

VI.—WHAT SHOULD BE DONE BY THE GOVERNMENT WITH REGARD TO THE GREAT BOHUS-LÄN HERRING FISHERIES.

A MEMORIAL ADDRESSED TO THE COUNCIL OF STATE AND THE HEAD OF THE ROYAL CIVIL DEPARTMENT.

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THE DUTY OF THE GOVERNMENT WITH REGARD TO THE GREAT BOHUS-LÄN HERRING FISHERIES.†

[A memorial addressed to the Department of the Interior by Axel Vilhelm Ljungman.]

As the course of the so-called “landing” of the herring near the coast of Bohus-län agrees in every particular with the experience of former herring periods, and our knowledge of the development of the great Bohus-län fisheries during former centuries, we are justified in looking forward with a tolerable degree of certainty to the growth of these fisheries and their continuance for thirty or forty years; and as both

* The drag-net so frequently referred to in the following pages is probably the form of gill-net so extensively used in Holland, Germany, and Scotland.—EDITOR.

† Om offentliga åtgärder med hänsyn till det rika bohuslänska sillfisket. | En vördsam memoria | till | statsrådet och chefen för Kongl. civil-departementet. | Af | Axel Vilh. Ljungman. | Gottenburg, 1882. Translated from the Swedish by HERMAN JACOBSON.

the experience of our former herring periods and the great herring fisheries in foreign countries have shown in the most incontrovertible manner that the herring fisheries may be greatly furthered and benefited by administrative measures, and that the aid and intervention of the government are absolutely necessary, if a great branch of industry such as these fisheries is to be raised to its proper height, especially in places like Bohus-län where the beginning, development, and close of the fisheries are (as to time) comprised in comparatively narrow limits. I consider it proper to describe those measures which are required in order to further the fisheries; although it will, of course, be impossible, owing to the extent and the peculiar difficulties of the work, to give, in the near future, a detailed description of the scientific investigations regarding the herring and the herring fisheries, which, with government aid, I have carried on without many interruptions since the beginning of July, 1873. It must be borne in mind that even those investigations which, with much greater aid from the government, have been carried on in Norway since 1861, and in Germany since 1871, have not yet been brought to a close, even after the purely theoretical and practical difficulties connected with the sea fisheries had been overcome; although the object in view was more limited, a greater number of persons were engaged in the investigations, and the difficulties were not so great.

Since there is good reason to believe that the present herring period will not last longer than forty years, and as it is well known how slowly such an industry develops, when left entirely to itself, and how hard it is to correct existing abuses, especially in places like Bohus-län, where these herring periods come at very irregular intervals and assume a different character according to the different natural conditions, it is all the more necessary to direct the efforts from the very beginning into the proper channel, which will *develop the fisheries to the greatest possible degree*, and which will *cause the least trouble and inconvenience both during the fishing period and toward and after its close*.

The measures that should be taken should relate to the *fisheries*, and the *transportation, preparation, and sale* of fish.

As regards *the fisheries*, it is of the utmost importance that they should commence as soon as possible after the fish have come near the coast (have "landed"). For this reason fishing with drag-nets should be carried on on a comparatively limited scale, with government aid, so as to ascertain whether the herring have really approached the coast; a fact which is of course of the greatest importance both for fishermen and scientists (see my memorial on experiments with drag-nets of February 12, 1878). As an implement for carrying on the herring fisheries on a large scale these nets should not be encouraged, at least not beyond the use which has been made of them during this and the past century. These nets are economically the least advantageous of all implements used in the herring fisheries, and should therefore only be employed where no other convenient implement can be obtained, especially as

Sweden does not possess any places in the Skagerack and Northern Kattegat which are convenient for fishing with drag-nets. These nets are particularly ill adapted to periodical fisheries, such as those of Bohus-län, as they, in proportion to the number of fish caught, require a much larger number of fishermen, whom it is difficult to supply with a suitable living at the close of the fishing period. Drag-net fisheries on a comparatively small scale, however, for catching a more valuable kind of herring for smoking or to be sold fresh, carried on with such boats as can be found and with smaller cheap nets, prior to the beginning of the ordinary net fisheries in autumn, might possibly be more profitable, without involving the same difficulties. But for catching herring beyond the outer coast it might prove highly valuable to have some experiments made with the purse seine (so highly prized by the Americans), an implement which, in contradistinction to the drag-net, is adapted to fishing both on the outer coast and in the narrow fiords, and to the catching of a larger number of fish of different sizes. The introduction of these purse seines would, moreover, prove a great benefit by supplying the fishermen with fish suitable for bait. The use of the purse seine would make the transition to other fisheries at the end of a fishing period much easier than would be the case with the drag-net. In North America, of whose great fisheries we can learn so much, drag-nets are not used at all, whilst purse seines and seines are constantly used with the best results.

