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DYNAMICS OF NUMBERS AND OCCURRENCE OF COLONIAL SPECIES OF BIRDS IN THE AREA OF UKRAINIAN ANTARCTIC STATION AKADEMIK VERNADSKY

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Dynamics of Numbers and Occurrence of Colonial Species of Birds in the Area of Ukrainian Antarctic Station Akademik Vernadsky. Smagol, V. M., Pilipenko, D. V., Dzhulai, A. O. — The research covers water area, island archipelagos and coastal line of the Antarctic Peninsula from 65°31' S, 64°25' W in the South to 65°03' S, 63°53' W in the North. There was time gap of 7 years between the researches (2011 and 2018), which allows to define tendencies in development of individual colonies and to make conclusion about success of existence of a given species. The work itself was carried out during the first half of January, that is in the time when the stage of brooding ends and the period of hatching starts. As of 2011, 12 nesting points of gentoo penguin (*Pygoscelis papua*) with total number of 8,342 pairs were found in the region under investigation. Till 2018, quantity of the colony grew to 14, with total number of 14,105 pairs. For seven years, quantity of nesting points of adelic penguin (*Pygoscelis adeliae*) almost did not change (4 colonies). Instead, total number of the species decreased somewhat: from 3559 pairs in 2011 to 3295 ones in 2018. Number of chinstrap penguin (*Pygoscelis antarctica*) in united stable locality for nesting also decreased from 26 pairs in 2011 to 19 ones in 2018. Booth Island (65°04' S, 64°02' W) for chinstrap penguins and Green Island (65°19' S, 64°09' W) for gentoo penguins are the southern most points of nesting range of the species. Also, 7 colonies of antarctic shag (*Phalacrocorax bransfieldensis*) were revealed in the region under investigation. For seven years from 2011 to 2018 total number of the species in the region under investigation grew from 190 pairs to 299, and in most cases the antarctic shag forms settlements jointly with penguins.

Key words: Antarctica, Akademik Vernadsky Station, gentoo penguin, adelic penguin, chinstrap penguin, antarctic shag, nesting range.

Introduction

Among variety of avifauna of the Antarctica, the most specialized ecological group is so called “divers”, which have mastered water area to find food. The most typical representatives of this group are included in the Sphenisciformes order, distinguishing themselves by appearance, way of life, physiological and behavioral features which reflect special adaptations to master water area. Besides, common peculiarity of their behaviour is ability to form colonies, which area especial nucleus of biocoenosis, around which life activity of other species of animals are concentrated. Long-tailed penguins (the genus *Pygoscelis*) constitute a homogeneous group of medium-sized birds with elongated tail feathers that define the name of the genus. The adeliae penguin (*P. adeliae* Hombron et Jacquinot, 1841) has the biggest range of living that is located circumpolar along coast of the whole Antarctica (Peklo, 2007). The chinstrap penguin (*P. antarctica* J. R. Foster, 1781) occurs on a considerably smaller area, which includes the South Sandwich Islands, South Orkney Islands, South Shetland Islands, South Georgia, Bouvet Island, Heard Island, Peter I Island. Further south of the Anvers Island it occurs sporadically (Peklo, 2007). Gentoo penguin (*P. papua* J. R. Foster, 1781) is probably the most “heat-loving” species among the aforesaid ones, as its nesting range extends further northwards, covering (besides the aforesaid islands) also the Falkland Islands, Staten Island, Marion Island, Crozet Island, Macquarie Island, Kerguelen Island, Prince Edward Island (Peklo, 2007). Meanwhile, nesting range of all the aforesaid species overlaps significantly and includes the Wilhelm archipelago and a part of the western coast of the Antarctic Peninsula, where the Ukrainian Antarctic Station Akademik Vernadsky (UAS Akademik Vernadsky) is situated and where Ukrainian biologists carry out their constant observations.

