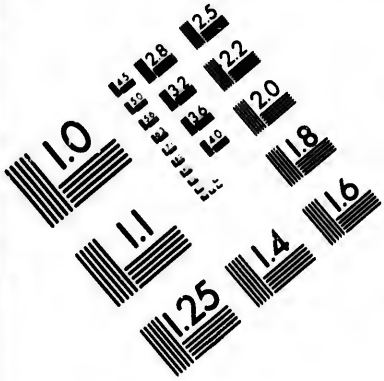
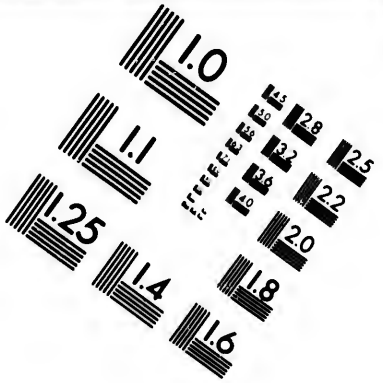
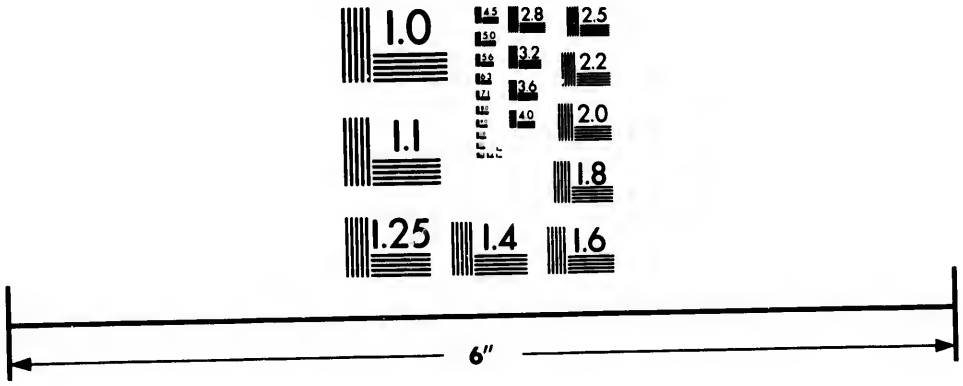
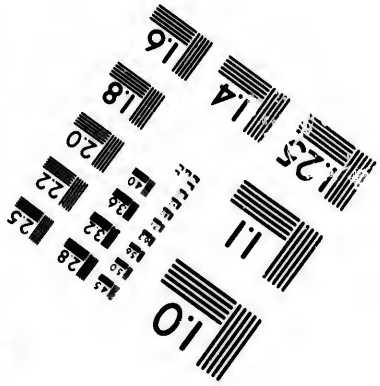
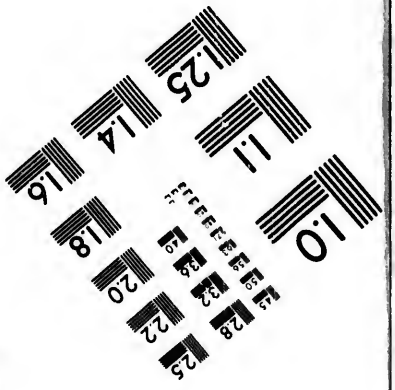



# IMAGE EVALUATION TEST TARGET (MT-3)




Photographic Sciences Corporation

23 WEST MAIN STREET
WEBSTER, N.Y. 14580
(716) 872-4503

## Technical and Bibliographic Notes/Notes techniques et bibliographiques

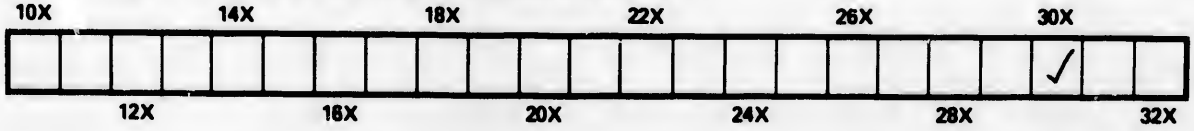
The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

- ☐ Coloured covers/ Couverture de couleur
- ☐ Covers damaged/ Couverture endommagée
- ☐ Covers restored and/or laminated/ Couverture restaurée et/ou pelliculée
- ☐ Cover title missing/ Le titre de couverture manque
- ☐ Coloured maps/ Cartes géographiques en couleur
- ☐ Coloured ink (i.e. other than blue or black)/ Encre de couleur (i.e. autre que bleue ou noire)
- ☑ Coloured plates and/or illustrations/ Planches et/ou illustrations en couleur
- ☐ Bound with other material/ Relié avec d'autres documents
- ☐ Tight binding may cause shadows or distortion along interior margin/ La reliure serrée peut causer de l'ombre ou de la distortion le long de la marge intérieure
- ☐ Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/ Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.
- ☐ Additional comments:/ Commentaires supplémentaires:

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- ☐ Coloured pages/ Pages de couleur
- ☐ Pages damaged/ Pages endommagées
- ☐ Pages restored and/or laminated/ Pages restaurées et/ou pelliculées
- ☑ Pages discoloured, stained or foxed/ Pages décolorées, tachetées ou piquées
- ☐ Pages detached/ Pages détachées
- ☐ Showthrough/ Transparence
- ☐ Quality of print varies/ Qualité inégale de l'impression
- ☐ Includes supplementary material/ Comprend du matériel supplémentaire
- ☐ Only edition available/ Seule édition disponible
- ☐ Pages wholly or partially obscured by errata slips, tissues, etc., have been refilmed to ensure the best possible image/ Les pages totalement ou partiellement obscurcies par un feuillet d'errata, une pelure, etc., ont été filmées à nouveau de façon à obtenir la meilleure image possible.

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.



The copy filmed here has been reproduced thanks to the generosity of:

Library Division
Provincial Archives of British Columbia

The images appearing here are the best quality possible considering the condition and legibility of the original copy and in keeping with the filming contract specifications.

Original copies in printed paper covers are filmed beginning with the front cover and ending on the last page with a printed or illustrated impression, or the back cover when appropriate. All other original copies are filmed beginning on the first page with a printed or illustrated impression, and ending on the last page with a printed or illustrated impression.

The last recorded frame on each microfiche shall contain the symbol → (meaning "CONTINUED"), or the symbol ▽ (meaning "END"), whichever applies.

Maps, plates, charts, etc., may be filmed at different reduction ratios. Those too large to be entirely included in one exposure are filmed beginning in the upper left hand corner, left to right and top to bottom, as many frames as required. The following diagrams illustrate the method:


L'exemplaire filmé fut reproduit grâce à la générosité de:

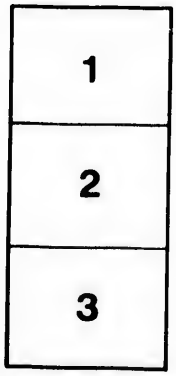
Library Division
Provincial Archives of British Columbia

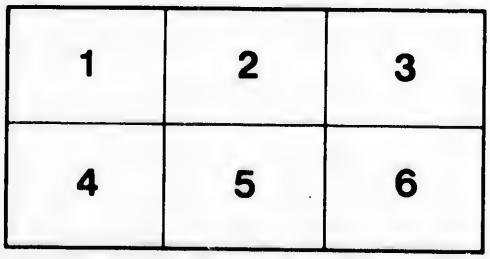
Les images suivantes ont été reproduites avec le plus grand soin, compte tenu de la condition et de la netteté de l'exemplaire filmé, et en conformité avec les conditions du contrat de filmage.

Les exemplaires originaux dont la couverture en papier est imprimée sont filmés en commençant par le premier plat et en terminant soit par la dernière page qui comporte une empreinte d'impression ou d'illustration, soit par le second plat, selon le cas. Tous les autres exemplaires originaux sont filmés en commençant par la première page qui comporte une empreinte d'impression ou d'illustration et en terminant par la dernière page qui comporte une telle empreinte.

Un des symboles suivants apparaîtra sur la dernière image de chaque microfiche, selon le cas: le symbole → signifie "A SUIVRE", le symbole ▽ signifie "FIN".

Les cartes, planches, tableaux, etc., peuvent être filmés à des taux de réduction différents. Lorsque le document est trop grand pour être reproduit en un seul cliché, il est filmé à partir de l'angle supérieur gauche, de gauche à droite, et de haut en bas, en prenant le nombre d'images nécessaire. Les diagrammes suivants illustrent la méthode.



with Professor D'Arcy
compliments

# REPORT

BY

## PROFESSOR D'ARCY THOMPSON

ON HIS

# MISSION TO THE BEHRING SEA IN 1896,

DATED MARCH 4, 1897.

---

# REPORT

BY

## PROFESSOR D'ARCY THOMPSON

ON HIS

# MISSION TO THE BEHRING SEA IN 1896,

DATED MARCH 4, 1897.

# Report by Professor D'Arcy Thompson on his Mission to the Behring Sea in 1896, dated March 4, 1897.

---

My Lord, *March* 4, 1897.

AFTER visiting, according to your Lordship's instructions, the Pribyloff and Commander Islands for the purpose of investigating the condition of the seal rookeries thereon, I have the honour to submit the following Report:—

2. The main object of my mission was the collection of information and statistics with regard to the working and effectiveness of the Regulations for the fur-seal fishery prescribed by the Award of the Paris Arbitration Tribunal.

3. It was particularly enjoined on me to investigate the breeding rookeries with a view to ascertaining the extent and causes of the alleged mortality of unweaned pups.

4. I was further instructed to inspect and estimate the number of seals resorting to the islands, and in particular to the Pribyloff Islands, and to compare the phenomena that I witnessed with the information and statistics supplied for the season of 1895 by the American Agents. (54th Congress, 1st Session, Sen. Doc. 137, Part I, pp. 372, 373.)

5. Lastly, I was directed to call upon the authorities in Washington and Ottawa, and to obtain there, and collect also from persons connected with the sealing industry in Victoria, information bearing on the business of my mission.

6. Mr. G. E. H. Barrett-Hamilton was associated with me and placed under my orders, with instructions to proceed, in the first instance, to Robben Island and the Commander Islands, and to investigate those localities in particular. Mr. James Macoun was associated with me as an Agent of the Dominion Government, and Mr. A. Halkett was directed at the same time by the same Government to proceed to Behring Sea on board a sealing-schooner, and to watch during the summer the methods and results of the pelagic industry.

7. I left England on the 23rd May, and arrived in Washington on the morning of the 30th May. His Excellency Sir Julian Pauncefote presented me to Mr. Olney and to Mr. C. S. Hamlin, Assistant Secretary to the United States' Treasury. With the latter gentleman, who had himself visited the seal islands in the summer of 1894, I had the benefit of much conversation, together with the advantage of introductions to the whole body of naturalists resident in Washington who had given thought to the matter, or participated in the research. Among those who did most to entertain and enlighten me were Mr. J. Browne Goode, of the Smithsonian Institute, the news of whose untimely and lamentable decease was to reach me ere my return; Commander J. J. Brice, of the Fisheries Department; Mr. Ridgway, Assistant in the same Department; Dr. L. Stejneger, Mr. F. True, and Mr. F. A. Lucas, of the National Museum, who had all been, or were about to be, employed in this particular inquiry.

8. On the night of the 3rd June, I left Washington for Ottawa, in company with Mr. J. Macoun, who had met me in New York. From Ottawa I journeyed to Quebec, at the request of his Excellency the Governor-General, in order to confer with his Excellency regarding the object of my mission. Returning to Ottawa on the 9th June, I discussed the whole question at length with Dr. G. M. Dawson, who was kind enough to draw up a collection of notes and suggestions for my information and guidance. In company with Messrs. Macoun and Halkett, I left Ottawa on the 10th June, and arrived in Victoria, British Columbia, on the 15th June.

9. In Victoria I associated and conversed with a number of the captains of sealing-schooners, who were then engaged in fitting out their vessels for the summer's cruise, and especially with Captain Sieward, of the "Dora Sieward," who had offered the hospitality of his ship to Mr. A. Halkett for the summer. I became acquainted also with several gentlemen connected with the industry, and particularly with Mr. Joseph Boscowitz, a leading trader, with large interests in the sealing business.

Admiral Stephenson, who was at that time leaving the station, and Admiral H. St. John Palliser, who was then assuming the command, received me with much kindness, and undertook to meet my requirements for conveyance in or from Behring Sea on board Her Majesty's ships.

I had previously received information that the United States' Government had extended to me an invitation to proceed to Behring Sea on board the United States' ship "Albatross," and I now learned that an American Commission had been appointed on the 18th June (since my departure from Washington) for an identical investigation. This Commission was headed by Dr. David Starr Jordan, President of the Leland Stanford University. Mr. Joseph Murray, of Fort Collins, Colorado, formerly United States' Treasury Agent at St. Paul Island, was selected as Assistant Commissioner, and the following gentlemen from the United States' National Museum and the United States' Fish Commission were detailed as associates: Lieutenant Commander Jefferson F. Moser, commanding the United States' Fish Commission steamer "Albatross;" Dr. Leonard Stejneger, Curator of Reptiles, United States' National Museum; Mr. Frederic A. Lucas, Curator of Comparative Anatomy, United States' National Museum; and Mr. Charles H. Townsend, Naturalist of the "Albatross."

Mr. G. A. Clark acted as Secretary to the Commission, and took a very important part in its subsequent investigations.

10. On the 19th June I departed from Victoria for Seattle, in the State of Washington, to join the "Albatross." On the 24th June I set sail from Seattle for Unalaska on board that vessel, in company with the American Commissioners and Mr. Macoun, Mr. Barrett-Hamilton being then on his way from San Francisco to Japan, *en route* for the Kurile Islands and the Sea of Ochotsk.

11. On the 3rd July we reached Unalaska, and disembarked on the 8th July on the Island of St. George. We were here received with great kindness by Mr. James Judge, Resident Agent of the United States' Treasury, and by Dr. L. A. Noyes and Captain Daniel Webster, of the North American Commercial Company.

12. On the 12th July we left the Island of St. George, and arrived on the same day at that of St. Paul, where we were received by Mr. J. B. Crowley, Resident Agent of the United States' Treasury, by Mr. J. B. Stanley Brown, Agent of the North American Commercial Company, and by Dr. O. H. Voss and Mr. J. C. Redpath, officials of the Company. Quarters were provided for us in the Company's house, a small laboratory and a photographic room were presently fitted up for our use in an empty hut, and then and thereafter, during the whole of our stay, we experienced the greatest kindness and attention from the above-named gentlemen and from the people of the island.

13. On the 15th August Her Majesty's ships "Satellite" and "Icarus" arrived off the island. On the following morning I embarked for the Commander Islands on board the "Satellite," accompanied by Dr. Jordan, to whom Commander Allen had offered the hospitality of the ship.

14. On the 22nd July we arrived at Behring Island, where we were received by Mr. Emil Kluge, agent for the Russian Fur Company.

We learned that the Governor of the islands, Colonel Grebnitzki and Mr. Barrett-Hamilton were both on Copper Island, and we accordingly set sail thither on the 24th July. On the intervening day it was impracticable to visit the rookeries, 12 miles distant from our anchorage at Nikolski, and our intention to return thither had to be afterwards abandoned.

15. On the 25th July, in the early morning, we anchored off the village of Preobrajenski, in Copper Island, where I immediately landed and paid my respects to the Governor. We then, accompanied by Mr. Barrett-Hamilton, sailed to the neighbouring village of Glinka, from which place we crossed the island, and, under the guidance of Major Waxmuth, Governor of Copper Island, spent a day in surveying seven out of the twelve portions that constitute the great rookery which takes its name from the village. Our journey going and coming followed two of the three chief drive-routes of the seals.

16. The conditions of weather and the difficulties of anchorage and of landing rendering it inadvisable to delay, and the other Commander Island rookeries having been sufficiently surveyed by Mr. Barrett-Hamilton, we departed the same night on our return

voyage to the Pribyloffs by way of Unalaska, from which place Her Majesty's ship "Pheasant," Commander F. A. Garforth, conveyed us to the islands.

17. We regained the Island of St. Paul on the 1st September. On the 8th September, in company with Dr. Jordan and Mr. Lucas, of the American Commission, I left St. Paul on board the United States' revenue-cutter "Rush," Captain W. H. Roberts, reached Sitka on the 22nd September, and arrived in Victoria on the 30th September. Messrs. Barrett-Hamilton and Macoun and Mr. Clark and Colonel Murray, of the American Commission, remained behind upon the islands, in order to resume and repeat during the first days of October the investigation and count of the dead pups.

18. I spent some days in Victoria, during which time Mr. A. R. Milne, C.M.G., Collector of Customs, furnished me with much information, and made me acquainted with several gentlemen versed or interested in the seal question, besides those whom I had met formerly.

19. Leaving Victoria on the 10th October, I travelled, in accordance with my instructions, to Ottawa, for the purpose of conferring with Dr. G. M. Dawson, and also, in the absence of the Minister of Marine and Fisheries, with Mr. Gourdeau, the Deputy Minister, and with Professor Prince, Commissioner of Fisheries. I had also here an opportunity of discussing the circumstances of the case with Sir C. Hibbert Tupper, who was about to proceed to Victoria as counsel for the Canadian sealers in the cases awaiting arbitration.

20. On the 20th October I left Ottawa, and arrived in London on the 31st October.

21. It is my duty to inform your Lordship that I and my colleagues received at every stage of our journey and in every portion of our work such kindness and hospitality as call for the warmest expression of our thanks. In our association with the officials of the United States' Government, with the captains and officers of the United States' ship "Albatross," with the captains and officers of the United States' revenue-cutters cruising in Behring Sea, in the conduct of the Company's officials resident on the islands, and in a very high degree in the attitude of the American Commission, we recognised continual anxiety for our comfort, and thoughtful provision for the accomplishment of our business.

It deserves to be particularly recorded that on the islands we enjoyed, together with the American Commissioners, opportunities and privileges that had never before been accorded to any investigators, whether American or British; that the utmost liberty of action within the bounds of reason was permitted us; that, in short, we were left free to see all that was to be seen, and to do whatsoever commended itself to our inclinations or judgment.

22. Lastly, it behoves me to acknowledge that in the investigations presently to be described my own part was that of one among many, and that the chief burden lay with Dr. Jordan and his Commission. On those great and scattered rookeries a man working singly can do little, where a company working in collusion can do much. Accordingly it was my business to co-operate continually with the Americans, to see what they saw, and to participate in what they did; and, as an eye-witness of all that they witnessed, I desire to place my testimony on record that the general success of our expedition, the new knowledge as to matters of fact that we obtained, and in particular the censuses that we for the first time attempted and achieved, were one and all the direct result of Dr. Jordan's counsel and leadership.

It is my purpose to deal in this Report with the general case under the following sub divisions:—

1. The present condition of the seal rookeries on the Pribyloff Islands.
2. The extent and causes of the mortality of pups.
3. The driving and killing of seals on the islands and other matters of local management.
4. Statistics of the industry.

To the Marquess of Salisbury,
&c. &c. &c.

---

## St. George Island.

### *The Aspect and Condition of the Rookeries.*

#### *North Rookery.*

This rookery occupies a stretch of rough shore, strewn with great blocks of basalt, for the space of about 1,000–1,100 yards west of the village, on the north shore of the island.

Behind the more or less narrow beach rise low cliffs, broken here and there by gullies giving easy access to the gently sloping plateau above, the main resort of the young seals and bachelors. Such a configuration of low beach and higher background conveniently approached is characteristic of the majority of the rookeries on both islands. In this case a deep gully at the east (cf. photograph No. 93) and another about 300 yards beyond the west end of the breeding rookery form the main ascents to the hauling-grounds. The westernmost gully of the actual rookery (photograph No. 94) was, we were told, an important ascent to the hauling-grounds ten or fifteen years ago.