Our rich coast fisheries in our fiords and inlets need proper regulation and an efficient coast-police, which would soon cause them to flourish more than ever before.

Not only the herring fisheries on our outer coast, but our entire sea fisheries and navigation on the coast of Bohus-län stand in urgent need of a number of *light-houses* placed in suitable localities. The places which more than others need light-houses are (1) the northern entrance to *Uddevalla* near the *Islandsberg Cape*, (2) the entrance to *Kungshamn*, (3) to *Grebbestad-Krossekärshamn*, and (4) to the harbors in the *Koster fiord*. To make the entrance to the last-named fiord passable at night-time, it would, however, be necessary not only to place a light-house at a suitable point near the central portion of the fiord, but the so-called "*Koster lights*" should be moved to the southernmost point of the *Koster coast*, *i. e.*, to *Ramskär*. This measure has been talked of for a long time, and is urgently needed. The *Koster fiord* is not particularly adapted to herring fisheries during the dark season of the year, long after they have come to a close in the southern part of Bohus-län, but numerous merchant vessels pass there on their way to and from Norway. Other light-houses than those mentioned may become necessary in time to come, but for the present those which have been enumerated will suffice.

As the fishermen have to follow the herring from place to place in their wanderings, and as the fish have to be transported to the places where they are prepared, or to the markets, the intercourse between

the different stations along the coast becomes a matter of great importance, and there is a great lack of proper means to indicate shallow and dangerous places.¹ The coast of Bohus-län has been treated in a very step-motherly manner in this respect, as compared with the east coast of Sweden. This mistake should be corrected, all the more as a new and very considerable branch of industry will be largely benefited thereby.

For this intercourse along the coast it will, moreover, be necessary that several *routes for ships* should be plainly marked, and that two canals should be constructed, to avoid the necessity of sailing along an extensive stretch of coast exposed to the full fury of the sea. An investigation of this matter was made last summer at the expense of the province, and an estimate drawn up of the extent and cost of the work.² The most dangerous places are (1) near *Tjurpannan*, (2) near *Soten*, and (3) the coast near the *Hjerterö* and *Marstrands* fiords. The two first-mentioned places require the canalization of considerable portions of land; whilst—as will be shown below—the requirements of the northern coast (mentioned under No. 3) will be most satisfactorily met by the construction of a railroad from *Uddevalle* to *Grebbestad-Krossekärr*, with a branch line to the southern end of the *Sannäs fiord*, in case the proposed canal between the last-mentioned place and *Krossekärrshamn* should not be constructed. Both the canals referred to above should, in order to meet all requirements, be at least 12 or 15 feet deep, and broad enough to allow two steamers to pass each other without inconvenience. They would therefore involve a very considerable expense, without satisfying half the demands of Northern Bohus-län for better means of communication. It is moreover feared that, on account of the strong current, sailing vessels could but rarely pass through them. The dredging of the inner route between the *Bottna* and *Joreds fiords*, however, should be done at once, as it will only involve a comparatively small expense, would connect the southernmost part of the northern coast with the terminus of the above-mentioned railroad, and could be taken both by steamers and sailing vessels. As regards the avoiding of the last-mentioned portions of the coast, this could easily be accomplished by dredging and widening the existing channel inside the *Hjerterö fiord*,³ and by dredging the sound between *Tjörnskalf* and *Tjörnshufvud*. As the last-mentioned work would make one of the best outer harbors of Bohus-län, *Kalfvehamn*, accessible from the south, the sound referred to should be made at least 15 feet deep. This subject was discussed several years ago; all the preliminary investigations were made, when the whole project fell through, because it was feared that the new channel would offer special facilities for smuggling. As the herring fisheries, both during the last century and during the present fishing period, were most productive south of *Soten*, and as all herring

¹ See "*Göteborg's och Bohus läns Landstings Handlingar*," 1879, No. 15; 1880, No. 14.

² See the same, 1878, No. 9, p. 10; No. 15, p. 3-4; No. 30, p. 4; 1880, No. 24, p. 1.

³ See the same, 1880, No. 15.

vessels and steamers coming from the north or going north would be greatly benefited by having an uninterrupted channel past the western coast of *Tjörn*, and as the movements of the fishermen in following the herring in their migration from one side of *Tjörn* to the other would be greatly facilitated, the importance of the work, which, moreover, would not be very expensive, will readily be seen. Besides this work, some other plans have been proposed, such as the dredging of the *Björn Sound* as far as its northern inlet to *Uddevalle*, as well as an inner channel along the *Koster fiord*, south of *Strömstad*, but all these plans are not of so great importance to the fisheries. The proposed improvements will prove a benefit not only to the herring fisheries and to navigation, but also to the coast defence.

