, ethology, genetics, ecology, acoustics, signal processing, pattern recognition, mathematics, and computer sciences applied to the study of the humpback whales and their environment, and the potential effects of anthropogenic activities on the species. The goal of the HWWC is to provide a forum for exchange of new results obtained from the latest advances in instrumentation and methods.

Thirdly, during the BaoBaB project I led from 2012 to 2014, it became apparent that the extensive movement of humpback whales, even during the breeding season (with more than 100 km being covered per day), resulted in the same individuals being observed from the east coast of Africa to the Mascarene Islands. Because of this remarkable characteristic of this baleen whale species, it was obvious that we needed to encourage collaboration at a regional level, and we envisaged a consortium of people who work collaboratively on the Southwestern Indian Ocean humpback whale population.

During the international HWWC we were very pleased by the quality of the work shared by different teams, and the strong motivation to exchange information and work together. For this reason, we requested some colleagues to describe their projects in full papers, to put them together, and publish this unique special issue.

I would like to thank all the authors and co-authors, all the persons who contributed to this special issue, and more strongly the Cetamada Team who currently does such amazing work on these humpback whales!

Enjoy reading!

Olivier ADAM
Professor
Institut d'Alembert
Sorbonne University, Paris, France

Distribution and biological characteristics of Humpback whales in the Northwest region of the Indian Ocean according to data from the Soviet whaling fleet

Yuriy A. Mikhalev

Institute of Marine Biology,
National Academy of Sciences
of Ukraine
yuriy.a.mikhalev@gmail.com

Abstract

The distribution and biological condition of humpback whales (*Megaptera novaeangliae* Borowski, 1781) caught during the 1960s by Soviet whaling flotillas in the relatively poorly studied Northwest region of the Indian Ocean, from the Asian coast to 40°S, and from the east coast of Africa to 80°E, were analyzed. Two distinct clusters were identified: South of Madagascar (Southern region); and off the coast of the Arabian Peninsula (Northern region). The humpbacks of the Southern region do not differ significantly from humpbacks from the higher latitudes of the Southern Ocean, and the humpbacks of the Northern region are similar to the humpbacks of the Northern Hemisphere, not only geographically, but also in their biological characteristics.

Keywords: Humpbacks, northwest region, Indian Ocean, distribution, sizes, nutrition, embryos, reproduction, biological condition.

Introduction

Soviet Antarctic whaling began after the Second World War when a former German whaling base (Wikinger) and several whalers were transferred to the Soviet Union as reparations. After repair and restoration in Liverpool (Great Britain) the fleet of vessels was named "Slava". The fleet's first season was in 1946, and the first whale was captured in January 1947. Another whaling vessel, "Yuri Dolgoruky", was converted from the German passenger liner "Hamburg" in 1960. Two domestic whaling vessels, "Soviet Ukraine" (1959), and "Soviet Russia" (1961), were built at the Nikolaev shipbuilding plant.

Between 1947 and 1972 (the years when whaling of large species of baleen whales was abandoned) Soviet Antarctic whalers caught 38,832 humpbacks, but only 1,555 whales (a quota assigned to the Soviet Union) were reported to the IWC. Actual extraction exceeded the allocated quota by 25 times, and at the same time the requirements related to the size and biological condition of whales were violated (Yablokov, 1994; Zemsky *et al*., 1994, 1995, 1996; Yablokov & Zemsky, 1995, 2000; Yablokov *et al*., 1998a, 1998b; Mikhalev, 2008).

It is known that in these years, and much earlier, the poaching of whales was conducted by the fleets of other countries. The main damage to the global whale population was caused long before the Soviet whaling (Golovlev, 2000). Strangely enough, even when the International Convention for the Regulation of Whaling was signed and adopted in 1946 and the Rules for whaling were designated, control of whaling was not implemented.

In 1961, by order of the Minister of Fisheries of the USSR, a state inspection was introduced for Soviet whaling flotillas. This act had a certain political significance, but in fact it covered-up the poaching even more. Not until 1972, when only the whaling flotillas of Japan and the Soviet Union remained in the Southern Ocean targeting small Minke whales (*Balaenoptera*