The harems occupy the beach in a line at first sight continuous, but interrupted by five short breaks amounting in the aggregate to a space of about 150 yards. In the two westernmost patches of the rookery the harems run back from the beach up two convenient gullies to a distance in the westernmost case of about 50 yards from the shore in the early part of the season.

On our first visit (the 8th July) we attempted to compare the aspect of the rookery with the outlines marked by Mr. Townsend, on the 18th July, 1895, upon Mr. Stanley Brown's map of the rookery (cf. Sen. Doc. 137, Part II, Chart I).

Mr. Townsend pointed out to us that the extremities of the re-entrant avenues in the western gullies were now apparently slightly curtailed, that a small break existed, not marked in his map, in the first or eastern patch, and that the middle patches were thinned off at their ends. But it seemed to me that in at least one part (of the westernmost patch but one) the space occupied was broader than the map displayed; and bearing in mind, firstly, that the original survey was a rough one (as Captain Moser and his officers proved by a partial resurvey this year), and, secondly, that the plotting of the occupied areas by a bird's-eye inspection was rougher still, and, thirdly, that our visit was ten days earlier in date than that of Mr. Townsend the year before, and fell by so much the more short of the period of maximum expansion of the rookery, it seemed clear to me that at least no such curtailment of the rookery's extent had taken place within a year as could be certainly discerned by the eye or demonstrated on the chart.

(The "spreading" of the rookery as the season advances may be shown by a comparison of Mr. Macoun's photographs Nos. 2, 4, taken the 10th July, 1896, with mine No. 93 taken from the same station on the 30th July.)

On the hauling-ground above the eastern end of the rookery (still on the occasion of our first visit) we saw a body of about 200 bachelors, mostly young or old, those of intermediate "killable" size being very few. A "drive" had taken place two days previously (the 6th July) from this rookery and the neighbouring one of Staraya Atil, at which 700 were killed. The circumstance that another drive on the 13th July from the same two rookeries yielded 487 skins, and a final one, on the 24th July, 308, illustrates the fact that the bachelors, at least, are never all at once upon the rookery, but keep coming and going between land and sea, so that any one apparent clearance is never a complete one.

We counted a large number of harems with a view to ascertaining the average number of cows. I, for instance, counted 34 harems west of the middle point of the rookery, and obtained the following numbers:—43, 14, 15, 16, 67, 15, 8, 1, 2, 3, 1, 4, 50, 4, 1, 26, 10, 3, 10, 1, 4, 16, 5, 7, 49, 12, 5, 1, 132, 31, total 563, giving an average of about 16·6.

The large harem numbering 132 cows was by far the largest that we met with during the summer. It was situated on the smooth flat rock above the last gully but one to the west, its position being near the left of my photographs Nos. 90 and 91. The bull was very large and active, going round and round his cows. In his immediate neighbourhood were eight other well-grown bulls, one with fourteen cows, two with one each, the rest with none.

On my subsequent visit on the 30th July this large harem we found to be broken

up and apparently divided between six or seven bulls. Within a short distance of it were nineteen harems and six well-grown bulls still "idle."

We have here illustrated several elementary facts of seal economy; for instance, that there is no moderation in the bull's desires, but that he gets to himself as many cows as he possibly can; that the harems are as diverse in number as the bulls are unequal in strength and ferocity; that the harems, once formed, are not immutable, but may in the ceaseless combat be broken up and redistributed; and that many bulls, apparently in full strength and vigour, may for months together fail to establish a harem at all.

Other partial counts of the rookery (still on our first visit) gave us, for instance, 684 cows to 35 bulls (average 19·5), 510 to 30 (average 17), 874 to 54 (average 16·2), on the whole an average of 17·4, and this was very approximately the average that similar counts elsewhere afterwards led us to.

On the 30th July Colonel Murray, together with Mr. Lucas and me, counted the harems then existing on North Rookery, and found 225, with about 100 idle bulls. Colonel Murray's statistics for the previous year give 100 harems and 50 idle bulls. (Sen. Doc. 137, 1, p. 373.)

### *Staraye Atil.*

The rookery of Staraye Atil occupies, like several others (*e.g.*, at Zapadnie and East Rookeries on St. George Island), the place where a comparatively level shore merges into a line of cliffs. The bevelled end of the higher ground in such cases furnishes a gradual slope upon which the body of seals extends to a considerable elevation. At Staraye Atil a high green hill-side slopes in semi-circular form to a shingly tract facing northward. In a hollow between is a small lake, the resting-place of innumerable kittiwakes. Beyond the western point of the bay the coast bends at a sharp angle south-westward, and changes to a line of cliffs, precipitous, inaccessible, and unapproachable. The sharp ascending summit-line of the beginning of the cliffs forms the boundary of the hollow. The main rookery faces north-west, occupying the border of the slope towards the edge of the precipice, to about half-way up. On the front of the green hill-side, two thick patches of wild celery (*angelica*) form a conspicuous land-mark, and around these and below them is visible the outline of the old hauling-ground, less distinct than in the photographs of 1892. On the 30th July a considerable body of bachelors was seen high on the hill above the main rookery, while other bachelors and idle bulls congregated in small numbers on the beach.

A comparison between Mr. Townsend's photograph No. 38 (18th July, 1895) and mine No. 1 (7th July, 1896) or No. 89 (30th July) shows clearly enough that no conspicuous change had taken place in the rookery within a twelvemonth, while a comparison of the last two, taken at an interval of three weeks, shows that in the course of the season the rookery had spread somewhat further up the hill and somewhat further from the edge of the cliff.

In this rookery Colonel Murray counted, in my presence and Mr. Lucas's, on the 30th July, seventy-five harems and seventy-five idle bulls. His statistics for 1895 give sixty harems and forty idle bulls.

### *Zapadnie (St. George).*

This rookery occupies the southern half of a wide bay on the south-west side of the island. To the southward, as at Staraye Atil, beyond the point which terminates the bay, a line of high cliffs succeeds to a level stretch of shore. The rookery consists of two elongated patches on the beach and a third larger patch which partly lies below and partly ascends the sloping edge of the rising ground where the beach merges into the cliffs. The main hauling-ground for the bachelors lies between the two latter portions, and above and behind the last.

We first visited this rookery on the 9th and 11th July.

The first or northernmost patch upon the beach then contained thirty-two harems, the nine largest counting from ten to thirty-three cows, the rest varying from one upwards, giving (at this date) the low average of 9·2 cows to each. Twenty-four large idle bulls were counted in the immediate neighbourhood. The great number of idle bulls in all parts was a conspicuous feature of this rookery.

The middle patch of the same rookery is somewhat larger.

Both of these patches appeared to be somewhat narrower than Mr. Townsend had represented them in his chart of 1895, but the first patch seemed to me somewhat more

elongated along the shore in a northerly direction. At this date the region close to the water was in both photographs almost unoccupied, and in neither case did the harems rise up above the sloping tract to the level of the higher ground. They had to some extent spread out backwards by the time of our second visit on the 1st August.

The south end of the rookery is of greater extent and much more populous. It commences where the level ground meets the cliffs. The harems ascend the slope, on which a broad shelf or "bench" gives a convenient habitation for many, and a small number of harems run along the beach for a short distance below the first stretch of ascending cliffs. Reference both to the map and the photographs tends to show that this rookery has diminished in recent years. We must make some allowance for the fact that our first photographs of this year were taken (11th July) before the spreading of the rookery had begun, and that my second series were made (1st August) when many cows had begun to go to sea; but, nevertheless, it is evident that Mr. Townsend's photographs Nos. 39 and 40 (18th July, 1895) depict a larger body of seals, both on the slope of the hill and in the distant patches of the rookery, than do my corresponding ones, No. 13 (11th July) and No. 98 (1st August). Mr. Macoun's photograph No. 59 of the 29th July, 1892, shows also a decidedly larger mass of seals on the slope of the hill than do Mr. Townsend's pictures of 1895.

This reduction of numbers on Zapadnie is, I think, unmistakable, and it deserves to be pointed out that there seemed to be no particular circumstances attending our inspection of this rookery, no special facilities for our close examination of it, such as might account for a decrease being here more easily demonstrated than on other rookeries where we failed to observe it.

On the other hand, while the photographs undoubtedly give indications of a diminution, its extent must not be exaggerated. On comparing my photographs above quoted of the 11th July and 1st August, we see that on the slope of the hill there were far fewer seals present at the latter than at the former date, while a very large number are congregated below the cliff. In this latter situation there appeared to me to be at least 1,000 pups. The day was exceptionally bright and warm, and I think the rookery was in part deserted. Moreover, Colonel Murray's actual count gives us for 1896 182 harems and 100 idle bulls, against 110 and 50 respectively for 1895. For this reason I can lay little stress on the apparent indications of decrease since last year, although I think that in the longer interval since the taking of Mr. Macoun's photograph of the 29th July, 1892, the diminution in this particular locality is distinct and considerable.

### *East Rookery.*

East Rookery lies along a convex shore near the extreme end of the north side of the island. In the eastern portion of the rookery, as at Zapadnie and Staraye Atil, the low-lying shore merges into a line of cliffs, and the harems are in part scattered upon the connecting slope and in part distributed further eastward beneath the cliffs. The open part of the tract, on which are four or five patches of seals, is divided by a small point and terminated by another. A little lake intervenes between the first point and the sloping hill. On the rough face of the latter, as at Staraye Atil, is the main body of seals, thinly scattered and not nearly covering the whole face of the hill. On this portion and on the beach below are about sixty bulls with harems. On the more inland portion of the slope and around and behind the little lake, are congregated the bachelors. On the shore in front of the lake, and again between the two western points, are colonies of sea-lions, the first including about 150 individuals, the others much smaller. Still further to the westward is yet another point occupied by sea-lions; and between this and the former one, well up beyond the beach, are bands of bachelors.

On the beach between the lake and the first point were about twenty harems, between the two points thirty-three, and below the cliffs to the eastward of where our joint count began Mr. Lucas counted nineteen.

### *Little East Rookery.*

This little rookery occupies a rough stretch of very rocky shore, about 400 to 500 yards west of East Rookery. We found it to contain forty bulls with harems.

In the case of the small rookery of Little East, the photographs give an adequate picture of the breeding herd. I think that a comparison of Mr. Townsend's photograph No. 39 (18th July, 1895) with mine No. 2 (9th July, 1896) or No. 84 (29th July, 1896) shows very clearly that the rookery was at least as well filled last year as the year before.

Taking East and Little East together, Colonel Murray counted (1st August, 1896) 179 harems and 55 idle bulls, that is to say, about as many harems as at Zapadnie and but half as many idle bulls. His figures for last year give 105 harems (East 80, Little East 25) and 60 idle bulls (East 40, Little East 20).

(I may here venture to say in parenthesis that, while Colonel Murray's enumeration always seemed to me most careful, I was on the occasion of this visit particularly impressed by his punctilious accuracy. While in every case his count nearly tallied with my own, yet in every section of the rookery his figures exceeded mine by a unit or two, showing that he had every here and there detected a harem which had escaped my eye.)

In the following table of statistics from St. George Island, I have set side by side the results of this year with those of last. For this year we have the count of harems (and idle bulls) made by Colonel Murray in company with Mr. Lucas and myself. The number of cows is estimated, first, on the basis of 17·3 cows to the average visible harems; secondly, plus the addition of 75 per cent. deduced from our count of pups on Ketavie, and elsewhere, which count showed to that extent a larger number of pups than of cows present at any one time (*vide infra*, pp. 9, 10). For 1895 we have, firstly, Colonel Murray's similar count of bulls and of harems, which he then made out to be over 43 per cent. less numerous than last year; the cows he estimated at 40 to a harem, as against our extreme corrected estimate of 30·2 ($17·3 \times \frac{175}{100}$), nevertheless producing a total, 35 per cent. below that accepted for this year by the American Commissioners and by ourselves. Lastly, we have for 1895 the rough estimate based on average of Messrs. True and Townsend, who place the number of cows at over 55 per cent. less than the number admitted to exist this year; and the fact that, according to these gentlemen, the number of bulls was comparatively high (only 16 per cent. below our own), is not of equal importance, for their estimate was based primarily on the cows, and the bulls were not counted at all.

STATISTICS for St. George Island, 1895–96.

| Rookery. | 1895. | | | | | 1896. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Colonel Murray. | | | Messrs. True and Townsend. | | Colonel Murray. | | Dr. Jordan. | |
| | Harems. | Idle Bulls. | Cows at 40. | Harems. | Cows. | Harems. | Idle Bulls. | Cows at 17·3. | Cows + 75 per cent. |
| North .. .. | 100 | 40 | 4,000 | 175 | 2,800 | 225 | 100 | 3,891 | 6,809 |
| Staraye Atil .. | 60 | 50 | 2,400 | 87 | 1,398 | 75 | 75 | 1,297 | 2,269 |
| Zapadnie .. .. | 110 | 50 | 4,400 | 174 | 2,786 | 182 | 100 | 3,148 | 5,508 |
| East .. .. | 80 | 40 | 3,200 | 92 | 1,476 | 135 | 55 | 2,335 | 4,086 |
| Little East .. | 25 | 20 | *1,000 | 33 | 527 | 14 | | 761 | 1,381 |
| Totals .. | 375 | 200 | 13,000 | 560 | 8,987 | 661 | 335 | 11,432 | 20,003 |

I do not in this case, nor in other similar cases in the sequel, quote my friends, Messrs. True and Townsend, with the least intention of imputing inaccuracy to their observations. On the contrary, I shall take pains to show in another place that we have ample indications of the care and accuracy with which their estimate was made, according to their opportunities and the knowledge current in their time. It is Dr. Jordan's own discovery of the fact that no enumeration of cows, even at the "height of the season," comes within 75 per cent. of the actual number appertaining to the rookery, that has thrown a new light upon the question and shown us that such numerical estimates as those of Messrs. True and Townsend were utterly misleading, in spite of all their care and truth and accuracy.

I do not claim the right to draw from these discrepant figures any positive evidence of an actual increase of the herd on St. George's Island between the seasons of 1895 and 1896, or at least any accurate measure of such an apparent increase. But, on the other hand, it is abundantly clear that we have no evidence at all to show a decrease during that period, and further that the state of the herd upon the island is at least very much better than it was believed to be on the authority of the American Agents of 1895.

## St. Paul Island.

### *Ketavie.*

The rookery of Ketavie lies on the eastern side, near the south end of St. Paul Island, on the opposite side to, but within a short walk of, the village. It runs along the shore for nearly a mile of coast-line, beginning some 300 yards from Ketavie Point, along the northern shore of a crescent-shaped bay, and then extends from Ketavie Point due north to another point forming an artificial boundary between it and Lukannon. The first portion south of the point occupies a steep beach, shingly and rocky. The northern portion consists of straight stretches interrupted by small coves or bays, of which the last one is next to Lukannon, and forms a natural amphitheatre. Close to the water's edge the shore consists of an entablature of columnar basalt, above which a shelving slope, gravelly and stony, leads with or without bolder interruptions to the level ground above. The chief hauling-ground lies near the south end of the rookery, and is approached from seaward in the neighbourhood of Ketavie Point. The rookery affords peculiar facilities for close inspection, and the counts made upon it are of particular importance.

We visited Ketavie for the first time on the 13th July. In the little amphitheatre-shaped bay already mentioned I then counted 500 cows, and Dr. Stejneger, counting independently, made out 501. Taking the bay and a little tract adjoining, I counted thirty-five harems with from 1 cow to 80 (the next largest being 75, and the next 53), and with a total number of 781, giving the large average to each of 22·1. There were rather more than twenty idle bulls within this area.

On the next portion, which consists of a broken terrace of columnar basalt, with a narrow sandy acclivity behind, I found the first twenty-five harems to include 395 cows (1 to 56), giving an average of 15·2. The further counts made on this occasion need not be recapitulated. They were not complete, and only give an idea of the average size of the harems.

My photograph of the middle portion of Ketavie, looking towards Ketavie Point (No. 16, 13th July, 1896), coincides in position with that of Mr. Macoun (No. 16, 25th July, 1892) and that of Mr. Townsend (No. 14, 20th July, 1895). I cannot detect any appreciable difference in the number of seals represented in the three.

The small bay already twice alluded to is beautifully depicted in Mr. Townsend's photograph No. 13 (20th July, 1895), and is also very clearly portrayed in my No. 15 (13th July, 1896). It seems to me that there are actually considerably more seals figured in the latter picture. However, I do not wish to press this point too much, for it may be that at the later date a larger number of cows were feeding: . But, on the other hand, Mr. Townsend's photograph does not show any great preponderance of pups, and at the date when it was taken the older females have not, as a matter of fact, betaken themselves in large proportion to the water. My companion picture (No. 116), taken on the 8th August, 1896, shows, however, that by that time a partial exodus has taken place, and the spot is black with a crowd consisting almost wholly of pups grouped around the bulls. Moreover, the photograph at this last date shows the rookery dispersed much higher up the ascent, the earlier photographs—mine and Mr. Townsend's—alike showing the rookery in its earlier, more restricted condition.

Whether or not there be any reasonable grounds for suspecting an increase, I am perfectly certain in my own mind that there is no evidence at all of recent diminution in this rookery.

On the same date (13th July) of our first visit Colonel Murray counted 190 harems and 100 idle bulls (according to the list communicated to me by him on the 7th September). At the average rate adopted by us of 17·3 cows to a harem at this period, that number would give 3,217 cows. The figures adopted by Dr. Jordan (Preliminary Report, p. 16) show 182 harems, and (at the same average) 3,152 cows, an unimportant difference. In 1895 Colonel Murray set the total at 200 harems and 50 idle bulls.

It was in this rookery, after noticing the apparently disproportionate number of pups, that Dr. Jordan initiated the crucial experiment of counting the latter. The count of living pups on Ketavie was performed on the 15th August, and showed the surprising number of 6,049. This figure represents an increase of 91 per cent. over what we had at first believed to exist on the basis of Dr. Jordan's entire estimate, or of 88 per cent. on the basis of Colonel Murray's.

*Note.*—Dr. Jordan's figures for the other rookeries are calculated by adding 75 per cent. to those furnished by the count of harems in the earlier part of the season after

allowing, as was then done, 17·3 cows to a harem. The strict count made upon Ketavie would, as is above shown, permit the addition of 90 per cent. rather than 75 per cent., and, indeed, Dr. Jordan himself speaks (Preliminary Report, p. 20) of the number of pups on any rookery being nearly double the greatest number of cows counted upon it at any one time. The lower figure is adopted on the ground of a lower result obtained on Lagoon Rookery and the Reef of Zapadnie.

We may now sum up the statements made for this year and last as to the number of female seals on Ketavie.

Mr. True (Sen. Doc. 137, Part II, p. 101, 1896) gives as the result of an actual count made between the 8th and 10th July, 1895, a total number of 2,640.

In the same year Colonel Murray estimated the number at 8,000, using the very high average of forty cows to a harem. Had he set the average at thirty, a number that would now seem to be a more reasonable one, his result would have tallied almost exactly with the 6,049 that were this year demonstrated by actual count of the pups; and if we add to Mr. True's actual count of 2,640 the increase of 91 per cent. to which the count of the pups now entitles us, we reach the figures of 5,042 for 1895, a number which may or not, as we please, be employed to indicate a positive increase since that time.

It is noteworthy that this rookery of Ketavie seemed to the gentlemen who inspected it five or six years ago to present particularly serious indications of loss and diminution.