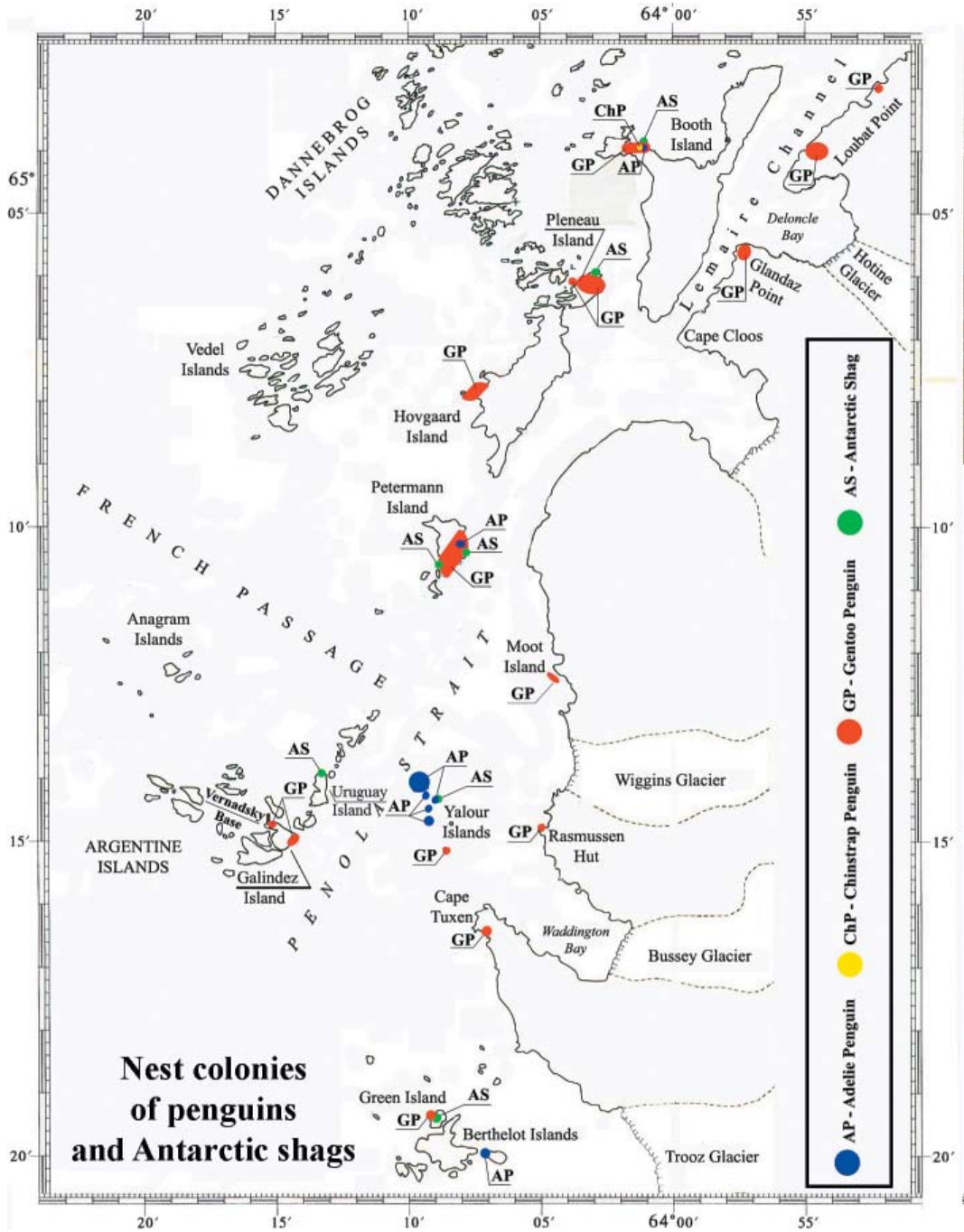
Besides penguins, the antarctic shag (*Phalacrocorax bransfieldensis* Murphy, 1936) should be ascribed to the afore-said ecological group, as the birds, despite their ability for active flight, have also mastered water area to find food. In a way similar to the previously mentioned species, shags reveal mechanism of social behaviour both in hunting and in arranging the colonies. Nesting range of the species also coincides to a significant extent with occurrence of long-tailed penguins, stretching along the Antarctic Peninsula — southwards from the South Shetland Islands (Peklo, 2007).