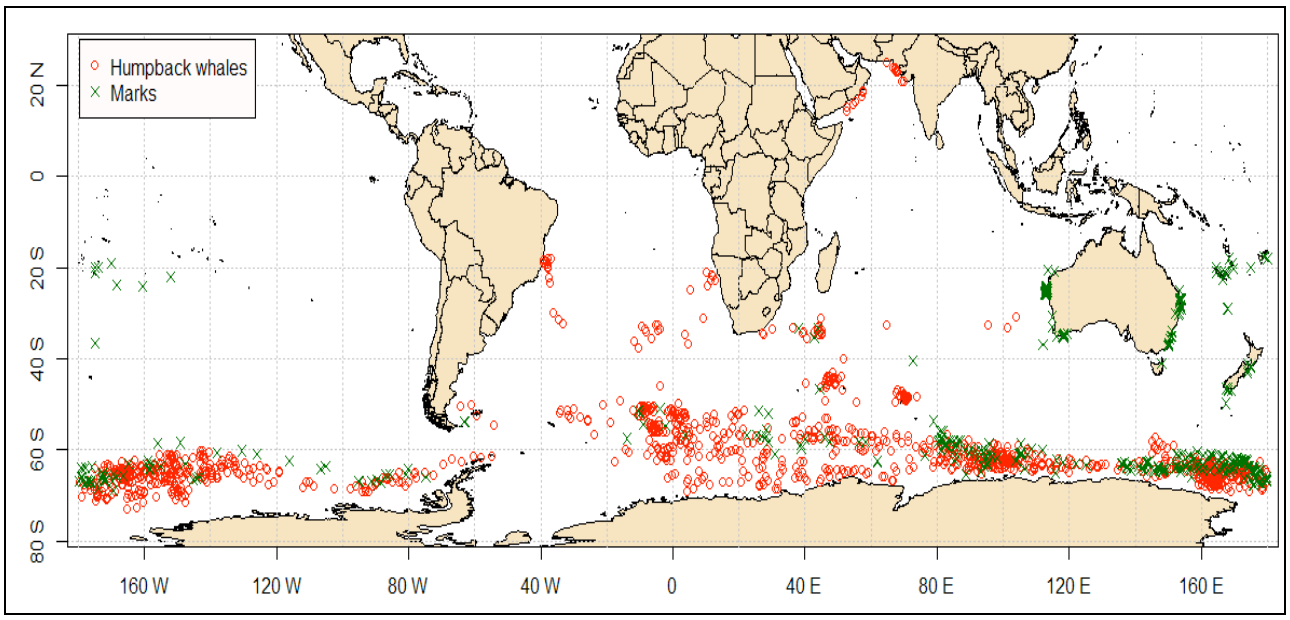

Figure 1. Distribution of humpbacks in the Southern Ocean and adjacent waters as per Soviet whaling data.

acutorostrata), were so-called "observers" introduced. However, because Japanese representatives began to appear on Soviet vessels, and Soviet ones on Japanese vessels, this could hardly be considered effective international observer programme. Poachers quickly learned to work together, and poaching and falsification of data continued.

Fortunately, scientific groups constantly worked on the Soviet vessels, and kept independent records of the whales surveyed by them. At the end of each season, the scientific groups submitted reports to the relevant institutions. Most of the whale watching logs kept by research workers on the flagships "Slava" and "Soviet Ukraine" have been accessed, and together with season reports from other flotillas, have allowed a more accurate picture of the actual distribution and biological status of the whales of the Southern Ocean and adjacent waters to become apparent.

At the session of the Scientific Committee of the International Whaling Commission (Puerto Vayarta, Mexico, 1994), Russian scientists reported on large-scale poaching of whales by Soviet flotillas and made public the actual data on whaling activities. The Russians believed that other countries would also divulge this information, but this never happened, and Russia remains the only country to have done so. The Russian data is therefore the only absolutely reliable information available in terms of species composition, volume of whaling, size, distribution and biological status of whales.

In this study it was possible to obtain objective results on the distribution and migration of humpback whales (*Megaptera novaeangliae* Borowski, 1781) based on the exact coordinates of the locations where 9,418 whales were caught, as well as the tagging of 3,944 whales (Fig. 1). As a result of tagging it became known that for feeding these whales migrate from the waters of Brazil to the west of the Bellingshausen Sea; the West African herds migrates to the vicinity, and to the south of, Gough Island; the West Australian herds migrate to the Commonwealth Sea; the East Australian herds migrate to Balleny Island, to the Commonwealth and Ross Seas; and the New Caledonian herds feed in the region of the Balleny Islands to the Bellingshausen Sea. In May, whales were observed in the Cook Strait and near the southern tip of Africa (Tomilin, 1957, 1980; Dawbin, 1964, 1966; Rice & Scheffer, 1968; Yablokov *et al*., 1972; Ivashin, 1973, 1990; Mikhalev & Tormosov, 1997; Mikhalev, 2000, 2008).

In warm waters in breeding areas active migration of humpbacks is observed in April, but some whales remain in cold high latitudes for winter. In the low latitudes, breeding zones are noted off the coast of Brazil and the southwestern coast of Africa, south of Madagascar, off the southwestern coast of Australia, off the coast of Tasmania and New Zealand, and in subantarctic waters in the vicinity of Bouvet, Crozet and Kerguelen islands. The breeding areas of humpbacks in high latitudes of the Southern Ocean are in the Bellingshausen Sea, an area east of the Commonwealth Sea, and the waters east of Balleny Island.