In his Report for 1893 (Sen. Doc. 137, Part II, p. 6, 1896) Mr. Townsend says: "Ketavie, now the thinnest rookery on the islands, shows a perceptible decrease since 1892. This decrease is perceptible in some, if not all, of the photographs of the rookery." And, again, in the following year, Mr. Townsend says (*ibid.*, p. 12): "This small and gradually diminishing rookery, I believe, shows a shrinkage since last season, but not a very marked one." It may be remarked that in this last Report this was the only instance on St. Paul Island in which Mr. Townsend chronicled a shrinkage since the previous year.

### *Lukannon.*

Lukannon Rookery is in reality, as has been stated already, continuous with Ketavie. It runs from the end of the latter rookery along half-a-mile or so of rocky shore, till the rocks end in the sandy beach that stretches all the way to Half-way Point and Polavina Rookery. The hauling-ground is at the northern end, near the sandy beach. This long sandy beach later on in the season, in late August and September, is thickly dotted with bulls from the adjacent rookeries, as are the sands of Middle Hill and English Bay on the other side of the island. The hauling-ground of Lukannon is said to be remarkable for the large proportion of young males that its drives furnish, and is spoken of on the islands as "the nursery" in consequence.

The photographs (Macoun's No. 64, 6th August, 1892, Townsend's No. 11, 20th July, 1895, and mine No. 22, 13th July, No. 23, 15th July, and No. 119, 8th August, 1896) are on different scales and for the most part from different points of view, and hence do not give us very much information as to the relative states of the rookery; but, so far as they can be compared, my No. 119, when regarded together with those of the earlier years, shows no perceptible decrease.

It struck me on our first visit (13th July) that idle bulls were very numerous here at that time, and that the harems were, on the average, of large size. At a convenient point in the middle of the rookery I found the adjacent harems, 11 in number, to contain respectively 42, 4, 25, 17, 60, 47, 6, 7, 19, 43, 22 cows, a total of 302 and an average of 27·5.

The count accepted by Dr. Jordan gives 147 harems for the rookery, or 2,543 cows, at the usual average of 17·3, and 4,450 breeding cows, allowing for an increase of 75 per cent. on that number. Colonel Murray gave me for the same rookery his count made on the 13th July, which places the bulls and harems at 205, with idle bulls at 125. For 1895 Colonel Murray placed the numbers at 300 harems and 200 idle bulls, but it must be remembered that for that year Colonel Murray's statistics were in round numbers and professedly less accurate than for 1896. Messrs. True and Townsend for 1895 only admitted 2,672 cows for Lukannon Rookery.

### *Lagoon.*

This little rookery occupies a shingly spit which stretches across from Tolstoi Hill nearly to the harbour, and separates the bay on which the harbour is situated from a

broad, shallow, muddy lagoon. In stormy weather the waves break right across the spit on which the seals lie. No seals are driven from this small rookery.

*Op. cit.*, p. 100. On this rookery Messrs. True and Townsend made a careful census on the 10th July, 1895, "passing in front of the rookery in a boat, using a low-power field-glass. The harems were separated here by considerable intervals, and as the whole rookery was in plain view, there was no obstacle to counting." The numbers thus obtained were 82 harems and 1,264 cows. Colonel Murray's figures are in this instance discrepant, as he states the number at only 50 harems, with no idle bulls.

I fancy that in this particular case Messrs. True and Townsend's census was the more accurate of the two, and that Colonel Murray's was probably based on a more distant view.

In 1896 Dr. Jordan, accompanied by Mr. Clark and Mr. Macoun, walked over the rookery, making a close count of bulls, cows, and pups. They found 120 harems, 1,474 cows, and 2,484 pups. These figures give the low average of 12·3 cows *visible* in a harem, and of 20·7 (an increase of 69·3 per cent.) as the actual size of the average harem estimated by pups. Mr. Murray's estimate of the number of harems in 1896 is very similar to Dr. Jordan's, viz, 115, with 40 idle bulls. The general results therefore are an increase of cows in sight over those witnessed by Messrs. True and Townsend in the previous year, and a confirmation by the count of pups of the inadequacy of any single inspection of the cows to give a full account of the number appertaining to the rookery. The less percentage of pups to cows in sight than in the count made on Ketavie is a justification for abating (to 75 per cent.) the addition (91 per cent. on Ketavie) requiring to be made to the average counts of cows.

### *Tolstoi.*

This rookery occupies the rocky portion to the east and south of a great bay (English Bay) in the middle of the southern coast of the island. The bay is for the most part sandy, and where its shore becomes rocky again to the westward we have the rookeries of Greater and Lesser Zapadnie.

At Tolstoi, to the southern end of the rookery, the seals occupy a rocky beach under high cliffs or steep slopes (photograph 75), difficult of inspection until as the season advances it becomes possible to penetrate into it. At the other end of the rookery, towards the sands of English Bay, the rocks lie further back from the shore (photograph Nos. 40, 74, &c.), and the seals are freely visible from the sands to the westward and from various stations on the hill above. Between the rocks and the sea are sandy stretches, to be afterwards referred to in my account of the dead pups. The chief hauling-ground is above this latter portion of the rookery and on the more or less stony slope above the adjacent portion of English Bay. Other tracts (photograph No. 39) in the middle of the bay (Middle Hill) serve as hauling-grounds for this rookery and Zapadnie.

My first photograph of Tolstoi was taken on the 25th July.

While in the more rocky parts of the rookery to the southward the seals lie scattered in a manner similar to those on the other rookeries already described, at the other extremity they lie in a dense mass (photograph No. 40), extending for some distance up the hill at the extreme end of the rookery, but leaving almost vacant the smooth, sandy interspace already alluded to. This rookery showed very markedly the change in outline and in extent of ground covered by the seals at a later period in the season. By the time our second series of views were taken (7th August, photograph No. 109), the sandy interspace was largely occupied by seals, and harems were dotted among the stones almost to the very top of the hill; still later they reached the rock at the very top.

Mr. Townsend's views of this rookery are particularly fine and on a larger scale than ours. His photograph No. 25 (24th July, 1895) would appear at first sight to show a much larger number of seals than ours; but it is taken at short range and from a very advantageous locality. When we take it in connection with its companion picture No. 26 and then compare the result with that of this year, the apparent difference tends in great part to disappear.

Messrs. True and Townsend give us no complete and specific estimate of the number of seals in this rookery for 1895; but Colonel Murray places the number of harems in that year at 400, and of idle bulls at 250. In 1896 (16th July) he estimated the harems at 325, and the idle bulls at 220; but Dr. Jordan and his party found somewhat later 389 harems on the main or northern part of the rookery and 168 more under the cliffs. On the latter portion of the rookery the cows were counted and found to number 1,498, an average of 13·87 to a harem; and the live pups were afterwards counted to the number

of 2,664, giving an increase of 77·8 per cent. over the original count of cows, or an average of 24·6 to the counted harems. The partial count of the rookery for 1895 given by Mr. Townsend (*op. cit.*, p. 35), "from the point to the end of the Grass Bluff," appears to correspond with the one above alluded to as "under the cliffs." For this area Mr. Townsend gives 113 harems and 1,539 cows, an average of 13·6 to a harem. These numbers are approximately identical with those of Dr. Jordan for 1896.

While we have thus no evidence to show a decrease of the rookery during the period 1895–96, yet it must in this case be admitted that a change is perceptible since the earlier photographs were taken in 1891–92. The great mass of seals, mostly bachelors, shown in Dr. Dawson's photograph No. 35 (19th August, 1891), was far beyond anything we saw on the spot this year, and the rookery is, I think, undoubtedly more populous as represented in Mr. Macoun's photographs Nos. 70 and 71 (8th August, 1892) and Nos. 91 and 92 (21st August, 1892). The case as regards the bachelors diminishes in importance, if its importance does not altogether vanish, when we remember the small number killed upon the island during 1890, 1891, and 1892, as compared with the number slain before and during our inspection of 1896; and as regar' the breeding areas, inspection of the photographs above quoted suggests that the areas occupied have shifted since that time. The pictures seem to me to indicate that while the seals extended considerably beyond, they were less numerous immediately within, what is the present margin of the rookery. Mr Townsend himself alludes to such a change and the possible reasons for it (*op. cit.*) when he says that "allowance should be made for a change in the shape of the bay itself, 100 feet or more of sand being filled in the bight at the left end of the rookery." But, making the best of the evidence in hand, I am quite prepared to believe that Tolstoi Rookery is towards its northern extremity considerably poorer than it was five years ago.

### *Zapadnie (St. Paul).*

This large rookery known also as Upper or Greater Zapadnie, fringes the rocky western extremity of English Bay. The ground is low and irregular, consisting of patches of rock, tracts of broken stones, and intervening spaces of sand. The seals occupy the shore for a space of from 1,500 yards to a mile, and run backwards, following more or less closely the contour of the ground, in long re-entrant lines or avenues. Three of these re-entrant lines, near the east end of the rookery, are conspicuous in photographs taken from the direction of the adjacent rookery of Little Zapadnie, to the east. The rookery terminates to the westward in a line of cliffs. The whole area covered by seals is very large.

The great extent and irregular distribution of the rookery render a bird's-eye inspection or the comparison of photographs of little value. So far, as far as the photographs go, my photograph No. 33 (15th July, 1896) compares favourably with Mr. Townsend's No. 10 (20th July, 1895). The only picture showing evidence of a once greater abundance is Mr. Macoun's No. 41A, 1892, which covers the eastern portion of those just alluded to; but when we reinspect the more recent pictures, we see that, though the precise spot is bare, the adjacent ground immediately to the west is thickly populated, and the evidence of the little area by itself bears no conclusion.

Little Zapadnie occupies the stony front of a knoll about 500 yards long, separated from Greater Zapadnie by a small sandy bay (South-west Bay), into which runs a streamlet from a lake. Patches of snow above the bay and rookery remain throughout the summer, and form a conspicuous landmark. The rookery is compact in form and pretty thickly populated.

From the knoll of Lower Zapadnie a stony beach extends eastward for about 1,000 yards to the sands of English Bay, and along this beach are scattered eight or nine patches of seals, which were spoken of collectively last year as the "Reef of Zapadnie." These patches are approximately identical with Mr. Townsend's chart of them for 1895; even a very tiny patch immediately to the east of Lower Zapadnie being still occupied, though only by a single bull and cow. (It probably contained no more than a single harem the previous year.)

For 1895 Colonel Murray estimated the whole area of Zapadnie (including Lower Zapadnie and the "Reef") to contain 500 harems, with 400 idle bulls. In 1896 (16th July) he placed the number at 577 and 421 respectively, assigning 477 harems and 310 idle bulls to Greater Zapadnie.

The enumeration made under Dr. Jordan produced a result very considerably in excess of this, viz., 583 harems for Greater and 210 for Lesser Zapadnie and 176 more for the Reef, a total of 969 in all. The cows were counted on Lesser Zapadnie

and the Reef to the number of 2,400 and 2,256 respectively, and the pups on the Reef to the number of 3,862, showing on the latter breeding-ground 71 per cent. beyond the visible number of cows.

*Polavina.*

This rookery, with its neighbour or outlier, Little Polavina, lies half-way along the eastern coast of the island, at the far end of the long sandy shore that stretches northwards from Lukannon. In the centre of the rookery a long, low spit projects into the sea, to the south of which are other low-lying, half-submerged reefs. Opposite to these a rocky terrace fringes the shore, and above it lies a broad, bare plateau, on which the seals congregate. At the south end of the rookery the terrace is broken, and the ascent is gradual from the beach. Beyond this point the beach is narrower, and its cliffs higher (though not so high as to prevent frequent possibilities of ascent or descent), and in these cliffs are found several deep recesses in the columnar basalt (photograph No. 55), each occupied by its group of harems, while other harems are scattered sparsely below the cliffs. The flat, bare plateau extends the greater part of the way to Little Polavina, a distance of more than a mile, and about mid-way between the two rookeries a convenient gully furnishes an ascent to it for the bachelors. The chief hauling-grounds are therefore to the south of Polavina, where the sands end and the rocks begin, half-way between the two rookeries, and again around the rookery of Little Polavina. Little Polavina itself (photographs Nos. 56, 57) is a small rookery surrounding the base of a small jutting point. The seals lie for the most part on stony level ground, facing a low hillock above the sea.

Of the rookery of Polavina we have two very excellent photographs antecedent in date to our visit, viz., Mr. Macoun's, panorama, 60, 61 (6th August, 1892), and Mr. Townsend's No. 9 (26th July, 1895). In Mr. Macoun's pictures taken later in the season, the seals spread further back than in Mr. Townsend's, and the aspect of the picture is affected by the different state of the tide, which in Mr. Macoun's nearly submerges the reefs; but, nevertheless, comparison of the two is plain and simple, and I am quite unable to see any sign of diminution in the later view. Indeed, it seems to me that the later picture shows actually more seals than the earlier.

The evidence in regard to Polavina is very conflicting, and the condition of the rookery deserves particular attention in the future. It seemed to me, and it seems on reinspection of my photographs Nos. 52, 53 (23rd July, 1896), and Mr. Macoun's No. 17 (15th July) and Nos. 69, 71 (28th July), that the rookery is less than the earlier photographs show it to have been, but I saw nothing on the spot, and I can see nothing in the photographic evidence to warrant Mr. Townsend's strong assertion (*op. cit.* p. 31), that, comparing 1895 with 1894, the "main rookery, situated on a comparatively level tract, *is shrunken perhaps 50 per cent. in dimensions.*"

*North-east Point.*

The great rookery of North-east Point is by far the largest on the islands. It is grouped around the sides of a peninsula commanded by Hutchinson's Hill, an eminence about 80 feet high. This hill lies towards the western side of the middle of the peninsula, and on the shore below it and up the slope extends the most densely populated portion of the rookery. The rookery begins on the west side of the narrow isthmus of the peninsula on a rocky beach, and extends with a few slight interruptions to the extremity of North-east Point, a distance of about 2,500 to 3,000 yards. About the middle of its length, where it skirts the hill, the ground is more sandy, and the space occupied by the seals is much broader than elsewhere. The chief hauling-grounds on the west side are just to the northward and southward of the hill. On the east side the breeding-grounds are much less extensive. On this side, nearly opposite to Hutchinson's Hill, is a rocky cape about 250 yards long, known as Sea-Lion Point. On its northern and southern shores (photographs Nos. 42, 43) are small patches of harems; south of it, on the beach, is a more considerable one (photograph No. 44). A large rookery (photograph No. 41, Macoun's photograph No. 96) lies about 300 to 400 yards north of it, and a long narrow strip fringes the greater part of the shore between this last and North-east Point. The rookeries on the two sides of the peninsula are now distinguished by Dr. Jordan under the separate names of Vostochni for the larger western portion and Morjovi for the smaller part or parts on the east. The latter name is given in allusion to the once innumerable walruses that have left their whitened bones in witness of a slaughter more ruthless than

any that the seals have here ever been subjected to. When the store house on the isthmus was built, it is said to have had its sandy foundations paved with thousands of tuskless skulls. Colonies of sea-lions still exist on Sea-Lion Point, on a smaller point midway between that and North-east Point, between the two patches of seal rookery, and again at one or two small points on the western side near the far end of the peninsula. The chief hauling-grounds of seals on the eastern side lie just beyond Sea-Lion Point (photograph No. 41) and around the rookery beyond. Many seals also haul out close to North-east Point itself. From this great rookery the seals are not driven all at once, but usually from the west and east sides on consecutive days.

As regards the eastern portion of the rookery, our photographs give good pictures of the large mass midway between Sea Lion Point and the far end. This is shown in Mr. Townsend's photograph No. 7 (24th July, 1895), in Mr. Macoun's Nos. 1 and 2 (22nd July), and No. 59 (5th August, 1892), and No. 18 (16th July, 1896), and less well in mine No. 41 (15th July, 1896). There is no difference whatsoever between the pictures of this portion of the rookery taken in 1895 and 1896. (The little patch marked beyond the great one on Mr. Townsend's chart of 1895, was still distinctly recognisable, though not shown in the photographs.)

In Mr. Macoun's photographs of 1892, the bachelor seals were very much more numerous. This fact, like the similar phenomenon already noticed at Tolstoi, may be simply due to the small number killed at that time, but, to judge by the photograph, I fancy the rookery itself was then somewhat larger.

On the western side of the rookery, looking from the top of Hutchinson's Hill, we have an enormous number of seals in direct view. With the older photographs in hand, it appeared to me at my first visit (16th July) impossible to doubt that a diminution of seals had taken place here since 1891–92, and wider intervals separated the seals from the hill, and, especially towards the south, the extent of this part of the rookery seemed curtailed. The broad stretch of sand here was almost bare where in the 1892 photographs it was thickly bestrewn. This impression still remains with me, but I am bound to say that it was weakened, and my estimate of its extent diminished by my subsequent visits. The extent to which the "spreading" of the herd alters the appearance of this rookery as the summer advances is enormous. It was with complete astonishment that on the 9th August we found the breeding seals extending up to the topmost rocks on the western side of the hill, and surrounding the photographic station from which we had three weeks before viewed them at a distance. The effect is shown in Mr. Macoun's photographs of the 10th August. The early photograph on which my first impression of decrease has been based was that taken by Mr. Macoun on the 20th August, 1892, a still later day allowing for still greater possibilities of extension. Between our photographs of 1896 and Mr. Townsend's No. 6 (24th July, 1895) I can detect no perceptible difference.

The counts of this rookery are not very satisfactory. For 1895 Colonel Murray estimated the harems (in round numbers) at 1,725; in 1896 (18th July) he found 1,595. The census by Dr. Jordan's party fell considerably below Colonel Murray's figures, giving only 975 harems for the western and 293 for the eastern side, a total of 1,268 for the whole rookery. I cannot help thinking some qualification or supplement is required to this estimate. It may be that the harems were all on the average large, or it may be that the influx of younger cows added largely in the later part of the season to these numbers. For the numbers are certainly surprising; inasmuch as they would make the rookery out to be only two and a-half times as large as Tolstoi and less than one-third larger than the whole of Zapadnie, or, in other words, one-sixth smaller than the united rookeries at the two ends of English Bay; and it is certain that the apparent size of North-east Point Rookery is greater than this, and that the yield of its killing-grounds is beyond the proportion of such an estimate.

*Reef Rookery.*

This rookery encircles the southern peninsula of the island, as that of North-east Point surrounds the northern. The western side of the rookery is known as Garbotch.

The small bay to the south-west of the village has in its middle part a stretch of some 250 yards of sandy beach, sloping upwards to some sandy dunes, known as Zoltoi Sands. Behind the dunes the ground continues to rise till it forms, on the eastern side of the isthmus, a precipitous cliff, beneath which lie many bachelors and half-bulls.

On the west side, facing the south half of the sands, is a stony ascent, on which and on the stones below the holloschikkie repose (photograph No. 49).

Beyond the sands the shore of the bay consists of a rough narrow beach, at first with low, rough grassy cliffs above, further on with a high bank of broken stones, and at the

south extremity of the bay a long, high, bare, cindery acclivity, which rises towards the "parade ground" or plateau.

All along the bay from Zoltoi Sands westwards are first scattered harems under the cliff, then more numerous harems on the broad bench below the stony ground, and lastly, on the lower portion of the great slope, a more numerous colony, running up here and there in long lines to nearly half the height of the hill.

Beyond Garbotch, near, but to the west of the extreme point of the peninsula, is a rocky beach with an ascending slope, commanded from above by a parapet of rocks. This spot is known as the "Slide," and Dr. Jordan has accepted for it the Aleut name of Ardiguen (photograph No. 62; Macoun's photograph No. 26, 25th July, 1892). This spot was kept under close personal observation by Dr. Jordan, whose account of its daily economy will be found on pp. 54–61 of his preliminary Report.