Material and methods

Research covers the region where the Ukrainian Antarctic Vernadsky Station (former British Faraday Station) is situated. This region includes water area, islands archipelagos and coastal line ranging from western coast of Lahille Island (65°31' S, 64°25' W) in the South till the northern arm of Loubat Point in the Antarctic Peninsula (65°03' S, 63°53' W) in the North (fig. 1). So, direct distance between the specified points is 65 km, which in total includes about 200 km of coastal line (free from ice), islands of Booth, Hovgaard, Petermann, Somerville, Darboux, Denia, Tot, Lahille, archipelagos of Dannebrog, Vedel, Cruls, Anagram, Argentine, Yalour, Berthelot, Lippmann etc. According to the classification set by the American Geographical Society (AGS), most part (in particular, northern part) of the above-mentioned water area belongs to the Wilhelm Archipelago. Water area and lots of firm land situated southwards from the Argentine Islands do not form part of the Wilhelm Archipelago. In particular, these are the islands of Somerville, Darboux, Denia, Tot, Lahille, and archipelagos of Berthelot and Lippmann, too. Meanwhile, the Berthelot Archipelago (65°20' S, 064°07' W) is the southernmost limit of the nesting range for penguins and shags in the research region, which is shown on the map (fig. 1). Southwards of the Berthelot archipelago (to the Lahille Island inclusive), coast of the Antarctic Peninsula and few islands, situated at significant distance from each other, are “open” for storms, what creates objective hindrances for the birds to nest. On the contrary, numerous small islands of the Dannebrog, Vedel, Cruls, and Anagram archipelagos negate influence of storms on coast of the Antarctic Peninsula and on the islands in the Wilhelm Archipelago, which are situated very close to the coast, thus creating adequate conditions for arrangement of colonies of penguins and shags (Muller-Schwarze, 1975; Pilipenko, 2013).

Counts were carried out in 2011 and 2018 (so, the gap between the similar researches was 7 years), which allows to define tendencies in development of individual colonies and to make conclusion about success of existence of a given species. The work itself was carried out during the first half of January that is in the time which corresponds to the end of the nesting and beginning of the hatching period. In the course of work it was carried out a visual accounting of nests of penguins and shags, a determination of geographical coordinates for nesting (colonial) localities, and a description of their landscape and orographic peculiarities. Coordinates for each colony were determined by using GPS, as a centre for intersection of two perpendicular lines between four furthestmost nesting points within aggregation. Nesting pairs were considered those which had either eggs or nestlings at the moment of research. “Sexually immature” pairs were, as a rule, birds of younger ages which revealed visual signs of sexual behaviour (building and protection of nest, courtship behaviour, copulation attempts etc.), though there were neither eggs nor nestlings in the nests. For penguins, such nests were flat, primitive, composed of few non-typical nest materials (too big or too small fragments of gravel). Such “nests” were predominantly free from central deepening. “Sexually immature” pairs of antarctic shags had a noticeably lower “cone” of nest, which quite often was just a low hill of nest material (packed rests of plants fixed with excrements).

Meanwhile, the following observations prove that in certain cases (in particular, for the gentoo penguin) such pairs may lay eggs. But, taking into account a very late time for the egg laying (quite often, more than a month later than it is normal for the birds), brooding and hatching of their nestlings look unlikely.



Results

It is found out that the southernmost point for occurrence of any penguin species of *Pygoscelis* genus (as well as, generally, for shags) in the research region is the group of Berthelot Islands (fig. 1). Further southwards no occurrence of birds from this ecological group was observed. A small nameless island (65°20' S, 64°07' W) at the eastern side of

Berthelot Archipelago is a range for nesting of the adelic penguin. Main part of the colony is located on a flat rock elevation (up to 30 m above sea level), forming aggregations (of several dozen pairs) at a small distance from each other. Separate aggregations are located near foot of the slope and on small islands in immediate proximity to the main locality. In the beginning of 2011, the settlement counted 346 nesting pairs and 28 “sexually immature” ones of the adelic penguin. Respectively, 339 nesting pairs and 75 “sexually immature” ones of the species were observed in 2018.