The present study focuses on humpbacks in the relatively poorly studied Northwest region of the Indian Ocean, north of 40°S. This is the area for which reliable data exists on humpback whaling even while the Soviet Union was violating IWC rules. Other countries were whaling in these waters long before the signing of the 1946 Convention. Humpback whaling in this region was conducted in the Mozambique Strait, in the Seychelles, and in the coastal waters of Madagascar (Townsend, 1935; Angot, 1951; Rorvik, 1980; Keller *et al*., 1982; Kasuya & Wada, 1991; Leatherwood & Donovan, 1991; Findlay *et al.*, 1994). According to the International Whaling Statistics, for the whaling season of 1909/10 to 1946/47, to the south of Madagascar, as well as the southeast coast of Africa, 12,759 humpbacks were caught. Strangely, on the maps of Townsend (1935), compiled from distribution data from ship's logs of American whalers of the 19th century, the humpback population in this region was concentrated only in the Mozambique Channel and on the eastern and west coast of Madagascar, and not to the south and north of Madagascar, as well as in the open waters of the region under investigation. This was despite the fact that at that time, American whalers were hunting throughout the Northwest region of the Indian Ocean, right up to the shores of the Arabian Peninsula. These maps even show sperm whales as being encountered off the coast of the Arabian Peninsula.

Material and Methods

In this paper, the humpbacks of the Northwest region of the Indian Ocean are discussed. The analysis covers the area from the east coast of Africa to 80°E and from the northern coast of the Arabian Sea to 40°S. The analysis included data from the examination of humpbacks by members of scientific groups on the Soviet whaling fleet of vessels "Slava" (1963-1966), "Soviet Ukraine" (1964-1967) and "Yuri Dolgoruky" (1962-1965). Determination of the species composition of whales and their measurements were conducted according to the "Unified methodology for studying cetaceans" (Yablokov *et al.,* 1972). The database of these data is included in the computer programme "Kit", created by the son of the author, Vladimir Mikhalev. The programme uses algorithms of graphical methods, construction of maps, the construction of histograms of dimensional series, and algorithms for processing digital material by biometric statistical methods (e.g. Plokhinsky, 1961, 1978; Rokitsky, 1961, 1964; Urbakht, 1964).

Results

"Yuri Dolgoruky" was the first of the Soviet fleet of vessels to begin whaling of humpbacks in the Northwest region of the Indian Ocean. They caught only one humpback whale each month to the south of Madagascar from November to January during the 1962/63 season. In November 1964, seven humpbacks were caught in the same area by this flotilla, and at the end of the voyage in May 1965 another humpback was caught. The flotilla "Soviet Ukraine" and "Slava" caught humpbacks in the Northwest region of the Indian Ocean, voyaging from Odessa to the Southern Ocean for whaling, not as usual through the Strait of Gibraltar, but through the Suez Canal, the Red Sea and the Bab-el-Mandeb Strait. They returned home by the same route. It is possible that information received from the Kuwaitis on whaling in the Persian Gulf drew the attention of Soviet whalers to this region, and, consequently, to adjoining waters.

The flotilla "Slava" caught 6 humpbacks; 3 in November and 3 in December during the voyage of 1964/65 to the area under investigation. The flotilla "Soviet Ukraine" operated with much greater success in the Northwest region. In November 1965, it caught one humpback, and on the next voyage in November 1966, 238 humpbacks. In November 1967, this flotilla

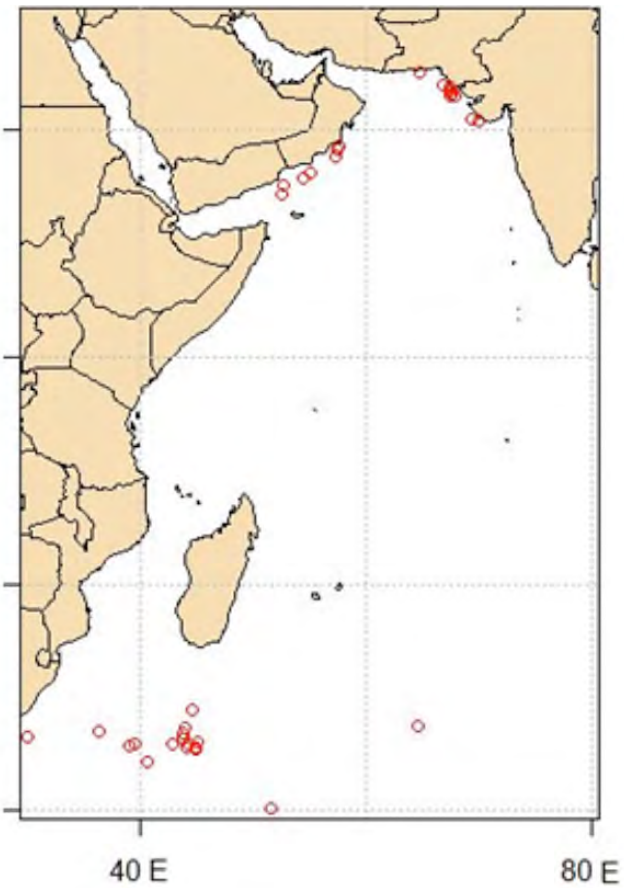

Figure 2. Distribution of humpbacks caught by Soviet fleets in the northwestern area of the Indian Ocean.