The east side of the peninsula constitutes Reef Rookery in the stricter sense. It consists of a broad rocky bench, on which a nearly continuous band of harems runs from the point to the isthmus. Towards the middle of the rookery are two shallow land-locked pools of foul water, through which the bachelor seals flounder, or pass between them to and from the extensive hauling-ground behind this portion of the rookery. The east portion of the rookery does not extend so far to the north as the west, stopping short at the isthmus, the eastern side of which is high and precipitous. Near the north end of the isthmus on the east, opposite Zoltoi Sands, and behind the dunes, is a small bay in which the bachelors haul out, and from the cliffs above which a close view of them may be enjoyed unobserved (photograph No. 50).

The greater part of the peninsula proper is occupied by a smooth plateau, sloping gently to the east (photograph No. 71), known as the parade ground. It is now for the most part grassy, except near the western edge, where the seals ascend the slope of Garbotch to it in small numbers. Two main and three smaller "pinnacles" rise above the parade ground, and command the best views of the Eastern Rookery. Near the southern end of the isthmus the ground is very rough and stony; near the southern end, by the dunes, it consists of loose-blown sand, a short stretch of which is by far the most arduous part of the journey to the seals driven to the village.

Between the dunes and the parade ground, on the route of the drives, is an old killing-ground, whose use is not recollected. On this ground seals of all sizes appear to have been slaughtered.

The smooth slope of Garbotch is the part of the rookery where we might expect the photographic evidence to be clearest, and where we might hope to see most easily changes in the superficial extent of the herd. As a matter of fact, however, it is in just such a place that the seasonal changes in area are so clearly perceptible and so striking that they hopelessly confuse one's estimate of the changes that may have taken place from year to year.

In Mr. Macoun's photograph No. 50 (20th July) and in my No. 60 and 61 (24th July), the seals only fringe the lower portion of the slope, except at the far end, where a wedge-shaped mass runs up to about the middle. The appearance is practically identical with that shown in Mr. Townsend's photograph No. 17 (20th July, 1895). But the older photographs, such as Mr. Macoun's No. 74 (15th August, 1892), show the seals spreading over the face of the slope and reaching its summit at both ends. Coming back to the photographs of this year, we see the seals spreading far up the hill in Mr. Macoun's photograph No. 65 (5th August) and reaching the top of it and invading the parade ground in Nos. 105, 106 (31st August). It is here, in my opinion, certainly true, as has been already said in so many other cases, that the photographs of 1895 show absolutely no superiority in numbers over 1896, but that already quoted of 1892 does appear to show somewhat more than those of the present year.

For the whole of Reef Rookery Colonel Murray estimated the number of harems at 1,000 for 1895 and 900 for 1896; Dr. Jordan in the latter year placed the number at 831. On Ardiguen "or the Slide" Dr. Jordan counted 27 bulls, 550 cows (an average 20·4), and 652 pups (an average of 23 to a harem).

Besides the figures quoted and compared in the preceding account, we possess yet another estimate of the breeding seals for 1895, that of Judge Crowley, Resident Agent of the United States' Treasury on the islands. Mr. Crowley says in his Report (Sen. Doc. 137, Part I, p. 35, 1896) "The breeding herd has been reduced to such proportions that they can now be counted with comparative accuracy. I made the count as follows:—

"St. Paul Island. Breeding cows, 78,696; bulls, 4,372.

"St. George Island. Breeding cows, 21,240; bulls, 1,180."

It is obvious here that the number of cows is estimated by applying to the number of bulls an average of eighteen cows to each harem. One-half of these statistics are as remarkable for their agreement with Colonel Murray's for 1895 and ours for 1896 as the other half are for their complete discrepancy.

The number of bulls assigned to St. Paul Island (viz., 4,372) is very near that of Colonel Murray for 1895 (viz., 4,625) and about identical with Dr. Jordan's for 1896 (viz., 4,348).

But Judge Crowley's enumeration for St. George is three times larger as regards the bulls than that of Colonel Murray for the same year 1895, and twice as big as Colonel Murray's for 1896. The result, on the other hand, of Judge Crowley's low estimate of eighteen cows to a harem is to bring out a number of cows for St. George approximately equal to this year's, but to give to St. Paul for 1895 only three-fifths of what we now believe to exist there.

Before passing from the later to the earlier numerical estimates, I would draw attention to a passage on pp. 20, 21, of Dr. Jordan's preliminary Report. Dr. Jordan says:—

"Accepting the figures of last year, 70,423 cows on the rookeries would mean an aggregate of 123,240 breeding cows. To this number must be added 25,000 to 40,000 virgin 2-year-olds and as many yearlings to form an estimate of the actual number of cows for 1895. That the figures given by us for 1896 are slightly higher than those for 1895 does not mean an increase in numbers since 1895, but simply an increase in the data on which an estimate may be made. Messrs. True and Townsend, for example, count 2,640 cows on Kitovi Rookery. This count is the most important element in their estimate by acreage. In this estimate, Kitovi is given credit for $3\frac{3}{4}$ per cent. of the total number of seals (70,423). This figure cannot be far from the truth. But the fact that, in 1896, in spite of some shrinkage, Kitovi shows 6,049 pups, demonstrates that the figures based on counts made at the height of the season are far from complete: 6,049 is $3\frac{3}{4}$ per cent. of 161,060."

Now, passing over the apparent fact that the phrase "in spite of some shrinkage" savours of a begging of the question, the one thing that this paragraph appears to me to prove is the surprising accuracy of Messrs. True and Townsend's estimate of $3\frac{3}{4}$ per cent. as the proportionate value Ketavie to the total seal population of the islands. For if we take our own count for 1896 of 3,152 cows visible on Ketavie at the height of the season and multiply it first in the proportion of $3\frac{3}{4}$ per cent., as Messrs. True and Townsend did, to find the total seal population of the islands, and then add 75 per cent. to the result, as Dr. Jordan has shown it is necessary to do, we get the result of 147,090 for the breeding cows in the rookeries for 1896, a surprisingly close approximate to the 143,071 that we actually found. In short, so far as it goes, the whole count is decidedly opposed to any signs of either local or general decrease, and would strongly tempt us to accept Messrs. True and Townsend's estimate (as corrected by Dr. Jordan) of 123,240 breeding-cows for the two islands in 1895 as not far from correct.

*Earlier Numerical Estimates.*

When it is so manifestly impossible to reconcile the statements made or to realize the conditions that obtained so lately as 1895, it is natural that earlier statements should lead us into still greater uncertainties and difficulties. By far the most important of such early estimates is that of Mr. H. W. Elliott in 1872–74, an estimate repeated by him in 1890. (*Cf.* Report on the Pribyloff Islands by H. W. Elliott, Paris edition, 1893, p. 9, *et seq*, and "Monograph of the Seal Islands," Census edition, 1881, p. 48, *et seq.*) The essence of Mr. Elliott's computation lies in his belief that the number of seals is in direct ratio to the superficial extent of the rookery. His statement is exceedingly precise, and may be here quoted (Report, pp. 15 and 16):—

"At the close of my investigation, during the first season of my labour on the grounds in 1873, the fact became evident that the breeding seals obeyed implicitly an imperative and instinctive natural law of distribution, a law recognized by each and every seal upon the rookeries, prompted by a fine consciousness of necessity to its own well-being. The breeding-grounds occupied by them were, therefore, invariably covered by the seals in exact ratio, greater or less as the area upon which they rested was larger or smaller. They always covered the ground evenly, never crowding in at one place here to scatter out there. The seals lie just as thickly together where the rookery is boundless in its eligible area to their rear and unoccupied by them as they do in the little strips which are abruptly cut off and narrowed by rocky walls behind. For instance, on a rod

of ground, under the face of bluffs which hemmed it in to the land from the sea, there are just as many seals, no more and no less, as will be found on any other rod of rookery-ground throughout the whole list, great and small, always exactly so many seals, under any and all circumstances, to a given area of breeding-ground. There are just as many cows, bulls, and pups on a square rod at Nah Speel, near the village, where in 1874, all told, there were only 7,000 or 8,000, as there are on any square rod at North-east Point, where 1,000,000 of them congregate."

"This fact being determined, it is evident that, just in proportion as the breeding-grounds of the fur-seal on these islands expand or contract in area from their present dimensions, the seal will increase or diminish in number.

"The discovery, at the close of the season 1872, of this law of distribution, gave me at once the clue I was searching for in order to take steps by which I could arrive at a sound conclusion as to the entire number of seal herding on the island."

After further discussing the case he says (on p. 18), "Taking all these points into consideration, as they are features of fact, I quite safely calculate upon an average of 2 square feet to every animal, big or little, on the breeding-grounds, as the initial point upon which to base and intelligent computation of the entire number of seals before us." It is on this estimate that Mr. Elliott bases his computation of 3,030,000 seals of all ages on the breeding-grounds for the Island of St. Paul in 1872–74, and 160,670 for that of St. George.

I believe, after careful perusal of Mr. Elliott's work, that he maintains precisely the same position as to the number of seals on the ground in 1890. He states indeed that the bulls were fewer and wider apart, but also that the harems were immensely larger; and though I do not quite understand the process of survey by which in the latter year he arrived at an estimate of the "average depth" of the rookery, yet, having done so, he certainly calculates its population at the same ratio of one seal to 2 square feet.

Now it is perfectly certain that no rookery last year, nor in the preceding year, presented to any observer so great a density. Where the dead bodies were lying almost as close as they could lie on the killing-ground at Polavina, they occupied an average space of 13½ square feet to each body (*cf.* Jordan, Preliminary Report, p. 20), and on Ardiguen Dr. Jordan measured the space occupied by a single harem of thirty-three cows, and found, within the limits of a single harem, a space of 8 square feet for each seal (*loc. cit.*) Not one of our observations and not one of our photographs shows on the more rocky rookeries a density (taking the harems collectively) near so great as this. The conformation of the ground and the interspersal of the boulders must at all times, as it does now, have prevented anything approaching to so uniformly compact a distribution of the seals. But it is not necessary to do more than cite the opinion of the American Commission of 1896 as expressed by Dr. Jordan, who in arguing concerning Messrs. True and Townsend's estimate of 23 square feet to each seal on the most crowded rookeries (Report 1895), and considering it excessive, says (p. 20), "Where seals are massed on rookeries, the space occupied by each seal is more nearly 12 than 23 square feet," and further that the 46 square feet which Messrs. True and Townsend's estimate for the more rocky and less densely populated localities is, as a matter of fact, doubtless too low. "We cannot believe," Dr. Jordan also says (p. 19), "that even in the most favourable times the fur-seals were evenly crowded over the rookeries, and it is evident that as they grow fewer this arrangement tends to become more sparse, especially on rocky slopes and boulder-strewn beaches."

I need not follow out in detail the deduction that such newer estimates involve in the numbers put forward by Mr. Elliott, but I may say that, taking Mr. Elliott's calculation of 3,190,000 breeding seals on the rookeries of both islands in 1872–74, deducting from that number the 90,000 bulls (Report, p. 90), and dividing the balance by 6 (to give instead of 2 feet for a seal the 12 feet that Dr. Jordan admits for each cow on the most crowded portion of Tolstoi, Preliminary Report, p. 18), we get the reduced number of 516,000, which is only about three and a half times as great as that which we know to exist now.

The calculation is of no great importance, and in making it we admit far too much, in particular that every part of every rookery was then as densely filled as is the most crowded spot to-day. But however much these figures may be twisted and the case reargued, it is perfectly clear that Mr. Elliott's gigantic computation can never again be upheld as a reasonable statement of the numbers that once existed on the islands, or with which the present numbers ought to be compared.

But if we refuse to admit Mr. Elliott's estimate of the seals, let us try to accept his measurement of areas. His surveys, he tells us (Report on the Pribyloff Islands in 1890, Paris edition, 1893, p. 19), were made with all scientific precautions in 1872–74 by measured

baseline and azimuth compass, in 1890 with a fine prismatic compass, and in 1874 with the help of a trained topographer, Lieutenant Maynard. "There is no more difficulty," he says (p. 17), "in surveying these seal margins during this week or ten days (10–20) in July than there is in drawing sights along and around the curbs of a stone fence surrounding a field." He tells us that in 1890 there were 9,000, and in 1872 37,000 seals on Lagoon Rookery; and as he estimates this number on his usual computation of 2 square feet for each, it follows that he is ascribing to that rookery an area of 18,000 and 74,000 square feet respectively in the said years. Yet Messrs. True and Townsend give the occupied area on Lagoon Rookery in 1895 as 82,241 square feet, 4½ times what Mr. Elliott asserted five years before.

For Lukannon and Ketavie he gives the measurement in 1890 as 145,050 and 56,000 respectively, a total of 201,050; it was 226,303 square feet by Messrs. True and Townsend's measurements five years later.

For Tolstoi he gives 124,800 square feet in 1890; Messrs. True and Townsend give 240,800 in 1895. For the entire island of St. Paul he gives 1,757,164 square feet in 1890; Messrs. True and Townsend give 2,202,557 in 1895.

The discrepancies on St. George are equally surprising. We may express them best in a tabular form:—

| Rookery. | Area in Square Feet. | | |
|---|---|---|---|
| | Elliott, 1872–74. | Elliott, 1890. | Messrs. True and Townsend, 1895. |
| Zapadnie .. .. .. | 36,000 | 24,000 | 128,171 |
| Staraya Atil .. .. .. | 60,840 | 32,000 | 61,329 |
| North .. .. .. | 152,500 | 77,046 | 128,868 |
| Little East .. .. .. | 25,500 | 9,600 | 24,251 |
| East .. .. .. | 50,503 | 18,200 | 67,881 |
| Totals.. .. .. | 325,340 | 160,846 | 413,506 |

Leaving aside for the moment the statements whose extravagance, I believe, we have adequately demonstrated, we may fall back on the plain and simple way of estimating the actual yield of the rookeries and the decrease of their productiveness; that is to say, we may set the 30,000 skins taken this year against the 100,000 that were got with neither less nor more difficulty (*Cf.*, Jordan, Preliminary Report, p. 22) in the plenitude of the supply. We should then have to admit that the herd was now something less than one-third of what it was twenty years ago. Even in this admission we admit too much, for, apart from other corrections that might be suggested, we should surely add for the purpose of such a comparison to the 30,000 taken on the islands the number of males taken in the sea, but this, for lack of better knowledge of the proportion of each sex and age in the pelagic catch, we cannot do. But if we fall back on Dr. Jordan, we find him placing (*loc. cit.*) the number of breeding females in 1880 at, "at least," four times as many as in 1893. It is not worth arguing whether we should say three times rather than four, for either number is vastly different from those which we have been of late accustomed to hear maintained and reiterated.

In the preceding account I have not attempted to prove that there has been *no* decrease, general or local, in recent years, but I have sought to show how inadequate and conflicting is the evidence at hand to prove such a decrease. The matter with which we are immediately concerned, and as to which we have most evidence at hand, is the relative state of the rookeries in 1895 and 1896. Had the decrease in the rookeries been as great and evident as it was reported to be up to 1895, the next twelve months should surely have shown signs still more unequivocal of continued impoverishment of the impoverished stock. The photographs show us time after time, with very few exceptions, an identical record. The harems on St. George were counted in both years by the same gentlemen, and all the rookeries but one show a large increase in the latter year. In the only instance on St. Paul Island where the cows were actually counted in both years, viz., on the Lagoon, they were one-sixth more numerous when counted in 1896; and

when the pups were counted on the same place they were twice as numerous as the cows were supposed to be in 1895. Though Colonel Murray's count of harems for St. Paul in 1895 was approximate only, and expressed in round numbers of hundreds and fifties, it only exceeded by $\frac{1}{16}$th (4625 to 4348) that of Dr. Jordan in 1896; in three instances, Lagoon, Tolstoi, and Zapadnie, it fell far below it.

I do not analyse these statistics further; they furnish clear and instructive lessons to those whose business it may hereafter be to unravel them further.

The following is a tabular recapitulation of the figures quoted in the preceding pages:—

## Summary of Statistics for St. Paul and St. George Islands, 1895-1896.

| | 1895. | | | | | | | 1896. | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | True and Townsend. | Colonel Murray. | | | | Judge Crowley. | | Murray. | | | Jordan. | | | |
| | Cows. | Harems. | Idle Bulls. | Cows at 40 per Harem. | Cows reduced to 30 per Harem. | Bulls. | Cows. | Harems. | Idle | Cows at 30 per Harem. | Harems. | Cows counted or estimated at 17·5. | Pups counted. | Cows at 75 per cent. extra. |
| **St. Paul Island.** | | | | | | | | | | | | | | |
| Ketavie | 2,640 | 200 | 50 | 8,000 | 5,000 | | | 190 | 100 | 5,700 | 182 | 3,152 | 6,049 | .. |
| Lukannon | 2,672 | 300 | 200 | 12,000 | 9,000 | | | 205 | 125 | 6,150 | 117 | 2,543 | .. | 4,450 |
| Lagoon | 1,261 | 50 | .. | 2,000 | 1,500 | | | 115 | 40 | 3,450 | 120 | 1,474 | 2,484 | .. |
| Tolstoi (main) | | 100 | 250 | 16,000 | 12,000 | | | 325 | 220 | 9,750 | 389 | 6,729 | .. | 11,775 |
| ,, (cliffs) | | | | | | | | | | | 108 | 1,498 | 2,661 | .. |
| Zapadnie | | 600 | 400 | 24,000 | 18,000 | | | 577 | 421 | 17,310 | 583 | 10,085 | .. | 17,648 |
| Little Zapadnie | | | | | | | | | | | 210 | 2,400 | .. | 4,200 |
| Zapadnie (reef) | | | | | | | | | | | 176 | 2,256 | 3,862 | .. |
| Gorbatch | | 1,000 | 500 | 40,000 | 30,000 | | | 900 | 411 | 27,000 | 302 | 5,224 | .. | 9,142 |
| Ardiguen | 54,860 | | | | | | | | | | 27 | 550 | 652 | .. |
| Reef | | | | | | | | | | | 504 | 8,749 | .. | 15,258 |
| Sea-Lion Rock | | .. | .. | .. | .. | | | .. | .. | .. | 63 | 1,090 | .. | 1,907 |
| Polavina (main) | | 350 | 200 | 14,000 | 11,500 | | | 285 | 251 | 8,550 | 138 | 2,387 | .. | 4,177 |
| ,, (cliffs) | | | | | | | | | | | 86 | 1,268 | .. | 2,496 |
| Little Polavina | | | | | | | | | | | 45 | 779 | .. | 1,363 |
| North-east Point (east) | | 1,725 | 1,000 | 69,000 | 51,750 | | | 1,595 | 1,095 | 47,850 | 975 | 15,879 | .. | 27,148 |
| ,, ,, (west) | | | | | | | | | | | 293 | 4,328 | . | 7,775 |
| Total for St. Paul | 61,436 | 4,625 | 2,600 | 185,000 | 138,750 | 4,372 | 78,696 | 4,192 | 2,666 | 125,760 | 4,348 | 70,361 | .. | .. |
| **St. George Island.** | | | | | | | | | | | | | | |
| North | 2,800 | 100 | 50 | 4,000 | 3,000 | | | 225 | 100 | 6,750 | 225 | 3,891 | .. | 6,809 |
| Little East | 527 | 25 | 20 | 1,000 | 750 | | | 179 | 55 | 5,370 | 44 | 761 | | .. |
| East | 1,476 | 80 | 40 | 3,200 | 2,400 | | | | | | 135 | 2,335 | . | 4,086 |
| Zapadnie | 2,786 | 110 | 50 | 4,400 | 3,300 | | | 182 | 100 | 5,460 | 182 | 3,148 | .. | 5,509 |
| Staraya Atil | 1,398 | 60 | 40 | 2,400 | 1,800 | | | 75 | 75 | 2,250 | 75 | 1,297 | .. | 2,269 |
| Total for St. George | 8,987 | 375 | 200 | 15,000 | 11,250 | 1,180 | 21,240 | 661 | 330 | 19,830 | 661 | 11,432 | | |
| Grand total | 70,423 | 5,000 | 2,800 | 200,000 | 150,000 | | | 4,853 | 2,996 | 145,590 | 5,009 | 81,793 | | |

Lastly, let me take Mr. Elliot's categorical statements regarding the condition of the rookeries in 1890 (*Cf. cit.*, p. 91).