Green Island in the Berthelot Archipelago is the southernmost point in the nesting range of the gentoo penguin. Here, in the lower part of graded rock elevation, a compact colony was formed, which counts 17 nesting pairs and 1 “sexually immature” pair. In 2011 this settlement did not exist. Thus, the gentoo penguin shows a tendency for expansion of the occurrence range southwards. The colony coordinates are: 65°19' S 64°09' W. It is worth noting that the colony is located jointly with a colony of antarctic shag, being situated lower than the latter — along exposition of the slope. The mentioned group of antarctic shags is the most numerous in the research region: in 2018 there were 89 nesting pairs and 10 “sexually immature” ones in the settlement. For reference, in 2011 number of the birds was somewhat less: 78 nesting pairs and 7 “sexually immature” ones. The settlement extends along a stepped rock elevation up to the height of 30 m above sea level. In total, it is worth noting that for all the settlements of antarctic shag it is characteristic a placement of nests on graded rock outcrops with abrupt slope of exposition.

The next point for nesting of the gentoo penguin (in the projection of displacement from south to north) is a cape of the Antarctic Peninsula which is called Cape Tuxen (65°16' S, 64°07' W). This locality is an extremely original range for nesting of birds of this species. A part of the colony was formed on a flat foothill of the Mount Demaria, while majority of the nests are dispersed along an abrupt slope, embracing rock outcrops as well as beds of moss between them. In the latter case (on the southern part of the slope), a fluffed moss substrate, instead of “typical” small stone fragments, is used in quality of nest material for gentoo penguins. In 2011, 192 nesting pairs and 17 “sexually immature” ones were found there. Till 2018 number of nesting pairs increased to 564, while only 12 “sexually immature” ones were discovered. The highest of them are located at the height of 100 m above sea level approximately.

Another two colonies of the gentoo penguin were formed not far from the Cape Tuxen, and they must be its “filial” aggregations, as they are located at a distance of 1 km northwards and southwards from the above-mentioned one. The first colony (8 nesting pairs) is located on the Rasmussen Hut Cape, on a small rock covered with moss, near a foothill of the Mount Mill (65°15' S, 64°05' W), where gentoo penguins occupy the highest lot, free from moss. The first pair of the birds formed a nest there in 2011, and they raised nestlings successfully. In 2018 there were already 8 pairs of penguins, and they all had eggs. Another colony covers a small island in the Yalour Archipelago, the closest to the mainland, with the following coordinates: 65°15' S, 64°08' W. In 2011, we discovered 24 nesting pairs; till 2018 their number increased to 30. It is interesting that in all the cases no “sexually immature” pair was found in any of these groups.

All other islands in the Yalour Archipelago, with their flat anticlines, are a uniform range for nesting of the adelic penguin. The colony covers 6 islands, which are located at a small distance (up to several dozen meters) from each other. Most part of the colony (60 %) is located on the biggest island (with range of 4 ha approximately). Rock masses in the centre of the island are higher as compared with its costal area, so they are the first to become free from snow. Therefore, the biggest aggregations (each more than a hundred of nests) are placed as far as possible from the coast. Coastal rock elevations are slightly raised over surrounding territory, for this reason they are the last to become assimilated by the nesting aggregations. A lesser part of the colony is located on five small islands with range from 0.25 to 1.5 ha. The colony coordinates are: 65°14' S, 64°10' W. In 2011 total number

of nesting pairs in the territory of the Yalour Archipelago amounted to 2555, and that of “sexually immature” ones was 314. In 2018 respective figures were 2269 nesting pairs and 319 “sexually immature” ones.

There is also a small colony of antarctic shag on one of the small islands in the Yalour Archipelago, arranged almost in one line along edge over an abrupt steep ($65^{\circ}15' S$, $64^{\circ}09' W$). In 2011, 16 nesting pairs and 1 “sexually immature” pair settled down there. In 2018 respective figures were 11 nesting pairs and 2 “sexually immature” ones. In this locality, shags nest together with adelic penguins, whose eggs are located lower — on flat boulders.