caught 41 humpbacks, and in December another 42 humpbacks (Mikhalev, 1997, 2000a, 2000b, 2008). So humpbacks were caught in November to December in the Northwest region, and only one whale was taken in January and May. When analyzing the distribution of humpbacks in this region, the presence of two areas that are fairly remote from each other is clearly visible; the southern region (south of Madagascar) and the northern region (the northern part of the Arabian Sea) (Fig. 2).

Dimensions and biological condition of humpbacks

In total, Soviet flotillas caught 318 humpbacks in the Northwest region of the Indian Ocean, of which 182 (57.2%) were males and 136 (42.8%) were females. The length distribution of humpback whales in dimensional classes is illustrated by the histogram in Fig. 3. In females, the length varied from 6.7 m to 15.5 m, with an average length of 13.3 m. The males ranged from 6.9 m to 14.9 m, with an average length of 12.9 m. The histogram is not symmetrical and shows visually that "small-sized" individuals (less than 11 m), including suckers, were banned from whaling to a considerable extent. In this case, the average size of animals is better characterized not by mean lengths, but by modal values of dimensional series. For females, the modal value is 13.75 m, and for males, 13.25 m, showing that, as is typical for humpbacks, females are on average half a meter larger than males. The average size of humpbacks without separation by sex was 13.04 m, with a modal value of 13.25 m (Table 1).

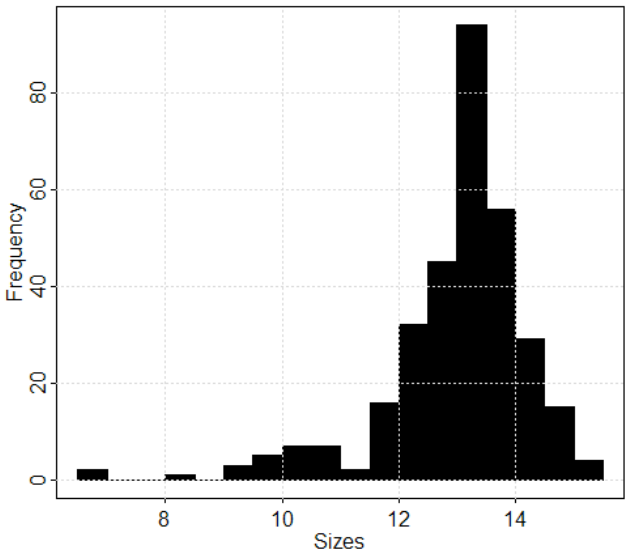

Figure 3. Histogram of humpback whale sizes for the northwestern area of the Indian Ocean (n=318).

Characteristics of humpbacks in the Southern region

The humpbacks in the Southern region accounted for a small part (76 individuals, or 23.9%), of all humpbacks caught in the Northwest region. They were mainly concentrated in the 30 latitudes, south of Madagascar (Fig. 2). There were twice as many males (53 or 69.7%) than females (23 or 30.3%). Dimensions of

Table 1. The size of the humpbacks of the Northwest region of the Indian Ocean according to the data of Soviet whaling flotillas.

Regions	Number and size of adults		
	Both sexes, ♂♀	Males, ♂	Females, ♀
All regions	N=318	N=182	N=136
	Average=13.04m	Average=12.9m	Average=13.3m
	Min=6.7m	Min=6.9m	Min=6.7m
	Max=15.5m	Max=14.9m	Max=15.5m
	Modal=13.25m	Modal=13.25m	Modal=13.75m
South region	N=76	N=53	N=23
	Average=13.0m	Average=13.0m	Average=13.1m
	Min=6.7m	Min=6.9m	Min=6.7m
	Max=15.5m	Max=14.5m	Max=15.5m
	Modal=13.25m	Modal=13.25m	Modal=13.25m and 14.75m
North region	N=242	N=129	N=113
	Average=13.0m	Average=12.8m	Average=13.3m
	Min=9.1m	Min=9.5m	Min=9.1m
	Max=15.2m	Max=14.9m	Max=15.2m
	Modal=13.25m	Modal=13.25m	Modal=13.75m