1. There is but one breeding bull now upon the rookery-ground where there were fifteen in 1872; and the bulls of to-day are nearly all old, and many positively impotent.

2. This decrease of virile male life on the breeding-grounds causes the normal ratio of fifteen or twenty female to a male, as in 1872–74, to reach the unnatural ratio of fifty to even 100 females to an old and enfeebled male.

3. There is no appreciable number of young males left alive to-day on these "hauling" or non-breeding grounds to take their place on the breeding-grounds, which are old enough for that purpose, or will be old enough, if not disturbed by man, even if left alone for the next five years.

Not one of these statements (I am not discussing the first clause) is true to-day. The bulls show no signs of senility or impotence; they are not "inert and somnolent," as Mr. Elliot said two pages before. But they are in the highest degree active, vigorous, and bellicose. Every rookery is surrounded by "idle" bulls, most of them to all appearance as robust and virile and full-grown as their more fortunate brethren; and from every drive are turned away a large proportion of younger ones to take their places in time.

There is no "unnatural ratio" of fifty to 100 females to "an old and enfeebled male." The harems show an average of about seventeen females to a male, and though we may have to add to these some 75 per cent. more (a circumstance of which Elliot knew nothing) to allow for the greater number appertaining to the rookery than are ever visible at once, yet, if we add at the same time the number of bulls at first idle on the rookery, we shall get a ratio between cows and bulls that compares favourably with Mr. Elliot's description of the most prosperous period in the history of the herd.

### *Mortality of Pups.*

In this important matter the labours of the past season have added very materially to our knowledge.

On the 1st August, the date of the opening of Behring Sea to pelagic sealing, a plump healthy pup was captured and placed in a box in the open air, in order to ascertain the period of death by starvation. The experiment was a necessarily cruel one, and was performed with great reluctance, but the importance of the inquiry was held to justify it. When captured, the pup weighed 12 lb; it died on the 15th August, its weight being then reduced to 9 lb.

From the very beginning of our inspection we saw daily, as we watched from the verge of the rookeries, a dead pup here and there, and now and then one was drawn out by the aid of a long pole and submitted to dissection. By the 1st August, dead pups were conspicuous wherever we went.

Until near the end of the first week in August it was impossible to enter the rookeries, and no more systematic investigation could be made. On the 5th August a regular progress was made through the rookeries, and the dead pups were systematically counted under Dr. Jordan's leadership. The count was completed for St. Paul Island on the 12th August, and on the 16th and 17th August, a similar count was made on the Island of St. George by Mr. Lucas, Mr. Macoun, and Colonel Murray. The following are the resulting numbers of dead pups for each rookery on the two islands:—

| | | |
|---|---|---|
| St. Paul— | | |
| Ketavie | 100 | |
| Lagoon | 78 | |
| Lukannon | 205 | |
| Tolstoi | 1,895 | |
| Zapadnie | 3,095 | |
| Little Zapadnie | 134 | |
| Zapadnie reef | 712 | |
| Gorbatch | 712 | |
| Ardiguen | 2 | |
| Reef | 950 | |
| Sea-Lion Rock | 50 | |
| Polavina | 635 | |
| Little Polavina | 47 | |
| Vostochni (North-east Point, west) | 1,808 | |
| Morjovi (North-east Point, east) | 485 | |
| Total | | 10,309 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| St. George— | | | | | | | | |
| North .. | .. | .. | .. | .. | .. | .. | 259 | |
| Little East | .. | .. | .. | .. | .. | .. | 31 | |
| East .. | .. | .. | .. | .. | .. | .. | 112 | |
| Zapadnie | .. | .. | .. | .. | .. | .. | 199 | |
| Staraya Atil | .. | .. | .. | .. | .. | .. | 135 | |
| | | | | | | | | 736 |
| Grand total | .. | .. | .. | .. | .. | .. | | 11,035 |

This very large aggregate is admitted to consist entirely of pups for whose death pelagic sealing is not to blame. On St. Paul they were all counted before, and on St. George within two days of the death of the pup alluded to, whose enforced period of starvation commenced with the opening of the pelagic fishery.

The existence of a large mortality of pups from natural causes has been the subject of much conflict of opinion. Elliot (*Op. Cit.*, p. 68) estimates the mortality in infancy, or up to the age of five or six months, as trifling, "say 1 per cent., while on and about the islands of their birth, surrounding which, and upon which they have no enemies whatever to speak of."

Mr. Townsend, in 1895 (*Op. Cit.*, p. 37), could find no dead pups until after the 1st September; from that time on, the death of the young was continuous, and for 1894 (*Op. Cit.*, p. 15) Mr. Townsend makes the same statement in almost identical words.

Mr. True, in 1895 (*ibid.*, pp. 99, 100), saw a number of dead pups during his sojourn, but did not think that the total would exceed 150 for all the St. Paul rookeries. He counted twenty-three dead pups on the 2nd August on Ketavie, and at the north end of Tolstoi he observed, on the 15th August, seventy in one small area, and about twenty-five more a little further south. "The area referred to" [in the neighbourhood of which, about the same day of the month, we found 1,895] "was occupied earlier in the season by a great mass of seals, and I regard the number of dead pups found here as representing the ordinary mortality of the young."

Judge Crowley (Sen. Doc. 137, Part I, p. 16) speaks of the first dead pup of the season appearing on the rookery breeding-grounds "in the latter part of August 1894."

Colonel Murray, in his Report for 1894 as Special Agent of the United States' Treasury, says (*ibid.*, p. 55) as follows:—

"Another very important feature observed in our inspection of the rookeries in 1894 was the absence of dead pups in the early part of August, for up to our leaving on the 8th I had not seen a dead pup on the island, and the agent in charge, who was on St. Paul Island from June to the latter part of August, and who kept a close watch for dead pups, tells me now that it was not till about the 20th August there was a dead pup to be seen, but from that date to the close of the season, according to official communications received from the islands, the carcasses of dead pups, starved and emaciated, increased with appalling rapidity until 12,000 were encountered by the assistant agents."

But it is not necessary to multiply such instances or quotations. It is plain that recent American observers have almost wholly overlooked the early mortality of pups from natural causes, and have attributed the whole mortality of the season to pelagic sealing.

On the other hand, precisely the same phenomen that we witnessed was described in detail by the British Commissioners (Report, p. 61) from their observations in 1891, and again with still greater precision by Mr. Macoun (Supplementary Report, p. 195) from his observations in 1892.

The Commissioners, "when visiting Tolstoi Rookery on the 29th July, observed, and called attention to several hundred dead pups, which lay scattered about in a limited area, on a smooth slope near the northern or inland end of the rookery-ground, and at some little distance from the shore." No dead pups caught their eye on St. George Island, and comparatively few on North-east Point, but at Polavina they found several hundred on the 4th August, and on the 19th August at Tolstoi, many more than had been there before. In short, broadly speaking, they saw what we have seen; they found the mortality slight where we found it slight, and great where we found it great.

Mr. Macoun, in 1892, investigated the matter with great care. On the 22nd July he counted, close around his camera at Polavina, 143 dead pups. On the 14th August he found about 4,000 at Tolstoi "on the same ground on which those seen last year (1891) were lying, but scattered over a larger area, and in much greater numbers." On North-east Point, on the 20th August, he saw, with a glass, at least 500 in the view from Hutchinson's Hill. All this took place in a year when no pelagic sealing was permitted in Behring Sea.

It is clear that by our work of last summer the statements of the British Commissioners, and of Mr. Macoun, are amply corroborated.

*Causes of Death.*

While this first count on St. Paul Island proceeded, about 150 bodies of pups were dissected. The dissection was in the greater number of cases performed conjointly by Mr. Lucas and myself. The examination was a somewhat cursory one; the bodies were rapidly opened on some convenient stone on the rookery ground, and the appearances noted on the spot. Neither Mr. Lucas nor I are pathologists, and the symptoms noted are simply those that would present themselves at once to any anatomist's eye. So far as they go, however, they are not without interest.

In the first place a very considerable number of pups died during this early period of starvation. Dr. Jordan (Preliminary Report, p. 47) attributes to this cause the death of only "perhaps of 200 in all," or less than 2 per cent. of the whole. This is, I think, the only point of any consequence where I find myself at variance with Dr. Jordan on a matter of actual fact and observation.

I take the following five consecutive cases from my notes of dissections made at North-east Point on the 10th August. The pups were not selected by me, but such as seemed fresh enough for dissection were laid aside by Dr. Jordan and Mr. Clark as they passed over the rookery making their count, and I dissected them there and then:—

40. Female pup, thin, no subcutaneous fat. Stomach empty; rectum full of very black sticky matter; lungs and viscera apparently normal.

41. Male pup, large, very thin. Muscles pale in colour: lungs deeply congested; stomach and small intestines empty, the latter stained with much bile; rectum contained black slimy matter.

42. Male pup, thin; stomach empty; lungs normal; rectum contains small quantity of black slimy matter.

43. Female pup, very thin; lungs deeply congested; stomach empty.

44. Male pup, very thin; lungs deeply congested; stomach and rectum empty; intestines suffused with bile.

In every one of these cases it seems to me safe to say that the pup was starved. In the case of the pup starved for experiment, and dissected by Dr. Voss on the 15th August, the record of autopsy was as follows:—

"Lungs small, flaccid, deeply congested; comparatively little blood in heart, and no clot; liver small, thin, and very dark; gall bladder full; much dark bile secretion in intestines; kidneys small and dark; both branches of uterus congested."

The accumulation of tarry matter in the intestines, black with bile products, or perhaps with the pigments of extravasated blood, was found by us to be a constant accompaniment of starvation, and though our general knowledge of the symptoms of death by actual starvation is scanty, yet we are not without evidence of a similar phenomenon in the human subject (*cf.*, Taylor's "Medical Jurisprudence," edition 3, vol. ii, p. 138). Suffusions of bile and a distended gall-bladder are still more familiar concomitants of death by starvation. I have preserved notes of eighty-one autopsies of pups, made mostly by Mr. Lucas and myself, some by myself alone, others by Dr. Jordan and Dr. Voss; and of these eighty-one, nineteen are described as "emaciated and very thin," and six more as "thin." Nine showed the slimy or tarry black or greenish matter in the rectum, besides others which showed more or less conspicuous suffusions of bile.

In some of these cases injuries had been received from the immediate effects of which the pup died; but in all, if starvation did not actually take place, it had at least been imminent.

In my opinion, difficult as it may be to account for the fact, the deaths attributable to starvation, or that occur after a stage of emaciation has been reached, are, even in the early season, before pelagic sealing can have produced its effect, very much nearer to 12 or 20 per cent. than to the 2 per cent. below which Dr. Jordan estimates them.

Whatever may be the proportion of deaths from starvation in this early part of the season, the bulk of the pups have undoubtedly met their death by accidental injuries, by being smothered in the sand, injured by bulls, and sometimes by drowning in the surf. We could detect no sign whatever of any disease of an epidemic kind.

The following are the percentages of dead pups to the whole number born on the various rookeries as shown in the August count:—

| | Per cent. |
|---|---|
| Ardignen .. .. .. .. .. .. .. .. | 0·3 |
| Ketavie .. .. .. .. .. .. .. .. | 1·8 |
| Sea-Lion Rock .. .. .. .. .. .. .. | 2·5 |
| Zapadnie (reef) .. .. .. .. .. .. .. | 2·7 |
| Lagoon .. .. .. .. .. .. .. .. | 3·1 |
| Zapadnie (Little) .. .. .. .. .. .. .. | 3·2 |
| Polavina (Little) .. .. .. .. .. .. .. | 3·4 |
| Lukannon .. .. .. .. .. .. .. .. | 4·6 |
| Reef .. .. .. .. .. .. .. .. | 6·2 |
| North-east Point (east) .. .. .. .. .. .. .. | 6·2 |
| „ „ (west) .. .. .. .. .. .. .. | 6·6 |
| Gorbatch .. .. .. .. .. .. .. .. | 7·7 |
| Polavina .. .. .. .. .. .. .. .. | 9·5 |
| Tolstoi .. .. .. .. .. .. .. .. | 13·1 |
| Zapadnie .. .. .. .. .. .. .. .. | 16·9 |

The great differences here tabulated go hand in hand in a way that is clear on the whole, if not not traceable in every single instance, with broad differences in the nature of the ground. The rocky rookeries show the least mortality; the stony beaches come next in order; the large rookeries of the Reef and North-east Point stand midway; Polavina, with its flat, level expanse, stands higher, and Tolstoi and Zapadnie owe their pre-eminence to sandy interspaces among the rocks, so fatal to the pups that we came to speak of them as "death-traps." The project of removing these last sources of danger by filling up the sandy hollows with rocks and stones has been put forward by the American Commissioners. The scheme is a big one, and I am for myself inclined to think that the labour involved would be very great indeed, and beyond the power of the islanders to accomplish.

After the middle of August my journey to the Commander Islands and other matters occupied my time, and I made no more autopsies. Accordingly, I cannot speak from personal observation of the cause of death indicated by the bodies of the dead pups later in the season.

*The Mortality subsequent to August 15.*

The second count of the dead pups was postponed until the end of September, in order that the pelagic fishery might produce its full effect. This count was made for St. Paul Island by Messrs. Macoun and Clark, with the assistance of Judge Crowley, Colonel Murray, and Mr. Barrett Hamilton, between the 28th September and the 1st October.

The count on St. George Island was made on the 6th October by Mr. Barrett Hamilton and Mr. James Judge on East and Little East Rookeries, and by Mr. Macoun and Mr. Clark on Zapadnie, Staraya Atil, and North Rookeries.

The following is the complete result of the October count, the number found in August being deducted from those found in October, to give the number that had died in the interval, and an addition of 20 per cent. being made in the case of St. Paul Island to fully cover the possible loss by putrefaction and other causes between August and the 1st October: the addition is a liberal one:—

PUP Statistics.—Summary.

| Rookery. | Total Born. | Dead. | | Died since August Count. | Starving. |
|---|---|---|---|---|---|
| | | August. | October. | | |
| ST. PAUL ISLAND. | | | | | |
| Ketavie .. .. .. | 6,049 | 109 | 609 | 500 | 42 |
| Lukannon .. .. .. | 4,450 | [illegible] | 579 | 374 | 27 |
| Lagoon .. .. .. | 2,484 | 76 | 316 | 238 | 51 |
| Tolstoi .. .. .. .. | 14,439 | 1,895 | 2,449 | 554 | 191 |
| Zapadnie .. .. .. | 17,648 | 3,095 | 4,395 | 1,300 | 154 |
| Little Zapadnie .. .. .. | 4,200 | 134 | 693 | 559 | 64 |
| Zapadnie Reef .. .. .. | 3,862 | 104 | 327 | 223 | 18 |
| Gorbatch .. .. .. | 9,142 | 712 | 1,878 | 1,166 | 126 |
| Ardiguen . .. .. | 652 | 2 | 78 | 76 | 8 |
| Reef .. .. .. .. | 15,238 | 950 | 2,786 | 1,836 | 300 |
| Sivotch Rock .. .. .. | 1,907 | 50 | 284 | 234 | 31 |
| Polavina .. .. .. | 6,673 | 635 | 1,555 | 920 | 55 |
| Little Polavina .. .. .. | 1,363 | 47 | 119 | 72 | 22 |
| Vostochni .. .. .. | 27,148 | 1,808 | 3,313 | 1,525 | 329 |
| Morjovi .. .. .. | 773 | 485 | 950 | 445 | 109 |
| Total .. .. .. | 123,048 | 10,309 | 20,331 | 10,022 | 1,527 |
| Addition of 20 per cent. for loss between August and October counts | .. | .. | .. | 2,061 | .. |
| Starving pups to be added as starved. | .. | .. | .. | 1,527 | .. |
| Addition for bodies taken for dissection .. .. .. | .. | .. | .. | 150 | .. |
| Total starved .. .. | .. | .. | | 13,760 | .. |
| ST. GEORGE ISLAND. | | | | | |
| North .. .. .. .. | 6,809 | 259 | 145 | .. | 7 |
| Staraya Artil .. .. .. | 2,269 | 135 | 194 | .. | 3 |
| Zapadnie .. .. .. | 5,509 | 199 | 527 | .. | 4 |
| East .. .. .. .. | 4,086 | 112 | 15 | .. | 4 |
| Little East .. .. .. | 1,350 | 31 | 16 | .. | 1 |
| Total .. .. .. | 20,023 | 736 | 897 | .. | 19 |
| Grand total for both islands. | 143,071 | 11,045 | 21,228 | .. | 1,546 |

It will be observed that the result for St. George Island is unsatisfactory, inasmuch as on three of its rookeries far less dead pups were found on the second occasion than the first. The blue foxes appear to have devoured the carcasses wholesale, and only two untouched bodies were found on the island. This destruction was most complete on East and Little East Rookeries, and just there I had noticed in the end of July the especial number of foxes, some of which had their earths almost within the bounds of the rookery. St. George may, therefore, be left out of the calculation, unless we choose simply to ascribe to it an estimated mortality in proportion to that of St. Paul.

The net result of the count for St. Paul is that, even were we prepared to admit that no other causes save pelagic sealing were at work after the 15th August to lead to the death of pups, and even if we reckon all the "starving" pups as starved, and add besides the estimate of 20 per cent. for loss or defects of observation, we then should have a total mortality to charge against the pelagic sealer a little more than equal to that which has already taken place in the early part of the season from causes acknowledged to be natural and apart from his agency. We may wonder that this mortality is not more, considering that nearly 30,000 seals (of all ages and both sexes) were taken during the summer in Behring Sea; but it is clear we cannot prove more nor any longer allege more. And such mortality is a very different matter from what has of late years been asserted to take place.