Westwards from the Yalour Archipelago a large group of Argentine Islands exists, and on one of the islands (Galindez) the Ukrainian Antarctic Station Akademik Vernadsky is situated. At the same time, Galindez Island is a locality for two colonies of the gentoo penguin at once, which, though located at a slight distance (1.0 km) from each other, are clearly differentiated by a high ice dome in the central part of the island. A large colony was formed on the western coast of the island, embracing rocky masses of the penguin point and pigeon point. Most of nesting ranges have “uneven” landform with projecting sharp edges — just over water line. In 2011 this group was fragmented enough, embracing mainly rocky masses which stretch out far into sea. For that moment, the settlement counted 247 nesting pairs and 8 “sexually immature” ones. Now the colony embraces not only areas of rocky masses, but also smallest lands between them and stone boulders at a certain distance from the coast. In 2018 number of nesting pairs was 753 there, and that of “sexually immature” ones — 18. The colony coordinates are: $65^{\circ}15' S$, $64^{\circ}14' W$.

The smaller colony of the gentoo penguin was formed immediately around the Vernadsky Station, covering natural forms of the projecting landform, as well as concrete elevations of the foundations for buildings and for supports for antennas. So, coordinates of the colony almost coincide with those of the station: $65^{\circ}15' S$, $64^{\circ}15' W$. In 2011, we observed 110 nesting pairs and 3 “sexually immature” ones there; till 2018 number of the settlement grew to 379 nesting pairs and 29 “sexually immature” ones, respectively.

A small colony of the Antarctic Shag was formed on Uruguay Island, located thereabout (in the same archipelago of Argentine Islands). Coordinates of the settlement, which is located on the height of 40 m above sea level, are: $65^{\circ}14' S$, $64^{\circ}09' W$. In 2011 quantity of the group was 27 nesting pairs and 4 “sexually immature” ones; in 2018 there were 38 nesting pairs and 1 “sexually immature” pair, respectively. This colony is the only locality where shags form a mono-species group. Their nesting places are located on abrupt steps immediately over water line, which makes them unfit for penguins, because penguins require flat surface in lower part of the exposition in order to have a safe exit from water. In other cases, aggregations of shags are always surrounded by settlements of penguins, where shags form defined monospecies “spots” which are “mixed” with nesting aggregations of penguins only at the periphery.

Low Moot Island (at 5 km northwards from the Tuxen Cape) is located almost back-to-back to coast of the Antarctic Peninsula. Despite the small size of the island (1 ha), gentoo penguins formed a settlement there ($65^{\circ}12' S$, $64^{\circ}05' W$) with high density. In 2011 number of nesting pairs was 389 there, and that of “sexually immature” — 4 ones. During the following seven years the group increased, amounting to 636 nesting pairs and 40 “sexually immature” ones.

Further northwards there is Petermann Island, where the biggest (in the research region) colony of the gentoo penguin was formed. Though suitable nesting places (free from ice) are located only in the southern and southern-eastern parts of the island, they show extremely different forms of the landform: from absolutely flat lots in the lowland and abrupt steps of the southern-western end to high rock elevations in the centre of the island. Despite some apartness of certain aggregations, total density of the settlement is unusually high. In 2011 we counted 2989 nesting pairs and 58 “sexually immature” ones there. In

2018 respective figures were: 3581 nesting pairs and 224 “sexually immature” ones. Central part of the colony can be defined on the basis of the following coordinates: 65°10' S, 64°08' W. At the same time, there are also settlements of adelic penguin on Petermann Island. Two differentiated aggregations of the species are located between the colonies of the gentoo penguin, holding clearly segregated forms of the landform (stone boulders or rock elevations) inside the island. A certain number of gentoo penguin nests are always located on periphery of such settlements. Despite the fact that a small number of adelic penguin pairs are also located sporadically among gentoo penguin nests in the lower part of the island, a slight distance is reserved between all the mentioned settlements, consequently they can be considered one colony, whose coordinates coincide with a conditional centre of the gentoo penguin settlement. In 2011 we counted 251 nesting pairs of the adelic penguin and 53 “sexually immature” ones. Till 2018 numbers decreased to 217 nesting pairs and 67 “sexually immature”.

