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## New sightings of the Southern right whales in West Antarctic Peninsula waters

**Abstract.** Southern right whales (SRW) in the southwest Atlantic are recognized as slowly recovering after the massive population decline induced by harvesting. SRWs spend summer months in high-latitude feeding grounds and migrate to mid-latitude wintering grounds in autumn, where breeding occurs. Only a few sightings are known for the Antarctic waters as far south as 64° S. The West Antarctic Peninsula is a biologically productive area experiencing marine ecosystem transformations caused by climate changing at one of the fastest rates on Earth. The continental shelf of this region is important for krill stocks — a key prey source for SRW. The purpose of the present study was to reveal the austral summer and autumn presence of the SRWs in the waters of the West Antarctic Peninsula. In May–June 2009, vessel observations were made during a National Science Foundation research cruise. In March 2014, opportunistic surveys were conducted by researchers using the tour vessel as a platform of opportunity. During late March and April of 2018, January — July 2019 and March — April 2020, regular boat-based observations and vessel surveys were conducted in frames of the XXIII and XXIV Ukrainian Antarctic Expeditions, based at the Ukrainian Antarctic Akademik Vernadsky station. In our study we discuss four sightings of SRWs occurred at south of 64° S (2), and 65° S (2). On May 7, 2009, a single adult foraging SRW was sighted in Wilhelmina Bay. On March 22, 2014, an adult SRW was resting with two adult humpback whales in the northern part of the Lemaire Channel. On April 7, 2018, one SRW was sighted in a group with four humpback whales, and intensive interspecies social interactions happened. The last encounter of the SRW happened on April 24, 2020, in Gerlache Strait, near the southeastern coast of the Brabant Island — a single adult right whale was noticed while travelling. Results of our study indicate the autumn presence of some SRWs in the West Antarctic Peninsula waters — on the edge of the southern limit of known distribution for the species.

**Keywords:** Cetacea, *Eubalaena australis*, Southern Ocean, spatial distribution

### 1 Introduction

The Southern right whale (SRW; *Eubalaena australis* (Desmoulins, 1822) is one of three species of the genus *Eubalaena* (Balaenidae, Cetacea). In the southern hemisphere, it has a circumpolar distribution. Reconstruction of the catch history of whaling in the

southwestern Atlantic Ocean for the period 1670–1973 indicated that the pre-exploitation abundance was close to 58,000 individuals, in the 1830s, fewer than 2,000 individuals remained, and the current median population abundance was estimated at 4,742 whales (Romero et al., 2022). Even though SRW whaling was banned in 1937 — to recover the species from

massive population decline, the Soviet Union kept hunting them illegally between 1960 and 1971 (Tormosov et al., 1998). However, the current hemispheric population trend of the SRW is uncertain (Cooke & Zerbini, 2018), the population in the southwest Atlantic is recognized as slowly recovering (IWC, 2013; Crespo et al., 2018; Harcourt et al., 2019; Romero et al., 2022).

SRWs spend the summer in high-latitude feeding grounds and migrate to mid-latitude wintering grounds in autumn, where breeding occurs. In the southwest Atlantic, wintering grounds are found along the southeastern coast of South America (Harcourt et al., 2019). But Weir and Stanworth (2019) confirmed the presence of this species year-round in pelagic areas around the sub-Antarctic Falkland Islands peaking in austral summer. Summer and autumn SRW sightings are more regular now in the sub-Antarctic waters off South Georgia Island following the cessation of whaling which occurred there between 1904 and 1965 (Jackson et al., 2020), and in the South Sandwich Islands (Zerbini et al., 2016; 2018; Nijs & Rowntree, 2017).

In the XX century, there were only a few records of right whales in Antarctic waters (Berzin & Vladimirov, 1981). In April 1986, 8 SRWs were sighted in the Gerlache Strait (West Antarctic Peninsula) near the northeastern part of Anvers Island and on the opposite side of the strait — it was the southern limit of known distribution for the species: 64° S in comparison with 63° S known from previous records (Stone & Hammer, 1988). In late February 1996, two individuals of the SRW were encountered in the Southern Ocean near the Wilkes Land in eastern Antarctica, as far south as 64° S (Bannister et al., 1999). The satellite tagging of SRWs in their breeding grounds in Argentina showed movements of some individuals north of the Falkland Islands, the Scotia Sea near South Georgia Island, the South Sandwich Islands, and in the South Atlantic basin between 38 and 64° S (Zerbini et al., 2016; 2018). Some of the more recent studies recorded no SRWs for the West Antarctic Peninsula area (Thiele et al., 2004; Friedlaender et al., 2006; Lazaneo et al., 2012). According to unpublished expedition reports, sightings of the southern right whales never happened during the previous 22 Ukrainian Antarctic Expeditions based at the Ukrain-

ian Antarctic Akademik Vernadsky station. However, cetacean observations until 2018 were rather opportunistic than dedicated.