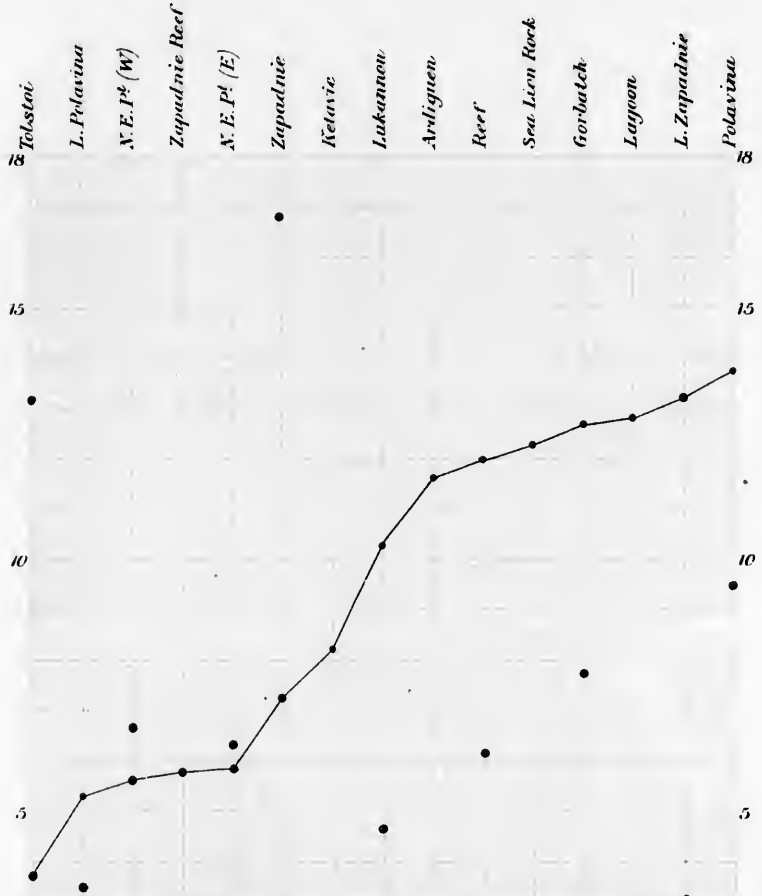
Dr. Jordan appears to charge in his preliminary Report the whole of this autumnal mortality, the whole loss of pups after the August count, to starvation, resulting from the operations of the pelagic sealers. I have no wish to dispute, nor have I any inclination to

| | Starving. |
|---|---|
| | 42 |
| | 27 |
| | 51 |
| | 191 |
| | 154 |
| | 64 |
| | 18 |
| | 126 |
| | 8 |
| | 300 |
| | 31 |
| | 55 |
| | 22 |
| | 329 |
| | 109 |
| | 1,527 |
| | .. |
| | .. |
| | .. |
| | .. |
| | 7 |
| | 3 |
| | 4 |
| | 4 |
| | 1 |
| | 19 |
| | 1,546 |

ry, inasmuch
sion than the
nd only two
complete on
of July the
ounds of the
ss we choose
l.
o admit that
lead to the
d add besides
l have a total
hat which has
ledged to be
is not more,
n during the
allege more.
en asserted to

this autumnal
lting from the
inclination to

## PERCENTAGE OF DEAD PUPS, AUGUST TO OCTOBER ON THE SEVERAL ROOKERIES OF ST PAUL ISLAND.




### REFERENCES.

*The rookeries to North and West are represented by Blue dots.*

*" " " South and East " " " Black dots.*

*The red dots indicate the earlier mortality ending with the beginning of August.*

(30. 4/37 1083/F 0 3/3 Harrison & Sons. Lith. St. Martins Lane W.C.

doubt, that to the death of the mother at sea a large part of this mortality is due, but that this is the entire and sole cause is surely impossible to maintain after our experience of the earlier mortality, which showed no signs of having ceased at the time we estimated it.

Let us make, for comparison with the similar table previously given (p. 23), a table of the later mortality on the various rookeries expressed in percentage proportion of the dead pups to the whole number born.

PERCENTAGE Proportion of Pups found Dead in the September–October Count (after deduction of the whole number already counted in August) to the whole number born on the several Rookeries.

| | Per cent. |
|---|---|
| Tolstoi .. .. .. .. .. .. .. .. | 3·8 |
| Little Polavina .. .. .. .. .. .. .. | 5·3 |
| North-east Point (west) .. .. .. .. .. .. | 5·6 |
| Zapadnie Reef .. .. .. .. .. .. .. | 5·7 |
| North-east Point (east) .. .. .. .. .. .. | 5·9 |
| Zapadnie .. .. .. .. .. .. .. .. | 7·3 |
| Ketavie .. .. .. .. .. .. .. .. | 8·2 |
| Lukannon .. .. .. .. .. .. .. | 10·3 |
| Ardiguen .. .. .. .. .. .. .. .. | 11·6 |
| Reef .. .. .. .. .. .. .. .. | 12·0 |
| Sea-Lion Rock .. .. .. .. .. .. .. | 12·3 |
| Gorbatch .. .. .. .. .. .. .. .. | 12·7 |
| Lagoon .. .. .. .. .. .. .. .. | 12·8 |
| Little Zapadnie .. .. .. .. .. .. .. | 13·3 |
| Polavina .. .. .. .. .. .. .. .. | 13·8 |

The contrast or comparison of these two tables is exceedingly interesting to me. We still have a wide discrepancy between the percentages on the different rookeries where we should certainly be inclined to look for much closer agreement were a general and distant cause (such as the catch at sea) the only factor in operation. But the order of percentage is totally different from the preceding one. Differences in the nature of the ground have now little effect or none at all. Zapadnie and Zapadnie Reef come near together, as do Ketavie and Lukannon; Ardiguen, Reef, Sea-Lion Rock, and Gorbatch are nearly identical one with another; Tolstoi, which stood all but at the head, now stands at the bottom. It is curious to note that, with the exception of Little Polavina, all the rookeries at the bottom of the list are on the north and west of the island, and, with the exception of Little Zapadnie, all those at the top of the list are rookeries on the south and east.

I do not propose to explain all the points that an examination of the statistics suggests. But while I believe that there are sufficient discrepancies to indicate the presence of other factors in the case, yet it would, in my opinion, be useless to deny that the figures tend to corroborate the presumption that pelagic sealing is responsible for a large part of this autumnal mortality.

The general result of our investigation accordingly is that pelagic sealing, instead of being the one and only cause of the whole mortality of pups upon the islands, is in fact responsible for an unknown but considerable fraction of a fraction which is somewhat over one-half of the whole.

If, moreover, we require further warning not to ascribe too large a coefficient to the influence of pelagic sealing on the aggregate mortality, we may find it in a comparison of the statistics for 1895 and 1896. We have every reason to believe that the count was made, for the Island of St. Paul at least, as conscientiously in the one year as in the other; the numbers are congruent for the rookeries severally as well as collectively. Yet we have evidence of only some 1,600 more dead pups in the former than in the latter year, against a pelagic catch in Behring Sea greater (*cf.*, United States' Treasury Doc., No. 1932, p. 37, 1897) by nearly 15,000.

In 1895 the count of dead pups on the islands was made, once for all, in the days immediately preceding the 10th October. The enumeration on St. Paul Island was evidently systematic and careful, and its results tally very closely with those of 1896.

On St. George Island the count is said to have been made by Mr. Ziebach, the agent in charge. Mr. Ziebach reports the finding of 1012 dead pups (where, in 1896, only 897 were obtained), a figure that would indicate a mortality of about one-third of all the pups born on the island. I can offer no explanation of this stupendous discrepancy.

The following Table sums up the total mortality of pups reported from the two islands for 1895 and 1896.

## Comparative Statement of the Total Mortality of Pups in 1895 and 1896.

### St. Paul Island.

| Rookery. | 1895. | 1896. | Remarks. |
|---|---|---|---|
| Ketavie .. .. .. | 857 | 609 | The figures for 1895 are from Sen. Doc. 137, Part II, pp. 36 and 37, 54th Cong., 1st Sess. |
| Lukannon .. .. .. | 1,347 | 579 | |
| Lagoon .. .. .. | 300 | 316 | |
| Polavina .. .. .. | 1,970 | 1,674 | |
| Gorbatch .. .. .. | 1,514 | 1,956 | |
| Zapadnie .. .. .. | 5,231 | 5,415 | |
| Little Zapadnie .. .. | 381 | .. | |
| Tolstoi .. .. .. | 2,582 | 2,449 | |
| Reef .. .. .. | 3,376 | 2,786 | |
| Sea-Lion Rock .. .. | 361 | 284 | |
| North-east Point .. .. | 4,017 | 4,263 | |
| Total .. .. | 21,936 | 20,331 | |

### St. George Island.

| Rookery. | 1895. | 1896. | Remarks. |
|---|---|---|---|
| Zapadnie .. .. .. | 2,083 | 527 | |
| North .. .. .. | 1,559 | 145 | |
| Staraya Atil .. .. | 1,131 | 194 | |
| East .. .. .. | 986 | 15 | |
| Little East .. .. | 253 | 16 | |
| Total .. .. | 6,012 | 897 | |

## Summary of Statistics for 1896.

| Date of Counting Cows. | Rookery. | Harems.* | Cows. | Counted or Estimated.† | Pups Alive, August. | Pups Dead, August. | Total of Pups Born.‡ | Cows Dead. | Bulls Dead. | Pups Dead (October).§ | Pups apparently Starving (October). |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **St. Paul Island.** | | | | | | | | | | |
| July 13 .. .. | Ketavie .. .. .. .. | 182 | 3,152 | C. + E. | 5,240 | 109 | 6,019 | .. | .. | 609 | 42 |
| ,, 20 .. .. | Lukannon .. .. .. .. | 147 | 2,543 | E. | 4,245 | 205 | 4,450 | 2 | .. | 579 | 27 |
| ,, 13 .. .. | Lagoon .. .. .. .. | 120 | 1,474 | C. + E. | 2,406 | 78 | 2,484 | 4 | 2 | 316 | 51 |
| ,, 14 .. .. | Tolstoi (main) .. .. .. .. | 389 | 6,729 | E. | 9,996 | 1,779 | 11,775 | 9 | 2 | 2,449 | 191 |
| ,, 14 .. .. | ,, (cliffs) .. .. .. .. | 108 | 1,498 | C. + E. | 2,548 | 116 | 2,664 | 7 | 1 | | |
| ,, 14 .. .. | Zapadnie .. .. .. .. | 583 | 10,085 | E. | 14,553 | 3,095 | 17,648 | 15 | 6 | 4,395 | 154 |
| ,, 14 .. .. | Little Zapadnie.. .. .. .. | 210 | 2,100 | C. + E. | 4,066 | 131 | 4,200 | 6 | .. | 693 | 61 |
| ,, 14 .. .. | Zapadnie (reef).. .. .. .. | 176 | 2,256 | C. + E. | 3,758 | 101 | 3,862 | 5 | 1 | 327 | 18 |
| ,, 14 .. .. | Gorbatch .. .. .. .. | 302 | 5,224 | E. | 8,430 | 712 | 9,142 | 5 | 1 | 1,878 | 126 |
| ,, 16 .. .. | Ardiguen .. .. .. .. | 27 | 550 | C. + E. | 650 | 2 | 652 | .. | .. | 78 | 8 |
| ,, 13 .. .. | Reef .. .. .. .. .. | 501 | 8,719 | E. | 14,308 | 950 | 15,258 | 24 | 2 | 2,786 | 300 |
| ,, 16 .. .. | Sea-Lion Rock .. .. .. .. | 63 | 1,090 | E. | 1,857 | 50 | 1,907 | .. | .. | 284 | 31 |
| ,, 12 .. .. | Polavina (main) .. .. .. | 138 | 2,387 | E. | 3,593 | 584 | 4,177 | 4 | 2 | 1,555 | 55 |
| ,, 23 .. .. | ,, (cliffs) .. . .. | 86 | 1,268 | C. + E. | 2,145 | 51 | 2,496 | .. | .. | 119 | 22 |
| ,, 15 .. .. | ,, (Little) .. .. .. | 45 | 779 | E. | 1,316 | 47 | 1,363 | .. | .. | | |
| ,, 23 .. .. | North-east Point (west ct.) .. .. | 224 | 2,887 | C. + E. | 4,117 | 295 | 4,412 | 30 | 11 | 3,313 | 329 |
| ,, 16 .. .. | ,, ,, (west cst.) .. .. | 751 | 12,922‖ | E. | 21,223 | 1,513 | 22,736 | | | 950 | 109 |
| ,, 16 .. .. | ,, ,, (east ct.) .. .. | 112 | 1,191 | C. + E. | 2,173 | 116 | 2,281 | | | | |
| ,, 16 .. .. | ,, ,, (east cst.) .. .. | 181 | 3,134 | E. | 5,115 | 369 | 5,484 | | | | |
| | Total for St. Paul .. .. | 4,348 | 70,361 | .. | 112,739 | 10,309 | 123,010 | 112 | 28 | 20,331 | 1,527 |
| | **St. George Island.** | | | | | | | | | | |
| ,, 10 .. .. | North .. .. .. .. | 225 | 3,891 | C. + E. | 6,550 | 259 | 6,809 | 7 | .. | 145 | 7 |
| ,, 11 .. .. | Little East .. .. .. .. | 41 | 761 | C. + E. | 1,319 | 31 | 1,350 | 1 | .. | 16 | 1 |
| ,, 11 .. .. | East .. .. .. .. .. | 135 | 2,335 | C. + E. | 3,974 | 112 | 4,086 | 2 | .. | 15 | 4 |
| ,, 12 .. .. | Zapadnie .. .. .. .. | 182 | 3,148 | C. + E. | 5,310 | 199 | 5,509 | 2 | .. | 527 | 4 |
| ,, 10 .. .. | Staraya Atil .. .. .. .. | 75 | 1,297 | .. | 2,134 | 135 | 2,269 | 6 | .. | 191 | 3 |
| | Total for St. George .. .. | 661 | 11,432 | .. | 19,287 | 736 | 20,023 | 18 | .. | 897 | 19 |
| | Grand total .. .. | 5 [illegible]9 | 81,793 | .. | 132,026 | 11,045 | 143,063 | 130 | 28 | 21,228 | 1,546 |

Otter Island had one harem, containing five pups.

* The count of harems here given for the Island of St. Paul was made during the general count by the Commissioners and Agents on the dates specified. Another count made by Colonel Murray, somewhat different to the above, is recorded on p. . For St. George Island, Colonel Murray's count is here made use of.

† The estimate of cows, where counting was impossible, is based on an average of 17·3 to a harem, that being the number given by the count of Ketavie Rookery.

‡ The total number of pups born is based on an actual count in the cases of Ketavie, Lagoon, Tolstoi Cliffs, and Zapadnie Reef. Elsewhere it is arrived at by adding 75 per cent. to the number of cows as observed or estimated in the foregoing columns.

§ The latter count of dead pups for St. George Island is very inadequate, the bodies having been destroyed or removed by foxes in great number.

‖ The estimate for the more crowded parts of the North-east Point is based on less perfect data than the rest, an accurate account even of harems being here impossible. Colonel Murray's count, above alluded to, is largely in excess of that here adopted for this rookery.

*The Drives.*

On the morning of the 15th July, in company with Dr. Jordan, Judge Crowley Captain Moser and Lieutenant Garrett of the "Albatross," Dr. Stejneger, Mr. Lucas, and Mr. Clark, I witnessed the entire conduct of a drive from Reef Rookery. This drive is minutely and accurately described by Dr. Jordan in his preliminary Report (pp. 38–40). The points which I especially noted at the time, and which may be here recapitulated in brief, were the silence, orderliness, and absence of haste with which the whole proceedings were conducted; the care taken in sorting out, as the drive progressed, the largest of the half-bulls included in it; the much greater ease with which the younger seals travelled over the ground than their older and heavier brethren; and, lastly, the ease with which the herd travelled over the harder and rougher portions of the ground, compared with the labour involved in crossing a short stretch of sand at Zoltoi. Before traversing the latter, arduous, though apparently unimportant, part of the journey, the herd was allowed to rest and cool for 10 minutes. The difference was quite enough to show that distance in itself is (within reasonable limits) an unimportant cause of fatigue and hardship compared with the character of the ground traversed, and, furthermore, that the ground which seemed to the novice the most arduous was far from being so, for the seals clambered actively and with ease over great boulders and high angular masses of broken rock, while they panted with fatigue over a level stretch of sand.

I could see absolutely nothing to find fault with in the drive. The route is the most fatiguing now made use of on the islands, but I could discover no great hardship, and certainly no cruelty, involved. The seals certainly puffed and blew, and sweated and steamed; they stopped every now and then to rest, and panted, as Dr. Jordan says, "like dogs," but a moment after they went on again briskly. The signs of distress were less painful than I have often witnessed in a flock of sheep on a hot and dusty road, and I have seen drovers show less regard for the comfort of their sheep. No seal died or was injured by the way; they came to the end of their journey all in good condition, and when the killing was over, those that were permitted to escape betook themselves straight and quickly to the sea.

We left the village at 2 A.M., and the drive commenced immediately thereafter at Zoltoi Sands. The seals driven from there and from the bay opposite were guided by three men straight to the village killing-ground, where they waited till the drive was over, about 5 o'clock. It was 3 o'clock when we reached the end of the reef, and the seals there were gathered together and started on their way by half-past. About 1,500 seals were included in the drive and driven in two batches, one of which reached the killing-ground about 5 o'clock, the other about a quarter to 6. On reaching the killing-ground they were first turned into the shallow lake by its side and afterwards rounded up on the grass; 1,919 seals in all were driven up to the killing-ground; of these, 849 were killed, and 1,070 rejected, 522 as too small, and 548 as too large (according to my figures), besides the small number of still larger ones that were turned away in the course of the drive. The percentage killed on the ground was, therefore, only 44·3 of those driven up. The killing was concluded by about 10 o'clock, an interval for breakfast intervening.

A week before, on the 9th July, I had attended, not a whole drive, but the last portion of one and the subsequent killing, at Zapadnie, St. George, and I append my notes made on the spot.

Leaving the village at 5 A.M., in company with Mr. J. Judge and Colonel Murray, we arrived on the ground shortly before 7 A.M. We found the pack of bachelor seals that had been driven on the previous evening from the hauling-grounds gathered together on rising ground near the watchman's hut. We walked down the hill to another hut, used by the Company's officers, at a distance of about half-a-mile, or rather more, and were there met by the Company's agent, Captain Daniel Webster. We had scarcely arrived there when the seals, driven by a couple of boys, arrived too, having covered the distance with no sign of exertion in less time than ourselves.

The killing-gang consisted of nineteen men and lads, three of whom carried wooden clubs 5 feet long. The seals were kept back a couple of hundred yards from the shore, and allowed to come forward in batches or packs to the killing-ground between the main batch and the sea. Captain Webster, club in hand, pointed out to the men what seals in each pack were to be slaughtered.

I counted in each batch the seals killed, and those rejected as too young or too old, as follows:—

| Rejected as too Young. | Rejected as too Old. | Killed. | Total. |
|---|---|---|---|
| 25 | .. | 28 | 53 |
| 18 | 4 | 20 | 42 |
| 13 | 7 | 20 | 40 |
| 30 | 3 | 22 | 55 |
| 12 | 14 | 10 | 36 |
| 21 | 10 | 17 | 48 |
| 28 | 1 | 13 | 42 |
| 7 | 4 | 12 | 23 |
| 16 | 8 | 11 | 35 |
| 15 | 6 | 21 | 42 |
| 30 | 1 | 13 | 44 |
| 17 | 6 | 20 | 43 |
| 33 | .. | 14 | 47 |
| 265 | 64 | 221 | 550 |

Percentage killed, 40·2.

The work of killing was completed at 8·20 A.M.

The men employed were clean, skilful, and vigorous. A single blow, or two at most, dispatched each seal, and I saw no failure of aim, even in the confused mass of seals tumbled pell-mell over one another. Though two killings (of 578 and 333 respectively) had already taken place from this rookery this season, I saw no seal bearing marks of previous injury. They showed no signs of terror; the survivors of each batch made quickly for the water, and were already swimming homeward as the next batch were being slain. Of the nineteen men, two drove down the batches of seals and two did the work of killing; two younger lads went round plunging a knife into the heart of any seal that still breathed, five (rippers) proceeded to slit the skins down the belly and around the neck and paws, after which the rest flayed the carcases. The work of skinning nearly kept pace with that of killing.

I could not detect in the whole process either intentional or accidental cruelty.

After a short rest, we saw the skins placed in the salt-house, the tally taking place under the eye of the Company's Agent and the Treasury Agent; 213 skins were tallied, my former count having been only approximate in the hurry of the killing operations.