The antarctic shag forms two separated aggregations on Petermann Island, too. The first one is located in the eastern (lowland) part of the island (in a similar way to the group on Yalour Island) — over a steep, along edge of a rock (65°10' S, 64°07' W). Number of the group almost did not change during the seven consecutive years (in 2011 — 8 nesting pairs, in 2018 — 9 ones). Nearby, nests of the adelic penguin occupy a middle part of the block, while aggregations of the gentoo penguin are located in the mountainous and lower parts of the slope. A joint placement of nests of the antarctic shag and those of the gentoo penguin in the western (elevated) part of the island (65°11' S, 64°09' W) has a different structure: nests of both the species are located on abrupt slopes of rocks, but with “diffused” placement. In this case localization of the nests varies in accordance with forms of the micro landform: shags hold tiny elevations, while gentoo penguins — depressions between the elevations (Smagol, Molchanoff, 2016). In this locality, number of shags is 50 nesting pairs and 6 “sexually immature” ones. Formation of such a big colony of Shags in the last seven years is an interesting fact, because in 2011 birds of this species were not observed there.

In 2011, on the Petermann Island in a mixed colony of the adelic penguin and gentoo penguin a singular pair of chinstrap penguin was noted; in course of time this pair raised nestlings (Pilipenko, 2013). This is probably casual fact, as well as a similar case in the Yalour Archipelago in 1998 (Peklo, 2007), where at the same time two pairs of antarctic penguins raised nestlings. However, in the following years birds of this species were observed neither on Petermann Island, nor in the Yalour Archipelago.

Northwards from Petermann Island, big Hovgaard Island is situated, and almost all its surface is covered with a deep ice coat (up to 370 m above sea level). However, open (free from ice) lots of stone strews and (here and there) moss fields have been formed along the southern-western coast. On one of such lots (65°08' S, 64°07' W) a colony of gentoo penguin was formed. The settlement is partly located on a small island (over a narrow channel from the basic group), but the biggest part of the settlement embrace foothill and abrupt elevation of the slope, with height of up to 100 m above sea level. In 2011, there were 617 nesting pairs of gentoo penguin there, but through seven years their number increased to 1631 ones. Besides, also 113 “sexually immature” pairs were counted there in 2018.

Over a narrow channel northwards from Hovgaard Island (in fact being its continuation), flat Pleneau Island is situated. The island surface gradually rises from the coast till the centre, without reaching significant elevations, but instead denuding large stone boulders suitable for nesting of the gentoo penguin. Besides, a part of the colony is located nearby on a small island, westwards from Pleneau Island. In 2011 the group comprised 2148 nesting pairs of gentoo penguin and 25 “sexually immature” ones. To 2018 the group increased to 3297 nesting pairs and 162 “sexually immature” ones. Coordinate of the settlement: 65°06' S, 64°03' W. In 2018, in the centre of colony of gentoo penguin, a single pair of adelic penguin was noted, which at the time of observation had raised nestlings. This fact

can probably be considered casual, too, in a way similar to retrospective nesting of antarctic penguins on the Petermann Island.

A settlement of antarctic shag was formed on northern abrupt slope of Pleneau Island (65°06' S, 64°04' W), surrounded by a colony of gentoo penguins. In 2011 we counted 27 nesting pairs and 2 “sexually immature” ones there. Till 2018 the group increased to 53 nesting pairs.

A group of gentoo penguins on Booth Island (northwards from Hovgaard Island) is located on its extended low western horn. However, only a small number of nesting localities are placed immediately in the lowland part with separate low residual boulders. Most part of the colony embraces a narrow enough rock elevation, dismembered by steeps which rise abruptly eastwards — towards the centre of the island. So, the colony is extremely “extended” both in length (up to 1.5 km) and in height (up to 150 m above sea level). Despite this peculiarity, the centre of the colony (65°04' S, 64°02' W) corresponds to a locality with the highest density of settlement. In 2011 number of the group was 1074 nesting pairs and 71 “sexually immature” ones. To 2018 it increased to 1657 nesting pairs and 88 “sexually immature” ones.