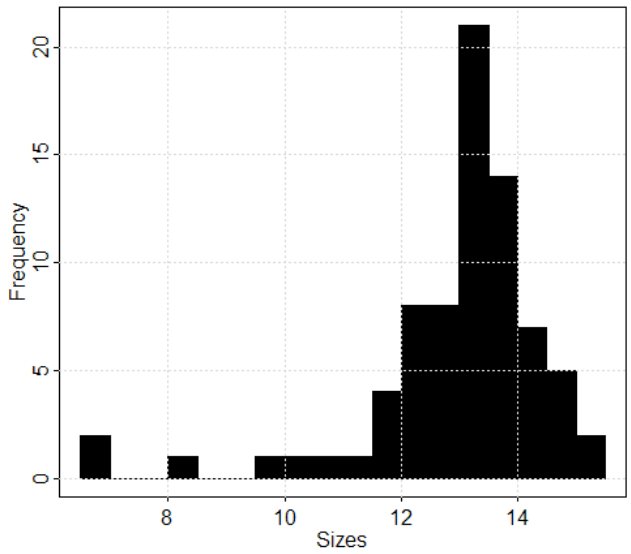

Figure 4. Histogram of humpback whale sizes for the southern area (n=76).

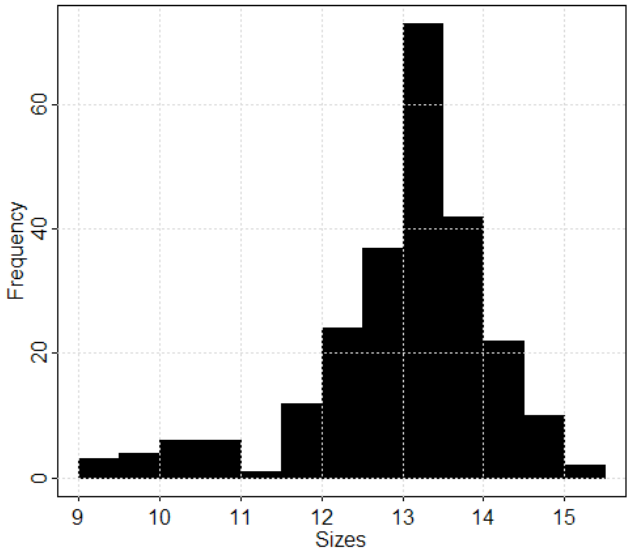

Figure 5. Histogram of humpback sizes for the northern area (n=242).

humpbacks of the region are given in Table 1 these are illustrated in the histogram in Fig. 4. The length of the males varied from 6.9 m to 14.5 m with an average of 13.0 m. The modal class was 13.25 m. The average size of females was slightly larger than that of males and was 13.1 m. The females also had more scatter length with a minimum of 6.7 m, and maximum of 15.5 m. There were two modal classes, 13.25 m and 14.75 m, which was most likely determined by a small sample of only 23 individuals. However, it is also possible that a part of the female population migrates to the breeding zones. The small number of pregnant females (3) at the early stages of pregnancy could support this conclusion. The aggregation of whales in the Northwest was geographically distant from other known more southern aggregations near the islands of Prince Edward, Crozet and Kerguelen, and did not differ in their biological indices from these (Mikhalev, 2008).

Characteristics of humpbacks in the Northern region.

The region is located in the northern part of the Arabian Sea, which occupies a special position in the World Ocean. Being in the Northern Hemisphere (its northern border runs through 30°N), the sea is also quite isolated from its main waters and, on the contrary, is closely connected with the waters of the Southern Hemisphere. The presence of humpbacks in the region was first reported by Gervais (1888), who described a dried humpback on the coast of Basra Bay in the Persian Gulf. The population of humpbacks in this area was not affected by whaling until the 1960s, and for these reasons is of special interest.

Aggregations of humpbacks were found by whalers off the Oman coast near the Kuria-Muria and Masira Islands, off the coast of Pakistan, and also on the Kathiavar Peninsula (India). Whalers learned about the humpbacks of this peninsula from the former whaling captain Alexei Solyanik, from the ship "Van Gogh", who was fishing shrimp here. Most of the humpbacks (242 whales, 76.1%) from the investigated region were caught here. Their length distribution according to the classes of the variational series is shown in Fig. 5. The minimum length of humpbacks in the area was 9.1 m and the maximum length was 15.2 m. The average size of the animals was 13.0 m, with a modal value was 13.25 m. From the 242 humpbacks, 129 (53.3 %) were males, and 113 (46.7%) females. The size of the males varied from 9.5 m to 14.9 m, with a modal value of 13.25 m, and an average length of 12.78 m. Most often males were from 12.1 m to 14.0 m (84.1 %). The average size of females was 13.31 m. Their sizes ranged from 9.1 m to 15.2 m, with a modal value of 13.75 m. More often females were from 13.1 m to 14.5 m (71.0%) (Table 1).

Biological analysis showed that the sexual maturity of both male and female humpbacks of the Northern region occurs when they reach a length of 11.5 m. Among the females, immature individuals made up 12.4% of the sample. Pregnant females made up 45.9% of the number of sexually mature individuals, while 51.8% were male, and 3.1% were nursing females. A low percentage of nursing females in the area is also confirmed by observations from a scout ship which reported that in this area only one female with a suckling was observed.