The Antarctic Peninsula is the northernmost part of the Antarctic continent. It is a biologically productive area experiencing marine ecosystem transformations caused by climate change at one of the fastest rates on the Earth (Clarke et al., 2007; Ducklow et al., 2012). The West Antarctic Peninsula continental shelf is important for krill stocks (Atkinson et al., 2004). The Antarctic krill (*Euphausia superba* Dana, 1850) and copepods (Stone & Hammer, 1988; Valenzuela et al., 2018; Jackson et al., 2020) are SRW's prey in sub-Antarctic and Antarctic waters. Some recent ecosystem models predict continuing ocean warming and the decline of Antarctic krill throughout the XXI century, which threatens southern right whale population recovery (Agrelo et al., 2021).

The purpose of the present study was to reveal the austral summer and autumn presence of the southern right whales in the waters of the West Antarctic Peninsula.

## 2 Materials and methods

In 2009, observations were made during a National Science Foundation research cruise in May — June. The sightings of whales were made from the bridge of the R/V *Laurence M. Gould* in the region around the Gerlache Strait and associated bays.

In 2014, opportunistic surveys were conducted in March from the R/V *Akademik Vavilov* by researchers using the tour vessel as a platform of opportunity.

In 2018—2020 observations were conducted near the Kyiv Peninsula and other West Antarctic Peninsula waters in frames of the XXIII and XXIV Ukrainian Antarctic Expeditions, based at Akademik Vernadsky station, which is located on the Galindez Island of Argentine Islands (65.2458° S, 64.2576° W). During late March and April of 2018, the regular boat-based observations and vessel-based observations took place from the bridges of the R/V *Laurence M Gould* and F/V *Marigolds*. During January — July 2019 and March — April 2020, the data were collected through regular boat-based surveys, several yacht-based sur-

