## DISCUSSION AND CORRESPONDENCE

### THE CENSUS OF FUR SEALS, 1914 AND 1915

Interest in the fur seals of the Pribilof Islands at the present time centers largely in the annual enumeration of the animals. Since 1912 a complete count of the pups born has been made each season, which constitutes an exact enumeration of the breeding females. In 1911 pelagic sealing, which had occasioned the herd's decline, was suspended by international treaty. The count of pups was instituted to secure an exact figure for the breeding stock at its lowest point and was continued to secure a measure of its annual increase.

Comparison of the figures for 1912 and 1913 showed a gain of 12½ per cent. This was approximately what was expected from the experience of many years in taking the annual quota of young male seals. Unfortunately the count of 1914 was made by men not previously experienced in the work and a new set of personal equations was introduced. The result gave a gain of only one per cent., without any adequate explanation for the irregularity. The results of the count for 1915, made by the resident agents on the islands, are now available, and, while they are affected by another new set of personal equations, this time an experienced one, a practically normal condition is found to exist; a gain of 11 per cent. in pups is shown over the count of 1914.

In the December issues of Science for 1912 and 1913 the censuses for these seasons were published. The census for 1914 appears at page 39 of Senate Document No. 980, the report of the investigating committee of 1914. The census of 1915 has not as yet been published. The figures of these two seasons may be contrasted with those for 1913 as follows:

| Animals | 1913 | 1914 | 1915 |
|---|---|---|---|
| Breeding bulls[1] | 1,403 | 1,559 | 2,151 |
| Breeding cows[1] | 92,269 | 93,250 | 103,527 |
| Idle bulls[1] | 105 | 172 | 673 |
| Young bulls[1] | 259 | 1,658 | 11,271 |
| 4-year-old bachelors[2] | 2,000 | 9,939 | 15,848 |
| 3-year-old bachelors[2] | 10,000 | 13,880 | 18,282 |
| 2-year-old bachelors[2] | 15,000 | 17,422 | 23,990 |
| Yearling bachelors[2] | 20,000 | 23,068 | 30,307 |
| 2-year-old females[2] | 15,000 | 17,422 | 23,990 |
| Yearling females[2] | 20,000 | 23,067 | 30,306 |
| Pups of the year[1] | 92,269 | 93,250 | 103,527 |
| Totals | 268,305 | 294,687 | 363,872 |

No particular importance attaches to the final totals or to the estimated groups in this table. The non-breeding animals can not all be seen together at any one time nor counted in any way. The estimates are based on assumptions regarding the mortality suffered by the different classes of animals on the winter migrations, and these assumptions are slightly different for each census. The important elements are the counted items, giving the three essential factors in the herd—the breeding females, the breeding males, and the reserve of male life—the idle and young bulls growing up.

Two facts of great importance are established by these counts. The first is that the herd has made a substantial growth in the years since pelagic sealing was abolished. The stock of breeding females which in 1912 numbered 82,000 now numbers 103,000. The suspension of pelagic sealing, accomplished by the treaty of 1911, has, therefore been effective in staying the decline and in restoring the herd to a condition of normal growth.

The second fact is that there has been an abnormal increase in the stock of reserve males. In 1913 this reserve was represented by 364 animals for an active stock of 1,403—an adequate reserve, since the breeding life of the male is six to eight years. In 1914, however, this reserve had advanced to 1,830 animals, more than equaling the active stock of 1,559. In 1915 it had advanced to 11,944 for an active stock of 2,151, giving a reserve of five times the active stock. The season of 1916 having now passed, the 15,848 four-year-old bachelors of 1915 have taken their places in this reserve, bringing it up to a total of about 27,000 animals, approximately ten times what the active stock should be. To this again will be added the 18,282 three-year-old bachelors of 1915, as reserve bulls of five years and over, in 1917. In that season the law which is occasioning this abnormal condition will have

[1] Actual counts.

[2] Estimates.

passed its first stage of complete suspension of killing, but it will go on for nine further years adding 4,000 unnecessary reserve bulls annually.

The harmful effect of this abnormal state of affairs is already beginning to be evident. Preliminary information regarding the conditions found in 1916 show a total of 3,500 harems on the Pribilof Island rookeries. In other words, while there has been a gain of about 25 per cent. in the stock of breeding females since 1912, there has been a gain of about 150 per cent. in breeding males. This is due to the pressure of idle bulls upon the breeding herd. The increase in this class of animals since 1912 is 2,280 per cent. These animals crowd into the massed rookery portions and establish small harems by capture, and their attempts to hold and augment these harems keep the breeding grounds in a constant turmoil to the injury of the mother seals and the trampling of their young. This condition will grow steadily worse as the young males now being released from killing grow to maturity.

More important still is the obscurity which this increasingly abnormal condition will throw over the vital facts of the herd—its normal rate of increase and the proper proportion of male life—which a prolongation of the normal condition of the last six or eight years, throughout the early stages of the herd's recuperation, would have cleared up. On this subject I may quote the following paragraph from my report to the Bureau of Fisheries in 1913:

> Unfortunately, if the suspension of land killing is prolonged, the balance will be broken. The herd will begin at once to enter upon a new era of abnormal conditions (like those of 1896–97). The pressure of the idle bulls will increase the number of harems without reference to increase in cows and the averages (resulting from the counts of pups) will become useless. The mortality among the cows and pups will increase frightfully, retarding the development of the herd. The work of rookery inspection and investigation will be rendered difficult and dangerous. The handling of the bachelor seals on the killing fields will also be attended with difficulty and danger by reason of the bulls which will necessarily be taken up in driving. Hauling grounds and breeding grounds will be overrun by a horde of savage, fighting bulls. The herd will go into eclipse and it will be fifteen or twenty years before it emerges from the darkness and begins to show normal conditions again. Its size will then preclude the possibility of counts or accurate estimates to enable those in charge to find a basis of understanding the herd such as we have to-day.

The condition thus warned against is now practically inevitable. The department of commerce, by accepting as "wise and sound legislation" the fur-seal law of 1912 and taking no step towards its repeal or amendment, has deliberately thrown away the opportunity to settle the two important facts vital to the future administration of the fur-seal herd.

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## IS DYNAMICS A PHYSICAL SCIENCE?

PROFESSOR HUNTINGTON'S latest communication[1] helps to make clear the difference between his method of treating mass and the usual treatment. According to the ordinary view, such problems as the one proposed by me are solved very simply by the principle that *the mass of a body is the sum of the masses of its parts.* Although Professor Huntington does not give a general[2] solution, he indicates that his method also makes use of this principle of additivity, but only after it has been *proved* by an analysis involving internal forces, the law of action and reaction and the law of vector composition of forces. Apparently he is unwilling to assume as fundamental even the fact that the mass of a body is increased by adding matter to it. I have no logical objection to this procedure, but it seems to me to be an unnecessarily difficult method of introducing a very simple principle. It is to be noted, moreover, that the proof of

[1] SCIENCE, September 8, 1916.

[2] The general solution must cover any case whatever in which a body is formed by putting together the material of two bodies; for example, the case of a body formed by fusing together two lumps of metal.