In order to facilitate the sale of fresh and prepared herring, both at home and abroad, it is of great importance to get a legally fixed standard for measuring herring, as the present unsettled condition of these measures causes much inconvenience. During the great herring fisheries of the eighteenth century, matters were better in this respect. According to the regulations then in force, the standard ton of fresh herring must hold 164.9 liters. In 1786 this standard was changed to 209.4 liters, for no other cause than to benefit the owners of salting establishments. This last-mentioned measure was nominally in use till 1865, although it had long since given way to the greatly varying measures peculiar to the different portions of the coast. In Scotland, where at present the herring fisheries have reached the highest degree of development, the ton of fresh herring (called "cran") must contain "45 gallons old wine measure," or $37\frac{1}{2}$ imperial gallons, i. e., about 170½ liters. In Norway the fresh herring are at present measured with the same ton as grain, which (according to the law of April 25, 1863, § 17) must contain 140 liters. With us, in Bohus-län, there are at present three tons which are in general use, viz, one of 125.6 liters, one of 157 liters, and the ton used by the *Gottenburg* herring merchants of 209.4 liters. These different measures have frequently caused mistakes and difficulties, which certainly are of no benefit to the trade. As by a "ton of fresh herring" we understand the average quantity of fresh herring which are required to make a ton of prepared herring, the ton containing 157 liters would probably be the most convenient; but as the metric system is soon to be introduced, a ton of fresh herring containing 150 or perhaps 160 liters would be preferable, particularly in view of the considerable exportation of fresh herring to Norway, Denmark, and Germany. A ton containing 160 liters comes nearest to the so-called "six cubic feet ton" known all over the county. Its introduction would, therefore, not offer any special difficulties. For convenience sake, it would also be well to again introduce the gauged measures for measuring fresh herring, which were in use during the eighteenth century.

Nothing can be of greater importance for furthering the herring trade

than the preparation of the herring for the market, as thereby the fisherman is enabled to get a higher price for his fish, and the trader finds a better market for his goods. The object in view can best be reached by regulating the methods of preparing herring so as to obtain a uniform article marked with the government mark. For this purpose a complete knowledge of all the approved methods should be more generally spread. Such regulations regarding the salting of herring are in force in Holland and Scotland, and have contributed their share towards the development of the herring trade, by producing a uniform article which gradually has found its way into many foreign markets, where it is highly esteemed. Since 1859, however, the gratuitous marking by the government officials of every ton of herring has been abolished, and it is now made optional with every salter whether by paying a small tax he will have his tons stamped with the government mark. Experience has shown that the official marking of the goods is an incalculable benefit to the trade; and, though optional, it is quite general. The opposition, which every now and then has been raised against this system by some of the large Scotch salters, has not found favor either with the public or with the Fishery Commission, and the official marking therefore continues in use to this very day, as a strange exception from free trade principles in the land of their birth. It is evident, however, that the system of marking would never have come into such extensive use if it had not in the beginning been introduced by extraordinary measures, and had thus brought about a uniform preparation of the Scotch herring, which, in consequence, are highly prized in nearly all the markets of Europe. In Holland, whose herring have for centuries enjoyed a world-wide reputation, and where the salting is in the hands of a few firms, the official marking of the herring, after having been obligatory for a long time, has recently (1878) been entirely abolished, which, possibly, was caused, in part at least, by the circumstance that the herring on the east coast of Scotland, where most of the Dutch herring are caught, became inferior in quality. As, especially in the beginning of a herring period, when a new herring is first brought into the market it may cause incalculable injury to the future of the trade if it gets the reputation of being an inferior article (because a lost reputation is very difficult to regain); and as the experience of our former herring periods proves in the most unmistakable manner that the herring best suited for salting are obtained a few years after the beginning of the period, it becomes our imperative duty to derive the greatest possible benefit from the experience of foreign countries, especially Scotland, and to take those administrative measures relative to the preparation of herring which will enable us to produce as soon after the beginning of the period as possible an article of uniform and generally recognized excellence. Even if during the latter part of the period the natural quality of the herring should become inferior, as has been the case on the east coast of Scotland, the reputation once gained would carry us safely to the end of the period.