Eight skins were produced in addition, as those of seals killed in the preceding days by the watchmen for food.

When I watched the killing, after the drive already described from the Reef, it seemed to me that if there was any difference at all between the operations on the two islands, the men of St. George were perhaps the more skilful of the two. I noted that it seemed to me that on St. Paul the animals were hit more on the nose and less on the back of the head, and that a second or a third blow was more often necessary. But though there may have been a man here and there less skilful than another, the operation on the whole was performed with very remarkable good order, dexterity, and speed; and, both in respect to the driving and killing on the two islands, I at least have no recommendations to suggest for their improvement.

I afterwards attended a killing at Polavina, on the 23rd July. The gang here consisted of twenty-six men (five with clubs to kill) and four boys; 585 seals were killed, and 344 released as young, and 313 as old. Two young seals were here accidentally injured; of these one was killed a few minutes afterwards, and the other was found dead in the afternoon. Work was over by 8·45 A.M. The drive here is a rather long one, the killing-ground being fully a mile from the extreme part of the rookery, but the ground is level and easy; the drive is lengthened in order to bring the killing-ground near to a small lake, where the seals are cooled off.

I afterwards witnessed the last killings of the season, save for a small number killed later for food, on the 25th and 27th July. The proceedings call for no further remark or description.

The drive on the 25th July was a large and comprehensive one, seals being brought from Lukannon, Ketavie, Zoltoi Sands, and the Reef; on the 27th July the chief drive was from Tolstoi and Middle Hill, afterwards from Lukannon. Although Lukannon had been driven so recently, there were said to be a remarkable number of good first-class skins in this final drive from that rookery.

This drive completed the season's catch of 23,842 for St. Paul Island. About sixty

killable seals were turned away, and a drive from Zapadnie that it had been intended to make was not required. Up to the previous week 5,858 skins had been taken on St. George Island, when Mr. Crowley arranged that other 300 should be taken, that being, in Captain Webster's opinion, the utmost that could be done.

I append a Table showing the proportion of seals killed and released on the various rookeries from the date of our arrival.

PERCENTAGE of Seals Killed and Released at the several Drives.

| | | |
|---|---|---|
| Zapadnie, St. George Island, July 9 (D.W.T.)— | | |
| Rejected as too young | 265 | |
| Rejected as too old | 64 | |
| Killed | 221 | |
| Percentage | | 41·8 |
| Reef, July 14 (D.W.T.)— | | |
| Rejected as too young | 522 | |
| Rejected as too old | 548 | |
| Killed | 849 | |
| Percentage | | 44·3 |
| North-east Point, July 13, 14 (Mr. Adam)— | | |
| Rejected young only | 1,159 | |
| Killed | 2,214 | |
| Tolstoi, July 16 (Mr. Adam)— | | |
| Rejected as too young | 1,038 | |
| Rejected as too old | 279 | |
| Killed | 1,138 | |
| Percentage | | 47·2 |
| North-east Point, west side, July 21 (Mr. Adam)— | | |
| Rejected as too young | 637 | |
| Rejected as too old | 811 | |
| Killed | 808 | |
| Percentage | | 35·8 |
| Polavina, July 23 (D.W.T.)— | | |
| Rejected as too young | 344 | |
| Rejected as too old | 313 | |
| Killed | 585 | |
| Percentage | | 47·1 |
| Lukannon, Ketavie, and Reef, July 25 (D.W.T.)— | | |
| Rejected as too young | 1,177 | |
| Rejected as too old | 1,008 | |
| Killed | 1,630 | |
| Percentage | | 42·7 |
| Tolstoi and Middle Hill, July 27— | | |
| Rejected as too young | 137 | |
| Rejected as too old | 457 | |
| Killed | 450 | |
| Percentage | | 43·1 |
| North and Staraya Atil, July 13 (Mr. J. Judge)— | | |
| Killed | 487 | |
| Percentage | | 46·0 |
| East, July 21 (Mr. Judge)— | | |
| Killed | 221 | |
| Percentage | | 27·0 |
| North and Staraya Atil, July 24 (Mr. Judge)— | | |
| Killed | 308 | |
| Percentage | | 17·0 |

Mr. Judge further supplied me with the following statistics of the percentage killed at the earlier drives on St. George Island. In these cases the percentage given is not the result of a close count, but is merely an approximation.

| Date. | Rookery. | Killed. | Percentage killed. |
|---|---|---|---|
| June 19 | East | 576 | 32 |
| ,, 24 | Zapadnie | 568 | 76 |
| ,, 26 | North and Staraya Atil | 999 | 72 |
| ,, 29 | East | 804 | 62 |
| July 2 | Zapadnie | 333 | 68 |
| ,, 6 | North and Staraya Atil | 700 | 56 |
| ,, 7 | East | 614 | 57 |

These figures, though not nearly so complete as we might wish them to be, are nevertheless exceedingly instructive, and illustrate a large number of useful truths.

In the first place they show that a very considerable proportion of males are rejected at every drive as too old for killing, and that to this extent the system is not a ruthless one, but leaves a liberal supply for breeding purposes. In some cases the animal taken is so little less than its neighbour which is left that the amateur can scarcely detect the difference, so inconspicuous is the incipient "wig" or growth of coarse hair over the withers which determines the rejection.

In the second place, the falling percentages are a rough measure of the extent to which the successive drives exhaust, or fall short of exhausting, the available stock.

In this instance the conclusion is inevitable that the drain upon the Island of St. George was this year much more severe than that upon the Island of St. Paul.

*Note.*—It is unfortunate that no more exact statistics are available as to the proportion of bachelor seals killed to those released. A careful count of the numbers released was not made until we arrived upon the islands, and the rough estimates furnished us for some of the earlier drives are useless as a basis for calculation.

It is clear that, if we may assume that the time intervening between two successive drives is sufficient to allow of a thorough redistribution of the bachelor herd, and if the case be not rendered much more complex by a great diversity in habits, or in the date of arrival of the bachelors of different ages, then we ought to possess in the falling percentage of "killable" bachelors in the successive drives a means of estimating approximately the total number of the bachelor herd for each rookery.

My colleague, Dr. John McCowan, has furnished me with the following solution of this problem:—

Let $m$ be the ratio of killed to spared in the second drive, and $n$ the like ratio for the first.

Let $r$ be the reciprocal of $1 - \frac{m}{n}$.

Then the total original number of seals = $r$ times the number contained in the first drive.

For example, taking the killings from North Rookery and Staraya Atil on July 6 and 13, as being perhaps the best (or the least faulty) instance at hand, we have—

$$\text{July } 6 \quad n = \frac{56}{44}$$

$$,, \ 13 \quad m = \frac{46}{54}$$

$$\therefore r = \frac{1}{1 - \frac{\frac{46}{54}}{\frac{56}{44}}} = \frac{1}{1 - \frac{253}{378}} = \frac{1}{\frac{125}{378}}$$

$$= \text{(nearly) } 3$$

Now, on the 6th July were killed 700, being 56 per cent. of the drive.

The drive on the 6th July, therefore, contained 1,250 seals.

The whole herd on the 6th July, therefore, contained $1{,}250 \times 3 = 3{,}750$ seals.

And $3{,}750 + 999$ (killed on 26th June) $= 4{,}750$, is thus given us as an approximate number of bachelors for the hauling-grounds of these two rookeries at the beginning of the season.

Estimating either by the count of cows or by the yield on the killing-grounds, these two rookeries are equivalent to about one-fifteenth of the two islands; and we, therefore, arrive at a total of somewhat over 70,000 as the number of bachelors (of two years old and upwards) frequenting the islands at the beginning of last season.

The subsequent drive on the 24th July from the same rookeries, at which only 17 per cent. are said to have been killed, is unfortunately not available as a check on th..

above calculation. It was the last drive of the season, and was only made to furnish the balance of the quota.

The estimate is here given merely as an illustration of a method, which, with better data to work upon, might prove valuable. The percentage given for the 6th July is not to be relied on. Nevertheless, the result arrived at is probably not a very long way from the truth.

## Statistics of Seals Killed on the Pribyloff Islands in the Season 1895-96.

### St. Paul Island.

| Season. | Date. | Rookery | | Seals killed. |
|---|---|---|---|---|
| 1895 | Autumn .. | Food-skins .. .. .. .. | | 929 |
| 1896 | May 13 .. | ,, Sea-Lion Rock .. | 121 | |
| | ,, 22 .. | ,, North-east Point .. | 3 | |
| | ,, 26 .. | ,, Tolstoi .. .. | 102 | |
| | June 4 .. | ,, North-east Point .. | 3 | |
| | ,, 8 .. | ,, Reef .. .. | 149 | |
| | ,, 13 .. | ,, Watchmen to date .. | 6 | |
| | | | | 384 |
| | ,, 19 .. | Zoltoi .. .. .. .. .. | | 283 |
| | ,, 20 .. | Watchmen .. .. .. .. | | 2 |
| | ,, 23 .. | North-east Point.. .. .. .. | | 1,414 |
| | ,, 24 .. | ,, ,, .. .. .. | | 1,408 |
| | ,, 27 .. | Reef .. .. .. .. .. | | 2,076 |
| | ,, 29 .. | English Bay, Middle Hill, Tolstoi .. .. | | 1,398 |
| | July 2 .. | North-east Point.. .. .. .. | | 1,396 |
| | ,, 3 .. | ,, ,, .. .. .. | | 1,109 |
| | ,, 6 .. | Zoltoi, Lukannon .. .. .. | | 1,535 |
| | ,, 7 .. | Zapadnie .. .. .. .. | | 784 |
| | ,, 8 .. | Polavina .. .. .. .. | | 961 |
| | ,, 10 .. | Reef, Zoltoi .. .. .. .. | | 1,271 |
| | ,, 13 .. | North-east Point.. .. .. .. | | 1,045 |
| | ,, 14 .. | ,, ,, .. .. .. | | 1,169 |
| | ,, 15 .. | Reef, Zoltoi .. .. .. | | 819 |
| | ,, 16 .. | Tolstoi, Middle Hill, English Bay | | 1,138 |
| | ,, 21 .. | North-east Point.. .. .. .. | | 808 |
| | ,, 22 .. | ,, ,, .. .. .. | | 1,047 |
| | ,, 23 .. | Polavina .. .. .. .. | | 585 |
| | ,, 25 .. | Lukannon, Ketavie, Zoltoi, Reef .. .. | | 1,630 |
| | ,, 27 .. | Middle Hill, Tolstoi, Lukannon .. .. | | 621 |
| | | Total .. .. .. .. | | 23,842 |

### St. George Island.

| Season. | Date. | Rookery. | | Seals killed. |
|---|---|---|---|---|
| 1895 | Autumn .. | Food-skins .. .. .. .. | | 166 |
| 1896 | May 18 .. | ,, North Rookery .. | 15 | |
| | ,, 31 .. | ,, ,, ,, .. | 46 | |
| | June 11 .. | ,, ,, ,, .. | 100 | |
| | | | | 161 |
| | ,, 19 .. | East Rookery .. .. .. .. | | 576 |
| | ,, 24 .. | Zapadnie .. .. .. .. | | 568 |
| | ,, 26 .. | North and Staraya Atil .. .. .. | | 999 |
| | ,, 29 .. | East .. .. .. .. .. | | 504 |
| | July 2 .. | Zapadnie .. .. .. .. | | 333 |
| | ,, 6 .. | North and Staraya Atil .. .. .. | | 700 |
| | ,, 7 .. | East and Little East .. .. .. | | 614 |
| | ,, 9 .. | Zapadnie .. .. .. .. | | 221 |
| | ,, 13 .. | North and Staraya Atil .. .. .. | | 487 |
| | ,, 21 .. | East .. .. .. .. .. | | 221 |
| | ,, 24 .. | North and Staraya Atil .. .. .. | | 308 |
| | | Total .. .. .. .. | | 6,163 |

TOTAL.

| | 1895–96. | 1896 to August |
|---|---|---|
| St. Paul Island .. .. .. .. | 23,842 | 22,913 |
| St. George Island.. .. .. .. | 6,163 | 5,997 |
| Total .. .. .. .. | 30,005 | 28,910 |

NOTE.—All skins of seals killed on the islands in 1896 were accepted by the agents of the North American Commercial Company. Seven skins taken for food in the previous autumn (15th October) on North Rookery, St. George Island, were rejected, one as being under-sized, the rest as stagey.

The above figures were furnished me for St. Paul Island by Judge Crowley, United States' Treasury Agent in charge of the Pribyloff Islands, and for St. George Island by Mr. James Judge, United States' Treasury Agent.

---

COMPARATIVE Frequency of Drives in past Years on the Pribyloff Islands.
*Cf.* Sen. Doc. 137, Pt. I, pp. 302–319.)

ST. PAUL ISLAND.

| Rookery. | 1878. | 1888. | 1889. | 1896. |
|---|---|---|---|---|
| North-east Point .. .. .. | 4 | 33 | 33 | 4 |
| Reef, including Zoltoi.. .. .. | 18 | 17 | 18 | 6 |
| Tolstoi and Middle Hill .. .. | 9 | 13 | 13 | 3 |
| Lukannon and Ketavie .. .. | 9 | 6 | 12 | 3 |
| Zapadnie .. .. .. .. | 4 | 8 | 8 | 1 |
| Polavina .. .. .. . | 3 | 8 | 7 | 2 |

ST. GEORGE ISLAND.

| Rookery. | 1878. | 1888. | 1889. | 1896. |
|---|---|---|---|---|
| North .. .. .. .. | 7 | 16 | 13 | 5 |
| East .. .. .. .. | 7 | 14 | 15 | 4 |
| Zapadnie .. .. .. .. | 7 | 10 | 12 | 3 |
| Starnya Atil.. .. .. .. | 5 | 15 | 13 | 4 |

NOTE.—In the above Table all the "food-drives" and all the drives in autumn subsequent to the "stagey" season are omitted.

The figures given for the years 1888–89 are not in all cases, at least not in the case of the larger rookeries, strictly comparable with those for this year, since they record as separate drives drives that obviously covered only a portion of the rookery; the figures for North-East Point in those years should, at any rate, be divided by two. Nevertheless, the comparison is of some value, and may be checked by an inspection of the full statistics from which the above epitome is drawn.

It is manifest from the above statistics that the rookeries, especially those on St. Paul Island, were last year subjected to vastly less severe handling than in days gone by, especially in the latter years of the Alaska Company's tenure.

There was no "raking and scraping" required to furnish the quota of 30,000 skins that was last year permitted and obtained. It is equally clear that the 30,000 might have been considerably exceeded, though it is not safe to make assumptions regarding the measure of such possible excess. But we may at least take note that the killing came to a satisfactory end last year without the need for even a second drive at Zapadnie, from which

no seals were taken after the single drive on the 7th July, at which 784 skins were taken; while in 1895 Zapadnie furnished—

| | Skins. |
|---|---|
| July 2 .. .. .. .. .. .. .. .. | 861 |
| „ 19 .. .. .. .. .. .. .. .. | 834 |
| Total .. .. .. .. .. .. .. | 1,695 |

And in 1894—

| | Skins. |
|---|---|
| June 23 .. .. .. .. .. .. .. .. | 846 |
| July 17 .. .. .. .. .. .. .. .. | 933 |
| Total .. .. .. .. .. .. .. | 1,779 |

*Statistics of Killing on North-east Point.*

Captain David Webster had the kindness to communicate to me (5th August, 1896) his private memoranda of the killing on North-east Point that he had himself superintended. Captain Webster has had more experience than any man alive of seals, their quest and their slaughter. His experiences are in part recorded in the Report of the British Commission of 1891, and the Commission then bore testimony, which it would be superfluous for me to repeat, as to his extreme regard for accuracy of statement.

| Year. | | Date. | Killed. |
|---|---|---|---|
| 1868 | Finished killing (for want of salt) September 15, after killing 26,000. Then twice as many more were killed on the same rookery by other hands.<br>In regard to the great and unrestricted slaughter of this year, it has been alleged that the slaughter was indiscriminate, and regardless of sex or age. Captain Webster is positive in asserting that bachelor males only were killed; that these were so abundant that it was unnecessary to disturb the more difficultly driven breeding-grounds for the bulls and females; and that the natives would have refused even then to kill after being all their lives accustomed to protect them. | | |
| 1869 | None killed. | | |
| 1870 | Captain Webster absent on Robben Reef. | | |
| 1871 | Killing completed .. .. .. | October 28 . | 18,000 |
| 1872 | „ „ .. .. .. | July 19 .. | 23,444 |
| 1873 | „ „ .. .. .. | „ 23 .. | 26,369 |
| 1874 | „ „ .. .. .. | „ 17 .. | 35,775 |
| 1875 | „ „ .. .. .. | „ 17 .. | 35,118 |
| 1876 | (Absent on Commander Islands.) | | |
| 1877 | Killing completed .. .. . | „ 9 .. | 25,264 |
| 1878 | „ „ .. .. .. | „ 10 .. | 22,839 |
| 1879 | „ „ .. .. .. | „ 10 .. | 29,245 |
| 1880 | „ „ .. .. .. | „ 9 .. | 25,799 |
| 1881 | „ „ .. .. .. | „ 8 .. | 18,077 |
| 1882 | „ „ .. .. .. | „ 17 .. | 23,211 |
| 1883 | „ „ .. .. .. | „ 9 .. | 13,361 |
| 1884 | „ „ .. .. .. | „ 18 .. | 23,099 |
| 1885 | „ „ .. .. .. | „ 23 .. | 19,818 |
| 1886 | „ „ . .. .. | „ 24 .. | 26,924 |
| 1887 | „ „ .. .. .. | „ 22 .. | 28,565 |
| 1888 | „ „ .. .. .. | „ 26 .. | 32,863 |
| 1889 | „ „ .. .. .. | „ 31 .. | 28,805 |

From these statistics two deductions may be fairly drawn.

Firstly that the diversities of dates by which the work was completed and the varying numbers obtained indicate a variation in the numbers of the stock from year to year even in very early periods. This fact Captain Webster himself pointed out, and bore witness from his recollection to its truth. He was positive that even in those early days the seals were more abundant one year than another, and that the yield was gathered in with varying

degrees of labour and in varying plenty; but he professed himself unable to explain this fact. Secondly, we may see from the continual lengthening out of the season something of the increasing difficulty experienced in the last years in obtaining the total; and the large numbers secured to the end (that of 1888 exceeding that of any year since 1875) may perhaps be interpreted as showing how this great harvest-ground was drawn upon to the utmost in the struggle to achieve the whole quota of 100,000 for the islands during the last years of the Alaska Company's tenure.

*Conclusion*

Besides the facts or statements that I have dealt with in the preceding pages, there are still many other points, to which my attention was directed, concerning which I beg leave in the meanwhile to prætermit my report. Such matters as these are the dates of arrival and departure of the various classes of seals, their manner of feeding and periods of abstinence from food, their distribution at sea and the duration of their stay ashore, the diet of the pups at weaning, the measure of virility of the bulls, and the phenomena of pregnancy in the females.

Certain of these matters are discussed in the Reports of my colleagues; certain of them are matters in regard to which the poverty of our knowledge invites suspension of judgment and fresh search for evidence.