Table 2. The size of embryos found in female humpbacks in the northwestern region of the Indian Ocean.

Regions	Number and size of embryos		
	Both sexes, ♂♀	Males, ♂	Females, ♀
All regions	N=41(2-esd*)	N=13	N=26
	Average=215cm	Average=195cm	Average=242cm
	Min=1	Min=10	Min=140
	Max=375	Max=375	Max=353
	Modal=195	Modal=165	Modal=255
South region	N=3 (2-esd*)	N=1	–
	Average=4cm	Average=10cm	–
	Min=1	Min=10	–
	Max=10	Max=10	–
	Modal=15	Modal=10	–
North region	N=38	N=12	N=26
	Average=232cm	Average=211cm	Average=242cm
	Min=64	Min=64	Min=140
	Max=375	MAx=375	Max=353
	Modal=195	Modal=165	Modal=255

* esd – early stage of embryo development

41 embryos were found in pregnant females, but only 38 embryos could be measured (Table 2). A 14.6 m female had twins; a female of 190 cm in length, and a male of 210 cm in length.

Discussion

Clearly, the data show that there were two fairly distant clusters of humpbacks in the region; Southern and Northern. Despite this, the average length of humpbacks in the whole region and in the separate parts of the Southern and Northern regions was around 13.0 m. It is important to note that this length is higher than the average length according to pelagic whaling data in the middle and high latitudes of the Southern Ocean. According to the International Whaling Statistics for the period from 1933 to 1945 (13,375 individuals), the average length of humpbacks in the Southern Ocean was 12.47 m (Tomilin, 1957). Consequently, the state of humpbacks in the Northwest Indian Ocean region was better by the 1960s. A relatively small percentage of immature individuals (9%-10%) also testifies to their relatively prosperous condition.

It should be noted, however, that the maximum size of the humpbacks in the Northwest Indian Ocean was 14.9 m for males, and 15.5 m for females. According to the literature, (Tomilin, 1957; Rising, 1928) in the 1920s-30s, lengths of 17.38 m and even 18.0 m were common. Of course, in those years the sample was much higher than the present study with 12,375 humpbacks caught. However, there is some doubt about these early measurements, and it cannot be ruled out that these whales were not measured in a straight line (as is the case with the "Unified Method"), but by the body contour.

Another picture is seen in the analysis and comparison of the biological state of of whales in the two regions. Of the 23 females in the Southern region, only three animals were pregnant. The embryos found in females on November 21, 1967, were of small size; 1 cm in the female of 14.0 m, 2 cm in the female of 14.4 m, and 10 cm (male embryo) in the 14.8m female. On average, the embryos were about 4 cm in length. Such embryo sizes generally correspond to the season of mating of southern humpbacks (Mikhalev, 2008). For the humpbacks of the Northern region (the northern part of the Arabian Sea), immature individuals made up 12.4% of the 113 females. From the number of sexually mature individuals, 45.9% were pregnant, 51.8% immature, and 3.1% nursing. A close, almost equal proportion, of the percentage of pregnant and mammary females indicates a high reproductive ability of humpbacks of this population with average females giving birth every two years (one year pregnancy, one year feeding and rest).

In pregnant females, sex was determined for 38 of the embryos found. 12 (31.6%) of them turned out to be

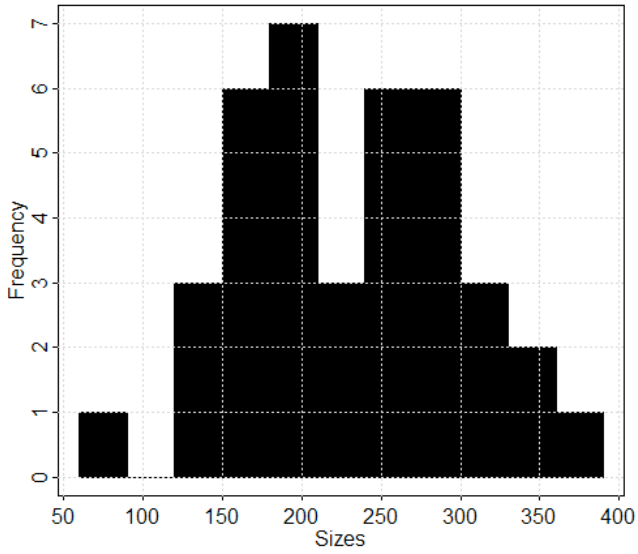

Figure 6. Histogram of humpback embryo sizes for the northern area (n=38).

males, and 26 (68.4%) female. This sex ratio is most likely influenced by a small sample. In the Southern region only 13% of the mature females where pregnant, and the embryos were small and at a relatively early stage of development. In the Northern region almost half of the mature females were pregnant (45.9%) and embryos were large. Their average length was 232 cm. The length of the measured embryos (with the exception of one of 64 cm long, which differed from the next largest embryo by 76 cm) ranged from 140 cm to 375 cm. When ranked, the difference in the length of two neighboring embryos did not exceed 20-22 cm. Such parity in embryo length is usually inherent in isolated, non-mixed herds of whales. However, the small sample (38 embryos) does not allow one to make such a conclusion with confidence, especially since two modal classes were apparent in the series of embryo length distributions (Fig. 6).