The question which should be decided as soon as possible is the fixing by law of the cubic measure of a ton of herring, so that the buyer may at least know how much the ton contains which he has bought, for the uncertainty, which at present prevails in this respect, is most injurious to the trade. Our old ton contained 125.6 liters; but since 1843 the Norwegian ton, with a capacity of 115.8 liters is also frequently used in Sweden, and as the decree of 1865 relative to weights and measures fixed no legal limit of the ton of herring even the Scotch ton of 121 liters capacity is often employed with us. Under these circumstances it would be best to adopt that ton, which is the favorite measure in foreign markets, *i. e.*, the Scotch ton, all the more as it stands midway between the Norwegian and the old Swedish tons. But, as the metric system of measures will doubtless soon be introduced in Sweden, and as for this reason it will be most convenient if the number of liters contained in a ton is a product of ten, it would be best to make the capacity of the ton 120 liters, as this would come very near to the Scotch ton, and would be the right medium between the two extremes. There is some prospect that this ton (of 120 liters capacity) may in the future become the international measure for herring. (See my treatise on the subject in *Nordisk Tidsskrift for Fiskeri*, vi, p. 328, in *Deutsche Fischerei, Zeitung*, 1881, No. 35, p. 282, and in *Fisker Bladet*, Frederikshald, 1881, No. 4.) Even if this hope should not be realized, much would be gained if at least Norway and Sweden could agree upon a common ton for herring, so that, in case of necessity, the salters of one nation could make use of the tons of the other nation. If we do not get a certain fixed measure for herring, and if our salters cannot have tons marked by the government officials, there is great danger that complaints will come from foreign markets that our tons are too small, or that they greatly vary in size, which of course will not raise the reputation of the Swedish herring. As it is evident that a new regulation regarding a certain legally fixed capacity of the tons cannot be made until sufficient time has elapsed to use up the old tons, it will be seen that the matter brooks no delay.

As our great Bohus-län herring fisheries, in all probability, will not continue for a very long period, it would seem eminently proper and useful that the government should cause to be prepared a popular guide, giving a full description of everything relating to the great herring industry in all its branches, for that portion of our people most interested in this subject, and unable to obtain or read foreign works, and who, considering the shortness of the herring period, cannot afford to lose any time in experimenting. Such a work should contain drawings of the buildings and apparatus used, and should be written in such a style as to prove useful, even to a common fisherman. It ought to be clear and concise, and based exclusively on the best and most reliable authorities. In order to derive the greatest possible profit from the fisheries, salting

and smoking ought not to be the only way in which herring are prepared; but every method in which herring can be prepared for the market should be taken into consideration. Not only the refuse resulting from the various ways of preparing herring, but also fish which from some cause or other are not fit for food, or which owing to their superabundance cannot find a market anywhere, ought to be made use of. A work like the one referred to above should therefore also describe the different methods of making oil, guano, &c. It is not sufficient, however, to learn from the experience of other countries, but technical and chemical investigations should be made at the expense of the government, so as to extend our experience in this comparatively new field of knowledge, and to discover new methods of utilizing the herring. Millions of dollars might in this way be saved to our country. It has already become evident that the fisheries will have to be limited, owing to the lack of a ready market for our products. The first and foremost object should therefore be, *not how to increase the fisheries by the introduction of new implements and methods, but how to extend our markets.* Competent persons, possessed of the necessary experience, should therefore be enabled to study the whole question in all its bearings, and be specially commissioned to aid by their experience in raising the herring industry to its proper height.

As the coast of Bohus-län, through this new industry, becomes economically of greater importance than hitherto, a more rapid and regular *postal service* becomes a necessity. At present the greater portion of the Bohus-län coast receives mails only twice a week, so that letters and papers are old when they reach the addresses; which, of course, must have an injurious influence on a growing and constantly extending trade.

The experience of Norway and Scotland has demonstrated in the most unmistakable manner, that the herring fisheries urgently require a sufficient number of *telegraph stations* along the coast. Connection by telegraph between the best harbors on the coast of Bohus-län and the telegraph net of the kingdom is a positive necessity, both for supplying the fishermen and traders with the latest news as to the weather and the fisheries by telegram, and for general business purposes. The police telegraph plays an important part in superintending the fisheries and in keeping good order on the coast; and no fisheries can flourish without it. Telegrams relating to the fisheries furnish the fishermen and the captains of the herring vessels with much needed information regarding the places where the herring make their appearance or to which they have migrated, and regarding the prices, which are principally governed by the quality and quantity of the fish caught, and are therefore invaluable to the traders in making their calculations. Telegrams relating to the weather will prove of the greatest usefulness to both fishermen and traders by enabling them to estimate their chances of success. It will hardly need any proof, that a sufficient number of