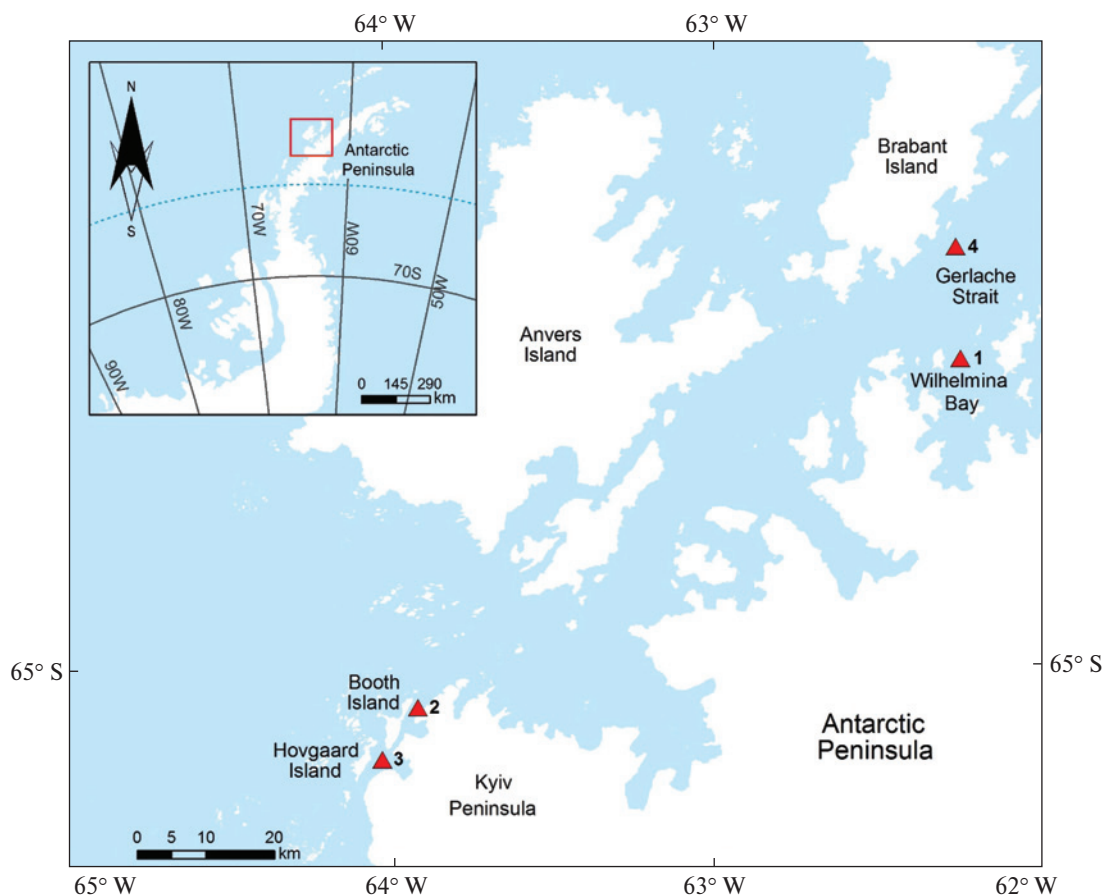


Figure 1. Locations of the southern right whale sightings

veys, and vessel-based observations conducted from F/V *Marigolds* and R/V *Betanzos*.

The research was conducted under the Ministry of Education and Science of Ukraine Permit Series AP № 075-19/2. Data from the National Science Foundation research cruises were conducted under NMFS Permit 14809 and ACA, and Duke IACUC permits.

Visual observations were performed under good or moderate weather conditions (Beaufort Sea state  $\leq 2$ ). Cetaceans were detected with the naked eye and 10 $\times$  binoculars. The following data were collected: observational effort, weather conditions, GPS vessel tracks and sightings coordinates, group size and composition, and behaviour. Professional digital single-lens reflex cameras with telephoto zoom lenses were used to confirm species identification and for the photo-identification of individuals: Nikon D2X, Canon

EOS 70D and Canon EOS 7D digital cameras with Nikon 300 mm f/2.8, Canon EF 100–300 mm f/4.5–5.6 USM and Canon EF 100–400 mm f/4.5–5.6L IS II USM lenses.

For the identification of individual right whales, their unique patterns of head callosities and skin pigmentation were used (Payne et al., 1983; Kraus et al., 1986).

The ArcGIS 10.5 software was used to prepare the map (Fig. 1).

### 3 Results

Four sightings of the southern right whales occurred during our studies (Fig. 1).

On May 7, 2009, a SRW was sighted in Wilhelmina Bay, Gerlache Strait (Fig. 1, № 1; 64.6105° S, 62.2461° W).

It was a single adult individual (Fig. 2) performing foraging behavior.

On March 22, 2014, another specimen was encountered in the northern part of the Lemaire Channel between Kyiv Peninsula on the mainland and Booth Island (Fig. 1, № 2; 65.0622° S, 63.9222° W). A single adult SRW (Fig. 3) was resting with two adult humpback whales (HW; *Megaptera novaeangliae* (Borowski, 1781)).