Meanwhile, local settlements of adelic penguin and chinstrap penguin are located literally in the centre of the group of gentoo penguin. In 2011 number of adelic penguin in this point was 9 nesting pairs and 3 “sexually immature” ones. However, till 2018 it decreased to 8 nesting pairs. Though the nesting point of chinstrap penguins remains stable for several years, its quantitative indices also degraded step by step; in 2011 there were 21 nesting pairs and 5 “sexually immature” ones here, while in 2018 only 16 nesting pairs and 3 “sexually immature” ones were counted.

The chinstrap penguins formed two micro aggregations at a small distance from each other. Localities of chinstrap penguin are demarcated by a shallow steep bank, to which coordinates of the adelic penguin settlement correspond, too. In its turn, this range coincides with the centre of the colony of gentoo penguin. So, nests of chinstrap penguin and adelic penguin are located nearby (on borders of a steep), completely surrounded by nests of gentoo penguin. The mentioned settlements can hardly be called fully valid colonies. The same is true for a single pair of adelic penguin on Pleneau Island, placed among a great colony of gentoo penguin.

Several meters below the mentioned locality, on a rock elevation among a deep depression on Booth Island, a colony of antarctic shag is placed. In 2011 it comprised 18 nesting pairs and 2 “sexually immature” ones. Till 2018 their number increased to 28 nesting pair and 2 “sexually immature” ones. Meanwhile, in 2011 on the Booth Island, at a considerable distance from this locality, another group of Shags was found: 2 nesting pairs and 1 “sexually immature” one. For the moment this group has disappeared.

Eastwards from Booth Island (over the Lemaire Channel), on projected little gullies of the Antarctic Peninsula, several gentoo penguin colonies were formed. Against a central part of Booth Island, penguins have occupied a mountainous part of the Glandaz Point. Angle of exposition of the slope is extremely abrupt (almost vertical), covered with a dense layer of packed snow and ice, therefore the settlement of penguins holds a limited lot, free from snow, on the height of 60 m above sea level approximately. Coordinates of the locality are: 65°05' S, 63°58' W. In 2011 number of the birds in this point amounted to 115 nesting pairs and 5 “sexually immature” ones. Till 2018 it slightly increased: 139 nesting pairs and 16 “sexually immature” ones.

The gentoo penguin also formed a numerous group at a distance of 3 km approximately northwards from the preceding locality (against north arm of Booth Island). In 2011, 237 nesting pairs and 8 “sexually immature” ones were counted there. For the following seven years the settlement grew to 607 nesting pairs and 78 “sexually immature” ones. The locality embraces a part of the extended Loubat Point and is also placed on abrupt slopes; however it has a noticeably bigger range. It is worth noting large distances between separate aggrega-

tions (from several dozen to several hundred meters), caused by distant location of separate anticlines, free from snow. The mentioned locality of penguins has “set up a record” as for

Table 1. The Comparison of Quantity of penguins and Shagsin 2011 and 2018 in the Area of Akademik Vernadsky Station