In the foregoing account I have merely set forth my observations of the herd and its past history in so far as both together show that the alarming statements to which utterance has been given in recent years, the accounts of the herd's immense decrease and the prophecies of its approaching extinction, are overdrawn and untenable. But it is my duty to state to your Lordship that there is still abundant need for care and for prudent measures of conservation in the interests of all. A birth-rate which we estimate at 143,000 per annum is not great in comparison with the drain upon the stock. From one cause or another, a loss of over 20,000 is experienced among the pups ere they emigrate to sea; and though the dangers they there encounter are unknown to us, we may take it for certain that the risks they run are great and the loss they endure considerable. When to the measured loss in infancy and to the unmeasured loss in youth and age we add the toll taken on the islands and the toll taken in the sea, it is not difficult to believe that the margin of safety is a narrow one, if it be not already in some measure over-stepped. We may hope for a perpetuation of the present numbers; we cannot count upon an increase. And it is my earnest hope that a recognition of mutual interests and a regard for the common advantage may suggest measures of prudence which shall keep the pursuit and slaughter of the animal within due and definite bounds.

(Signed) D'ARCY W. THOMPSON.

The Marquess of Salisbury, K.G.,
&c., &c., &c.

## British Columbia Sealing Catch, 1896.

| Vessel. | Tons. | Master. | Crews. | | Boats. | | Particulars of Catch. | | | | | | | | Number of Special Sealing Licence. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | British Columbia Coast. | | Japan Coast. | | Vicinity of Copper Islands. | | Behring Sea. | Total. | |
| | | | White. | Indians. | Boats. | Canoes. | Males. | Females. | Males. | Females. | Males. | Females. | Males. | Females. | |
| Ada | 91 | G. R. Percy | 6 | 20 | 1 | 10 | .. | .. | .. | .. | .. | .. | 204 | 519 | 723 | 67 |
| Agnes MacDonald | 107 | M. F. Cutler | 25 | .. | 10 | .. | .. | .. | 235 | 310 | .. | .. | 147 | 135 | 827 | 26 |
| Ainoko | 75 | G. Heater | 6 | 12 | 2 | 6 | 198 | 230 | .. | .. | .. | .. | 6 | 133 | 567 | 49 |
| Allie J. Alger | 75 | C. E. Locke | 23 | .. | 9 | .. | .. | .. | 397 | 262 | 16 | 32 | 123 | 288 | 1,118 | 12 |
| Amateur | 18 | C. Jipson | .. | 16 | .. | 8 | 22 | 87 | .. | .. | .. | .. | .. | .. | 109 | 57 |
| Annie C. Moore | 113 | C. Hackett | 8 | 34 | 2 | 16 | 271 | 160 | .. | .. | .. | .. | 583 | 505 | 1,519 | 51 |
| Annie E. Paint | 82 | A. Bissett | 26 | .. | 12 | .. | .. | .. | 419 | 396 | .. | .. | 81 | 144 | 1,040 | 24 |
| Arietis | 86 | P. Martin | 25 | .. | 9 | .. | .. | .. | 715 | 319 | .. | .. | 108 | 330 | 1,472 | 20 |
| Aurora | 41 | T. H. Brown | 20 | .. | 6 | .. | .. | .. | 44 | 281 | 16 | 19 | 8 | 69 | 437 | 14 |
| Beatrice (Shanghae) | 66 | Wm. Heater | 6 | 26 | 2 | 13 | 239 | 142 | .. | .. | .. | .. | 179 | 353 | 913 | 38 |
| Beatrice | 49 | A. H. Jones | 6 | 11 | 2 | 6 | 272 | 91 | .. | .. | .. | .. | 45 | 47 | 455 | 44 |
| Borealis | 37 | A. Wasberg | 2 | .. | 7 | .. | .. | .. | 82 | 245 | .. | .. | 70 | 235 | 632 | 3 |
| Carlotto G. Cox | 76 | W. D. Byers | 25 | .. | 9 | .. | .. | .. | 552 | 670 | .. | .. | 74 | 160 | 1,456 | 27 |
| Carrie C. W. | 92 | J. A. Gould | 9 | 31 | 2 | 16 | 112 | 57 | .. | .. | .. | .. | 273 | 630 | 1,072 | 42 |
| Casco | 63 | C. Le Blanc | 22 | .. | 7 | .. | .. | .. | 186 | 622 | 63 | 139 | .. | .. | 1,010 | 15 |
| C. D. Rand | 51 | J. O. Townsend | 6 | 27 | 2 | 13 | .. | .. | .. | .. | .. | .. | 214 | 355 | 569 | 64 |
| City of San Diego | 46 | W. McDougall | 6 | 22 | 1 | 11 | 149 | 64 | .. | .. | .. | .. | 93 | 307 | 613 | 29 |
| Diana | 50 | A. Nelson | 18 | .. | 6 | .. | .. | .. | 475 | 522 | 19 | 76 | .. | .. | 1,092 | 7 |
| Director | 87 | F. W. Gilbert | 23 | .. | 7 | .. | .. | .. | 460 | 433 | 85 | 98 | .. | .. | 1,076 | 21 |
| Dolphin | 72 | John Daley | 8 | 26 | 3 | 13 | 454 | 48 | .. | .. | .. | .. | 333 | 274 | 1,109 | 54 |
| Dora Siewerd | 93 | H. F. Siewerd | 10 | 32 | 2 | 16 | 174 | 203 | .. | .. | .. | .. | 336 | 490 | 1,203 | 45 |
| Doris | 60 | Fred Griffiths | 6 | 25 | 1 | 12 | .. | .. | .. | .. | .. | .. | 129 | 533 | 662 | 65 |
| E. B. Marvin | 96 | C. J. Harris | 23 | .. | 11 | .. | .. | .. | 397 | 439 | .. | .. | 109 | 142 | 1,087 | 9 |
| Favourite | 80 | L. McLean | 6 | 23 | 2 | 16 | 514 | 310 | .. | .. | .. | .. | 454 | 595 | 1,873 | 48 |
| Fawn | 59 | M. Foley | 9 | 26 | 2 | 13 | 286 | 143 | .. | .. | .. | .. | 371 | 243 | 1,043 | 40 |
| Fisher Maid | 21 | C. Chipps | .. | 9 | .. | 4 | 8 | 55 | .. | .. | .. | .. | .. | .. | 63 | 56 |
| Florence M. Smith | 99 | L. McGrath | 27 | .. | 11 | .. | .. | .. | 396 | 206 | .. | .. | 137 | 134 | 873 | 36 |
| Fortuna | 97 | Thos. O'Leary | 24 | .. | 7 | .. | .. | .. | 162 | 372 | 44 | 130 | .. | .. | 708 | 10 |
| Geneva | 92 | W. O.Leary | 26 | .. | 8 | .. | .. | .. | 190 | 309 | 162 | 289 | .. | .. | 950 | 8 |
| Ida Etta | 69 | W. O. Hughes | 22 | .. | 9 | .. | .. | .. | 195 | 455 | 3 | 10 | 65 | 305 | 1,033 | 39 |
| Kate | 58 | C. Stromgren | 7 | 25 | 2 | 12 | 82 | 122 | .. | .. | .. | .. | 87 | 231 | 522 | 22 |
| | | | 20 | .. | 6 | .. | .. | .. | 99 | 116 | .. | .. | .. | .. | 215 | 2 |
| | | | | | | | | | | | | | | | 100 | 18 |

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ida Etta .. .. | 69 | W. O. Hughes .. .. | 22 | .. | 9 | .. | .. | .. | 195 | 455 | 3 | 10 | 65 | 305 | 1,033 | 39 | | | | | | |
| Kate .. .. .. | 58 | C. Stromgren .. .. | 7 | 25 | 2 | 12 | 82 | 122 | .. | .. | .. | .. | 87 | 231 | 522 | 22 | | | | | | |
| Katharine .. .. | 81 | J. E. Fulton .. .. | 20 | .. | 6 | .. | .. | .. | 99 | 116 | .. | .. | .. | .. | 215 | 2 | | | | | | |
| Kilmeny .. .. | 18 | W. Holgarn .. .. | 4 | 12 | 1 | 6 | 63 | 37 | .. | .. | .. | .. | .. | .. | 100 | 18 | | | | | | |
| Labr dor .. .. | 25 | John Haan .. .. | 7 | 10 | 2 | 5 | 48 | 43 | .. | .. | .. | .. | 163 | 145 | 399 | 13 | | | | | | |
| Liblae .. .. .. | 92 | F. Hackett .. .. | 8 | 28 | 2 | 14 | 358 | 144 | .. | .. | .. | .. | 312 | 281 | 1,095 | 50 | | | | | | |
| Mary Ellen .. .. | 63 | D. McPhee .. .. | 6 | 24 | 3 | 11 | .. | .. | .. | .. | .. | .. | 274 | 262 | 536 | 63 | | | | | | |
| Mary Taylor .. .. | 43 | R. O. Lavender .. | 19 | .. | 6 | .. | .. | .. | 174 | 209 | .. | .. | 35 | 102 | 520 | 30 | | | | | | |
| Mascot .. .. .. | 40 | E. Lorenz .. .. | 6 | 16 | 2 | 7 | .. | .. | 99 | 93 | .. | .. | 191 | 226 | 609 | 5 | | | | | | |
| Maud S... .. .. | 97 | R. E. McKeil .. .. | 10 | 20 | 3 | 11 | .. | .. | .. | .. | .. | .. | 244 | 358 | 602 | 68 | | | | | | |
| Mermaid .. .. | 73 | W. H. Whitley .. | 25 | .. | 8 | .. | .. | .. | 438 | 502 | .. | .. | 141 | 204 | 1,285 | 23 | | | | | | |
| Minnie .. .. .. | 46 | V. Jackobsen .. .. | 6 | 20 | 2 | 10 | 327 | 159 | .. | .. | .. | .. | 193 | 291 | 970 | 25 | | | | | | |
| Ocean Belle .. .. | 83 | A. B. Whidden .. | 18 | 13 | 3 | 10 | .. | .. | 154 | 439 | .. | .. | 97 | 219 | 900 | 4 | | | | | | |
| Ocean Rover .. .. | 55 | O Buckhaltz .. .. | 7 | 18 | 2 | 9 | .. | .. | .. | .. | .. | .. | 180 | 422 | 602 | 65 | | | | | | |
| Oscar and Hattie .. .. | 82 | T. Magnesen .. .. | 9 | 28 | 3 | 14 | 197 | 156 | .. | .. | .. | .. | 331 | 253 | 942 | 41 | | | | | | |
| Osprey .. .. .. | 40 | G. N. Fulton .. .. | 8 | 10 | 3 | 5 | .. | .. | .. | .. | .. | .. | 68 | 132 | 200 | 61 | | | | | | |
| Otto .. .. .. | 86 | J. McLeod .. .. | 9 | 25 | 2 | 12 | .. | .. | 534 | 185 | .. | .. | 121 | 380 | 1,220 | 17 | | | | | | |
| Pachwellis .. .. | 20 | J. Nyetam .. .. | .. | 20 | .. | 10 | 49 | 103 | .. | .. | .. | .. | .. | .. | 152 | 58 | | | | | | |
| Penelope .. .. | 70 | D. G. Macaulay .. | 6 | 25 | 2 | 12 | 332 | 126 | .. | .. | .. | .. | 324 | 570 | 1,352 | 37 | | | | | | |
| Pioneer .. .. .. | 66 | W. E. Baker .. .. | 24 | .. | 7 | .. | .. | .. | 439 | 410 | 30 | 14 | 154 | 221 | 1,268 | 32 | | | | | | |
| Sadie Turpel .. .. | 56 | A. S. Crane .. .. | 9 | 20 | 4 | 8 | .. | .. | 288 | 294 | .. | .. | 118 | 163 | 863 | 6 | | | | | | |
| San José .. .. | 31 | Fred Cole .. .. | 7 | 18 | 2 | 10 | 49 | 181 | .. | .. | .. | .. | 162 | 443 | 835 | 53 | | | | | | |
| Sapphire .. .. | 109 | Wm. Cox .. .. | 9 | 40 | 3 | 18 | 217 | 201 | .. | .. | .. | .. | 528 | 474 | 1,420 | 43 | | | | | | |
| Saucy Lass .. .. | 38 | Daniel Martin .. | 6 | 22 | 1 | 11 | 301 | 170 | .. | .. | .. | .. | 337 | 218 | 1,026 | 33 | | | | | | |
| Selma .. .. .. | 21 | J. Mohrhouse .. .. | 3 | 10 | 1 | 5 | .. | .. | .. | .. | .. | .. | 66 | 119 | 185 | 60 | | | | | | |
| South Bend .. .. | 21 | C. F. Dillon .. .. | 4 | 10 | 1 | 5 | 17 | 53 | .. | .. | .. | .. | 59 | 300 | 429 | 55 | | | | | | |
| Teresa .. .. .. | 63 | G. Meyer .. .. | 10 | 15 | 2 | 9 | .. | .. | 130 | 101 | .. | .. | 206 | 277 | 714 | 1 | | | | | | |
| Triumph .. .. | 98 | C. N. Cox .. .. | 14 | 23 | 5 | 12 | .. | .. | 348 | 258 | 7 | 13 | 304 | 446 | 1,376 | 16 | | | | | | |
| Umbrina .. .. | 99 | C. Campbell .. .. | 25 | .. | 10 | .. | .. | .. | 265 | 477 | 34 | 7 | 103 | 195 | 1,081 | 11 | | | | | | |
| Venture .. .. .. | 48 | A. Mathieson .. .. | 6 | 16 | 2 | 8 | 118 | 151 | .. | .. | .. | .. | 207 | 235 | 711 | 35 | | | | | | |
| Vera .. .. .. | 60 | Wm. Shields .. .. | 22 | .. | 7 | .. | .. | .. | 317 | 225 | .. | .. | 63 | 201 | 836 | 28 | | | | | | |
| Victoria .. .. .. | 63 | R. Balcam .. .. | 8 | 22 | 2 | 11 | 78 | 86 | .. | .. | .. | .. | 460 | 441 | 1,065 | 46 | | | | | | |
| Viva .. .. .. | 92 | M. Pike .. .. | 26 | .. | 7 | .. | .. | .. | 280 | 327 | .. | .. | 31 | 36 | 677 | 19 | | | | | | |
| Walter L. Rich .. .. | 76 | E. P. Robbins .. .. | 8 | 27 | 2 | 13 | 80 | 13 | .. | .. | .. | .. | 44 | 355 | 492 | 52 | | | | | | |
| Zillah May .. .. | 66 | S. Balcam .. .. | 9 | 22 | 3 | 11 | .. | .. | .. | .. | .. | .. | 437 | 381 | 821 | 60 | | | | | | |
| Totals .. .. | 4,222 | .. .. .. | 809 | 889 | 263 | 442 | 5,015 | 3,335 | 8,470 | 9,498 | 479 | 827 | 10,185 | 15,515 | 53,324 | | | | | | | |

Total catch of sealing fleet for 1896 .. .. .. .. 53,324
" " Indian canoes on British Columbia Coast .. .. 2,353
55,677

(Signed) A. R. MILNE, *Collector of Customs.*

*Port of Victoria, British Columbia, November* 1896.

## Appendix.

Communication from Messrs. C. M. Lampson as to the market prices of salted fur-seal skins, 1886–96.

---

Dear Sir, 64, *Queen Street, E.C., London, January* 30, 1897.

We are in receipt of your favour of yesterday's date, and in reply beg now to inclose statement showing the yearly catches of the different kinds of fur-seals sold by public auction in London since 1886.

You will notice that prices advanced very greatly in 1890, when the take of the Alaskas was suddenly reduced to about one-fifth of the usual quantity. Prices generally kept at a high figure during the years 1891–92, and they showed a decline as soon as the largely increased quantity of the north west coast catch began to tell. Since then there has been an almost uninterrupted decline in the leading sorts until the present time.

In explaining our classification, we beg to state again that—

*Alaskas* comprise the male seals taken by the North American Commercial Company on the Pribyloff Islands;

*Coppers*, the males taken by the Russian Seal-skin Company on the Siberian Islands;

*North-west Coast*, those taken by the pelagic sealers off the west coast of North America from San Francisco to the Aleutian Islands, along the coast of Japan, in the neighbourhood of the Siberian Islands and in the Behring Sea;

*Lobos*, the skins taken by a Uruguayan Company on the Lobos Islands, off Monte Video;

*South Sea*, skins taken in the Antarctic Ocean.

Besides the seals enumerated above, about 3,000 skins per annum are taken off Cape Horn, about 1,000 skins per annum in Australasian waters, and about 2,000 skins per annum off the Cape of Good Hope, all these being of comparatively little value.

We shall at all times be happy to furnish you with any information that is in our power to give.

Yours truly,
(Signed) C. M. LAMPSON AND Co.

Professor D'Arcy W. Thompson,
University College, Dundee.

---

STATEMENT of Gross Average Prices obtained for Salted Fur-seal Skins.

| Year. | Alaska. | | Copper Island. | | North-west Coast, &c. | | Lobos. | | South Sea. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Number of Skins. | Price of Skin. | Number of Skins. | Price of Skin. | Number of Skins. | Price of Skin. | Number of Skins. | Price of Skin. | Number of Skins. | Price of Skin. |
| | | *s. d.* | | *s. d.* | | *s. d.* | | *s. d.* | | *s. d.* |
| 1886 .. .. | 99,947 | 69 3 | 41,750 | 40 0 | 49,079 | 29 5 | 15,049 | 18 1 | .. | .. |
| 1887 .. .. | 99,949 | 56 0 | 54,584 | 40 0 | 39,419 | 26 0 | 14,831 | 16 4 | .. | .. |
| 1888 .. .. | 100,037 | 77 11 | 46,296 | 38 4 | 30,285 | 34 8 | 17,774 | 20 6 | .. | .. |
| 1889 .. .. | 100,031 | 66 11 | 47,411 | 50 6 | 39,884 | 42 0 | 13,205 | 27 8 | .. | .. |
| 1890 .. .. | 20,994 | 146 6 | 52,765 | 58 2 | 47,467 | 64 4 | 14,241 | 35 0 | .. | .. |
| 1891 .. .. | 13,494 | 125 4 | 53,946<br>5,800<br>30,681 | 84 9<br>58 10<br>68 6 | 63,733 | 54 9 | 13,634 | 33 6 | .. | .. |
| 1892 .. .. | 7,554 | 125 4 | 31,380 | 81 1 | 72,973 | 68 7 | 12,202 | 26 6 | .. | .. |
| 1893 .. .. | 7,500 | 108 6 | 32,832 | 71 10 | 106,368 | 51 3 | 13,624 | 30 4 | 45 | 77 4 |
| 1894 .. .. | 15,888 | 86 0 | 27,299 | 57 0 | 135,686 | 35 7 | 12,145 | 21 1 | .. | .. |
| 1895 .. .. | 15,002 | 81 9 | 17,72 | 54 0 | 102,460 | 43 10 | 12,017 | 20 0 | .. | .. |
| 1896 .. | 7,500<br>22,500 still unsold | 68 1 | 14,415 | 45 2 | 63,696<br>6,900 still unsold | 32 2 | 14,019<br>5,153 still unsold | 22 6 | 584 | 51 8 |

A table showing, from the above figures, the actual value of the pelagic catch in recent years, makes it evident that the fall in price has been a more serious matter than the diminution in the catch.

TOTAL Value of the North-west Coast (Pelagic) Catch.

| Year. | | | | Value. |
|---|---|---|---|---|
| | | *s.* *d.* | £ | £ |
| 1891 | 63,733 skins at .. .. | 54 9 | | 174,469 |
| 1892 | 72,973 ,, .. .. | 68 7 | | 250,236 |
| 1893 | 106,368 ,, .. .. | 51 3 | | 276,568 |
| 1894 | 135,686 ,, .. .. | 35 7 | | 241,408 |
| 1895 | 102,460 ,, .. .. | 43 10 | | 224,558 |
| 1896 | 63,696 ,, .. .. | 32 2 = | 102,444 | 113,541 |
| | 6,900 unsold at .. .. | 32 2 = | 11,097 | |