Judging by the size, and according to the methodology developed by the author for determining the age of embryos of whales (Mikhalev, 1970, 1975, 1984, 2007, 2008), the mating season for humpbacks in the Northern region lasts about three and a half months, from January to May, with a peak in the first half of March. This seems quite realistic, since the largest embryos at the beginning of November already had a length of 340-375 cm. In this case, the calving season for the humpbacks of this region begins in December, and its peak falls at the beginning of February. So the season of reproduction of humpbacks in the Northern region (the northern part of the Arabian Sea, which is in the Northern Hemisphere) coincided with those of humpbacks in other parts of the Northern Hemisphere, rather than the Southern hemisphere, as

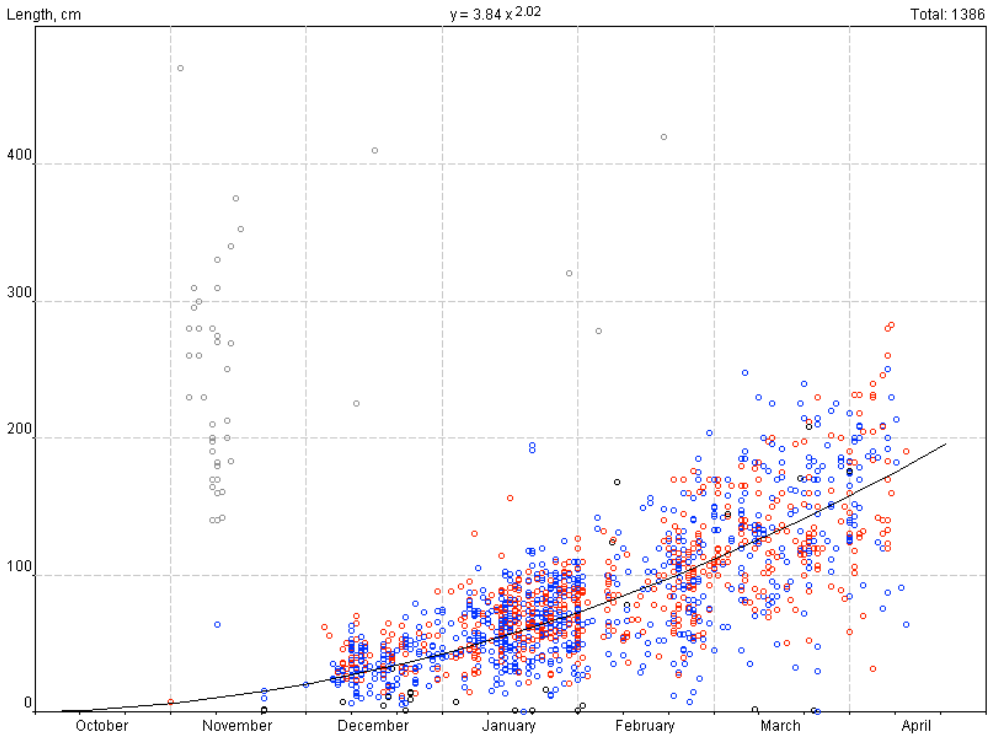

Figure 7. Humpback embryo sizes in the Arabian Sea (left-upper grey dots) and in the Southern Ocean (right-lower dots with curve formula: l=3.84$t^{2.02}$). Blue dots – males, red dots – females. Grey dots are excluded, when the curve is calculated.