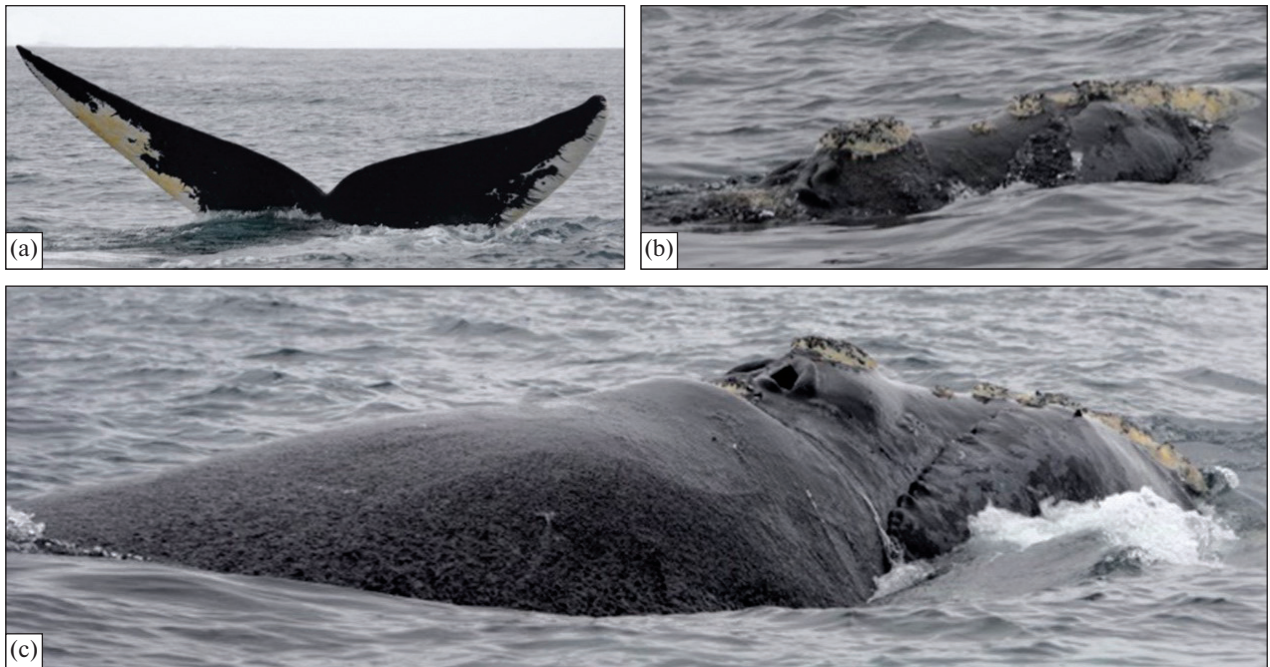
On April 7, 2018, an adult SRW was sighted in a group with four adult humpback whales in the area between the northeastern part of the Hovgaard Island and Kyiv Peninsula (Fig. 1, № 3; 65.1252° S, 64.0311° W). Observations were performed between 12:35 and 13:45 from a distance of several dozen meters and more. Around the sighting location, there were several groups of humpback whales. The observed individual (Fig. 4) was performing intensive social interactions with humpback whales, particularly with one of them. By the end of the survey, they separated from the two other HWs, changing their behavior to a slow travel side by side (Fig. 4e). The SRW and HWs were swimming in close proximity, carrying out different pat-



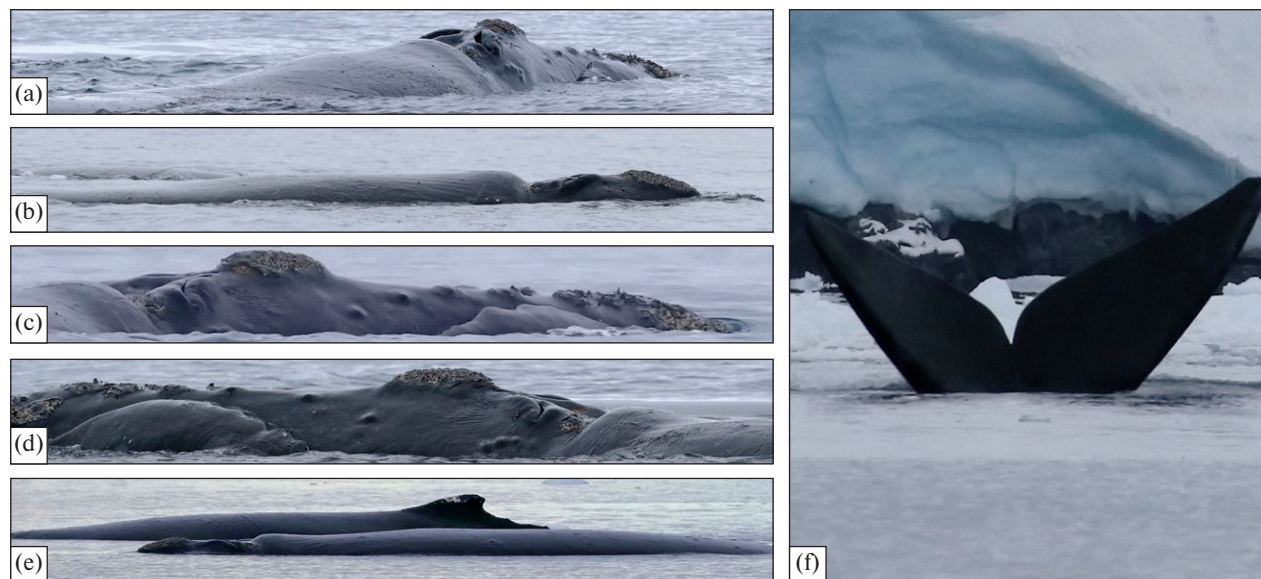
**Figure 2.** Images of the southern right whale encountered in May 2009 (№ 1): (a) — left side of the body; (b) — tail fluke