Distribution of colonies	Gentoo penguin, pairs				Adelie penguin, pairs				Chinstrap penguin, pairs				Antarctic shag, pairs			
	2011		2018		2011		2018		2011		2018		2011		2018	
	nesting	sex. immatur.	nesting	sex. immatur.	nesting	sex. immatur.	nesting	sex. immatur.	nesting	sex. immatur.	nesting	sex. immatur.	nesting	sex. immatur.	nesting	sex. immatur.
Berthelot Arch. 65°20' S, 64°07' W					346	28	339	75								
Green Is. 65°19' S, 64°09' W	–*	–*	17	1									78	7	89	10
Tuxen Cape 65°16' S, 64°07' W	192	17	564	12												
Rasmussen Hat 65°15' S, 64°05' W	1	0	8	0												
Yalour Arch. 65°15' S, 64°08' W	24	0	30	0												
Yalour Arch. 65°15' S, 64°09' W													16	1	11	2
Galindez Is. 65°15' S, 64°14' W	247	8	753	18												
Galindez Is. 65°15' S, 64°15' W	110	3	379	29												
Yalour Arch. 65°14' S, 64°10' W					2,555	314	2,269	319								
Uruguay Is. 65°14' S, 64°09' W													27	4	38	1
Moot Is. 65°12' S, 64°05' W	389	4	636	40												
Petermann Is. 65°11' S, 64°09' W													–*	–*	50	6
Petermann Is. 65°10' S, 64°08' W	2,989	58	3,581	224	251	53	217	67								
Petermann Is. 65°10' S, 64°07' W													8	0	9	0
Hovgaard Is. 65°08' S, 64°07' W	617	0	1631	113												
Pleneau Is. 65°06' S, 64°03' W	2148	25	3,297	162	–*	–*	1	0								
Pleneau Is. 65°06' S, 64°04' W													27	2	53	0
Glandaz Point 65°05' S, 63°58' W	115	5	139	16												
Booth Is. 65°04' S, 64°02' W	1,074	71	1,657	88	9	3	8	0	21	5	16	3	18	2	28	2
Loubat Point 65°04' S, 63°54' W	237	8	607	78												
“nameless” colony 65°03' S, 63°53' W	–*	–*	24	1												
Together	8,342		14,105		3,559		3,295		26		19		190		299	

* Earlier (in 2011) birds were not observed here.

height of settlement for this species: certain pairs built nests and hatched their nestlings on the height over 200 m above sea level. Coordinates of the settlement are: 65°04' S, 63°54' W.

The uttermost of the recorded colonies of gentoo penguin is located at a distance about 500 m approximately northwards from the preceding locality, on a small denuded lot of rock material at several dozen meters from water level. Number of the colony: 24 nesting pairs and 1 “sexually immature” pair. The coordinates are: 65°03' S, 63°53' W. It is important to note that in 2011 this group was not observed. Hence, formation of new colonies of gentoo penguin happens not only in the direction of expansion of the occurrence range southwards, but also by increase in density of settlements on the area already taken by this species.

Discussion

Common species in the ecological group of “divers” in the research region is gentoo penguin. As of 2011, in the region under investigation 12 points of their nesting were discovered, with total number of 8143 nesting pairs and 199 “sexually immature” ones (table 1). Till 2018 number of colonies of this species increased to 14, with total number of 13 323 nesting pairs and 782 “sexually immature” ones. For seven years, number of nesting points of adelic penguin almost did not change (4 colonies). Instead, total number of this species decreased somewhat: from 3161 nesting pairs and 398 “sexually immature” ones in 2011 to 2834 nesting pairs and 461 “sexually immature” ones in 2018. So, it is characteristic for the latter species a significantly higher percentage of the birds which are not involved in reproductive process. This fact explains somewhat a depression of adelic penguin population, which has been observed in certain parts of its range for recent years, as well as increasing the number of gentoo penguins and expanding their range to the south (Chesalin, 2007–2008; Chesalin et al., 2009; Lynch et al., 2010; Clucas et al., 2014). Number of chinstrap penguin in unites table locality for nesting also decreased from 21 nesting pair and 5 “sexually immature” ones in 2011 to 16 nesting and 3 “sexually immature” ones in 2018. Review of literature sources (Peklo, 2007) proves that nesting of chinstrap penguin on Booth Island and that of gentoo penguin on Green Island are the southern most points of nesting ranges for each of the species, which allows to draw conclusion about priority of the region where Ukrainian Antarctic Station Akademik Vernadsky is situated for biological investigations (in particular, for ornithological ones). Also, 7 colonies of antarctic shag were found in the region under investigation. Total number of this species in the region under investigation for seven years grew from 174 nesting pairs and 16 “sexually immature” ones in 2011 to 278 nesting pairs and 21 “sexually immature” ones in 2018, and in most cases this species form settlements jointly with penguins. The results obtained are of interest against the background of a stable abundance of the species or even some decrease in some parts of the range over the past years. (Casaux, Barrera-Oro, 2016; Schrimpf, Naveen, Lynch, 2018).

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