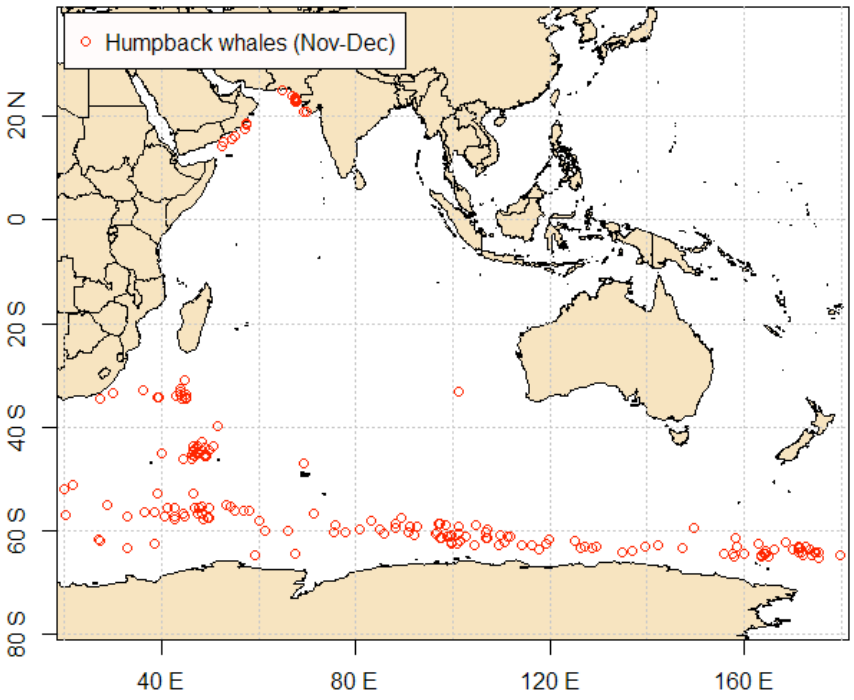

Figure 8. Distribution of humpbacks in November-December.

indicated by the location of embryo lengths by months of the year (Fig. 7). It should be noted that all other concentrations of humpbacks in the Indian Ocean in November-December are located to the south of the thirty-fifth latitude (Fig. 8).

According to the color of the ventral side of the body of humpbacks, Omura (1935), Matthews (1937), and Matsuura (1940), identified three main types; black-belly, variegated, and white-belly. According to the data by Ivashin (1958) from the Southern Ocean, the humpbacks of the South African herd are most likely to be included in the Southern region studied in the current study, and are dominated (80%) by "black-bellied" humpbacks. In the Northern region, of the 65 humpbacks examined, 46.2% were black bellied, 26.2% were variegated, and 27.6% white-bellied. That is, as in the Southern Ocean, the black-bellied humpbacks prevailed, but their percentage was much lower.

The damage to the surface of the body by the barnacle crustaceans *Coronula* sp. was noticeably different from the southern humpbacks. The damage was minor and the *Coronula* sp. were smaller. There were much fewer "white scars" on their body from the bites of small pelagic sharks than for Antarctic humpbacks (Shevchenko, 1970, 1971, 1975, 1977). Many of the humpbacks in the Northern region had a damaged liver. Out of 38 animals examined, liver pathology was registered in 68.5% of cases. There was connective tissue damage of the peripheral parts of the liver with the appearance of cone-like growths up to 20 cm in diameter. The bile ducts were filled with a thick, muddy-gray mass. The pattern of pathological changes resembled liver damage caused by parasitizing trematodes, however, it was not possible to isolate these worms from the affected areas.

The stomachs were examined for 190 humpbacks. The degree of fullness was as follows: "Full" - 10%; "Half" - 40.5%; "Little" - 34.2% and "Empty" - 15.3%. While the food of the humpbacks of the Southern region was mainly *Euphausia*, those in the Northern region also fed on bony fish including *Corangidae, Scomber* sp., *Sardinella* sp., with one whale found to have about a ton of *Sardinella* in its stomach. The degree of fullness of stomachs and the species composition of the contents indicated a good food base in the region, and confirmed the findings of other studies on the distribution and magnitude of plankton biomass in the surface waters of the Indian Ocean (Bogorov & Vinogradov, 1961).

Information on the migration of humpbacks to the Arabian Sea and back to the south is not yet available. Tomilin (1957) assumed possible migration of an "insignificant part" of the South African humpback population through the Mozambique Channel and further along the coast to the Arabian Sea. However, it is important to note here that whaling ships of the flotilla

"Slava" and "Soviet Russia" did not notice humpbacks in the area between 10° and 20°S both in October-December and in April-May. Humpbacks were also not noted in the area of Mozambique, Madagascar, Mauritius and north of 15-20°S from August to October by other researchers (Angot, 1951; Rorvik, 1980; Findlay *et al.*, 1994). Humpbacks were also not registered in the Seychelles area during aerial observations during the period April-July (Keller *et al.* 1982). There was not a single humpback observed in May and July on the expedition of 1993 that crossed the Indian Ocean from Australia to Africa (Eyre, 1995). This hypothesis of Tomilin (1957) is difficult to accept because of the already mentioned differences in the humpbacks of the Northern region from humpbacks in the Southern region, particularly in the size of the embryos. It is noted that there is no information about the penetration of northern humpbacks into the Arabian Sea, through the waters of Indonesia from the North Pacific, and it is therefore apparent that the humpbacks of the Northern region of the Northwest area of the Indian Ocean make up a discrete population. It is possible that Gervais (1988) was right in suggesting that the Persian Gulf humpbacks belong to a stand-alone species, *Megaptera indica*. Unfortunately, sufficient standardised whale measurements and age determination data are not available from the region under investigation to confirm this. Further comprehensive research is necessary to resolve the systematics of the humpbacks in the Northern region of the Arabian Sea.

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