terns of surface movement, synchronous dives, intense loud breathing, and pushes.

The last sighting of the southern right whale happened on April 24, 2020, in Gerlache Strait, near the southeastern coast of the Brabant Island (Fig. 1, № 4; 64.4531° S, 62.2649° W). A single adult right whale was



**Figure 3.** Photo-identification images of the southern right whale encountered in March 2014 (№ 2): (a) — tail fluke; (b) — right side of the head; (c) — right side of the head and body



**Figure 4.** Photo-identification images of the southern right whale encountered in April 2018 (№ 3): (a–b–c) — right side; (d–e) — left side; (e) — accompanied by the humpback whale (behind); (f) — southern right whale tail fluke



**Figure 5.** Images of the southern right whale encountered in April, 2020 (№ 4): (a) — head, (b) — tail fluke

noticed travelling (Fig. 5). It is interesting that in 1986, eight SRWs were sighted in the Gerlache Strait in April (Stone & Hammer, 1988), and two of our sightings there also happened in autumn — in April and May.

The photos of the SRW encountered in 2014 and 2018 (Fig. 3, 4) could potentially be used for the individual identification of the specimens. Images of the SRW sighted in 2009 and 2020 are of insufficient quality, but also contain certain individual characteristics, confirming that all four whales sighted by us were different.

#### 4 Discussion and conclusions

Understanding the movement patterns of SRW populations is critical for their conservation. While we know some large-scale movement patterns for the SRW populations, we still know little of their mesoscale movements and the extent of their range both in space and time.

For SRW, females typically migrate with their dependent calves from breeding to feeding grounds, where they eventually wean. This transit helps to provide the young animal with information on preferred habitats during the 1st year of life (Valenzuela et al., 2009; Carroll et al., 2015; 2016). Such ‘cultural memory’ helps SRWs to colonize new areas, but its loss could be an important factor that impacts their recovery. As the SRW recovers, the winter ranges of its populations seem to have been expanding towards the margins of their historical range (IWC 2013; Carroll et al., 2014; Roux et al., 2015).

Through satellite tagging, it was found that movement patterns of SRW migration towards feeding destinations have substantial individual and yearly variation, including such behavior as visiting multiple potential feeding areas each season (Zerbini et

al., 2016; 2018). SRWs in the South Atlantic and the Atlantic sector of the Southern Ocean are quite flexible and use at least three distinct food sources (Valenzuela et al., 2018).

It is essential to understand how movement patterns of SRWs between winter and summer grounds are affected by climate change and how flexible their distributional and migratory responses are. Studying the impacts of climate-driven changes on polar species is particularly important given the rapid changes occurring at both poles in both marine and terrestrial ecosystems (Rogers et al., 2020). Results of our study indicate the autumn presence of some SRWs near the West Antarctic Peninsula — on the edge of the southern limit of known distribution for the species. And as this species is not considered an endemic Antarctic one such as the Antarctic minke whale (*Balaenoptera bonaerensis* (Burmeister, 1867)), its presence in typically ice-covered areas around the Antarctic Peninsula in winter may be a manifestation of how non-polar species are encroaching on a recently modified habitat. Such a trend is currently seen in gentoo penguins and humpback whales (e.g. Fraser et al., 1992; Weinstein & Friedlaender, 2017).

In the area of the Western Antarctic Peninsula, both the annual mean sea ice extent and the duration of winter sea ice have significantly decreased in recent decades (Smith & Stammerjohn, 2001). The water areas freed from ice become available for whales. The Western Antarctic Peninsula is a biologically rich area known to support a persistent and large standing stock of Antarctic krill (Lascara et al., 1999). It is likely that the whales were taking advantage of changing climate conditions and used ice-free areas during the austral summer and the following austral autumn seasons to move far south to feed on krill. We managed to encounter SRW twice in the Gerlache Strait, known as the sighting location for 8 SRWs, in April 1986 (Stone & Hammer, 1988).

Given the large amount of effort made during the summer months with no sightings of SRW, it is interesting to note that their presence is only observed in this region later in the feeding season when sea ice would typically be forming or have already accreted in the past. Similarly, it has been shown that this region also sup-

ports exceptionally large aggregations of krill late in the autumn and in winter (e.g. Nowacek et al., 2011).

Two out of our four cases of SRW sightings were in groups with HW. Such interspecies interactions are also described in other regions. For example, SRW and HW interspecies interactions were previously described for the SRW breeding ground off Mozambique (Banks et al., 2011), where among others the behavioral patterns included elements of possible sexual behavior.

While our sample size is not large, it is important as it represents both the population growth and repatriation of a major krill predator to a rapidly changing region. As with humpback whales that have recovered significantly and are now found in the same region well into winter in ice-free areas, we may be witnessing a similar trend occurring in SRW. Thus, we have an opportunity to study the rate of this return, its scope and scale, and also whether there may be cultural transmission between generations that makes this area important feeding grounds to support population growth.

Future work, including continuous passive acoustic recording, can help determine the relative abundance and timing of whales in certain areas. Tissue biopsy sampling can be useful for determining the demographics and population structure. And satellite tagging could help provide long-term information on whale behavior in the region as well as migratory corridors and pathways.

*Author contributions.* OS and AF provided the data and photos. OS drafted the manuscript. Both authors contributed to interpreting and discussing the results and edited the manuscript. All authors have read and agreed to the published version of the manuscript.

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**Conflict of Interest.** The authors declare that there is no conflict of interest.

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### Нові спостереження південних гладких китів поблизу західного узбережжя Антарктичного півострова

**Реферат.** Вважається, що південні гладкі кити (ПГК) у південно-західній Атлантиці повільно відновлюються після масового скорочення популяції, спричиненого китобійним промислом. ПГК проводять літні місяці у місцях нагулу, що знаходяться у високих широтах, а восени мігрують до середніх широт, де розмножуються. Відомо лише декілька спостережень цих китів в антарктичних водах на південь до 64° пд. ш. Західна частина Антарктичного півострова є біологічно продуктивною територією, в якій відбуваються трансформації морської екосистеми, викликані одними з найшвидших темпів зміни клімату на Землі. Континентальний шельф цього регіону є важливим для запасів криля — ключового харчового ресурсу для ПГК. Метою цього дослідження було виявити літню та осінню присутність ПГК у водах західної частини Антарктичного півострова. У травні—червні 2009 року спостереження з борту судна проводилися під час дослідницького круїзу Національного наукового фонду (США). У березні 2014 року дослідники виконували спостереження з туристичного судна в якості іншої можливості для досліджень. У березні та квітні 2018 року, в період з січня по липень 2019 року та з березня по квітень 2020 року спостереження з човнів і суден виконувалися в рамках 23-ї та 24-ї Українських антарктичних експедицій, що базувалися на Українській антарктичній станції «Академік Вернадський». Під час досліджень ми чотири рази спостерігали ПГК у районі 64° (2) і 65° (2) південної широти. Перше спостереження зафіксоване 7 травня 2009 р. у затоці Вільгельміни, — трапилася єдина доросла особина ПГК, яка харчувалась. А 22 березня 2014 року спостерігалась доросла особина ПГК, яка відпочивала з двома горбатими китами в північній частині протоки Лемейр. Спільну групу ПГК і горбатих китів також спостерігали 7 квітня 2018 року: в групі з чотирма горбатими китами перебував один дорослий ПГК, при цьому відбувалися інтенсивні міжвидові соціальні взаємодії. Останнє спостереження ПГК відбулося 24 квітня 2020 року, де було помічено одного дорослого кита в протоці Жерлаша, біля південно-східного узбережжя острова Брабант трапився один дорослий кит. Результати нашого дослідження вказують на осінню присутність деяких ПГК у водах західного узбережжя Антарктичного півострова, на південній межі відомого поширення виду.

**Ключові слова:** *Eubalaena australis*, китоподібні, Південний океан, просторовий розподіл