telegraph stations for sending and receiving simple business telegrams of every kind, are absolutely indispensable to the fishermen, the captains of vessels, and to tradesmen. In the northern portion of the coast there are telegraph stations at *Strömstad* and *Fjellbacka*; between these two places a new telegraph station should be established at *Grebbestad*, which has become a place of considerable importance as the terminus of the proposed new railroad as a port of call for steamships, and as a business and watering place. From *Grebbestad* there should be a telephone connection to *Hafstensund*, which is an important station for pilots and steamships. In the southern portion of the northern coast a new telegraph station should be established at the fishing and steamship station of *Bovallstrand*, between *Fjellbacka* and *Sotehufvud*, at the mouth of the important *Bottna fiord*. In the central portion of the coast there are telegraph stations at *Lysekil*, *Uddevalla*, and *Marstrand*. North of *Lysekil* a new telegraph station is needed at *Kungshamn*, which is surrounded by quite a number of important fishing stations; is one of the best outer harbors of the province; has a pilot station and a light-house, and is passed by all the steamers and sailing vessels plying along our coast. The telegraph line to *Kungshamn* could easiest be constructed by continuing the line to *Bovallstrand* in a southerly direction past the fishing station of *Hunnebostrand*. On the portion of the coast between *Lysekil* and *Marstrand*, which according to the testimony of seven centuries has always been the principal seat of the herring fisheries, several new stations (4 or 5) are needed, owing to the circumstance that the coast-line is broken by the two great islands of *Orost* and *Tjörn*. For the coast belonging to these islands the following lines of telegraphs would be required: From *Uddevalla* in a westerly direction to the steamship station of *Sund-Sandvik*, from which place a submarine telegraph should go across the narrow sound to the island of *Vindö*, which is connected with *Orost*; thence the line should be continued in a southerly direction (if possible near to the steamship and trading station and watering place *Hendan*) to the tavern of *Vräländ* (from which place *Toggestad* could be reached by a short telephone line); at *Vräländ* the line should branch out in two directions, the western passing the post-office of *Horleby* and the *Ihleberg* station and continuing to the northern end of *Borviks inlet* (whence a private telegraph or telephone line might be constructed to the important trading place *Nösund*), and beyond, past the fishing station of *Hallen*⁴ to the town of *Mollösund*, which of late years has become a place of considerable importance as a steamship and fishing station. The eastern branch should go from *Vräländ* in a southerly direction past *Varekil* and *Skopesund* to *Tjörn*, and reach its terminus at *Kalfvehamn*, which is the center of many important fishing stations. In this neighbor-

⁴If the railroad from *Uddevalla* to *Ellös* should not be built, a telegraph or telephone line should be constructed from *Hallen* to *Ellös*, running in a northerly direction past the fishing station of *Hällvikstrand*.

hood there were located, during the great fisheries of the last century, a very considerable number of salting and smoking establishments, among them the largest and best known of the entire province (see *Handlingar rörande sillfisket*, Stockholm, 1843, p. 4). In the north-western portion of the coast there should of course be a telegraph station at the terminus (either *Eilös* or *Fiskebäckskil*) of the proposed railroad from *Uddevalla*. On the inner coast there should be a telegraph station at *Stenungssund*, which is an important place both as a fishing station and as a watering place. A telegraph or telephone station could, with very little expense, be established at *Tjufkil*, whence a submarine cable goes to *Marstrand*. In the southern portion of the coast there are telegraph stations at *Gottenburg* and on the islands of *Brännö* and *Vinga*. For the benefit of the herring fisheries a new telegraph station should be established at *Juthamn*, on the southwestern point of the island of *Hisingen*, which is most favorably located for the herring fisheries and the herring trade; lies on the high road for all the steamers plying along this coast; is the center of a large number of fishing stations, and is moreover the terminus of a proposed railroad from *Gottenburg*. The southern part of the south coast has easy access to *Marstrand* or *Tjufkil*, and the southern part can easily be reached from the *Brännö* station. Of the eight new telegraph stations which have been proposed in the above, four will probably soon be established, viz: *Grebbestad*, *Kungshamn*, *Mollösund*, and *Juthamn*.

Of the greatest importance, however, not only for our herring and other sea fisheries, but for the welfare of our coast and our whole province will be the establishment of *railroad connections* between some of the most favorably located outer harbors and the railroad system of the country. The experience of other countries has clearly shown the beneficial influence of railroads on the sea fisheries; and in proof of this assertion we quote the following from one of the most recent and best English works on the fisheries, which shows of what great importance railroad connections are considered to be, in their relation to the sea fisheries. *Holdsworth*, a man of great experience, after having given a brief review of the British fisheries for the last twenty or thirty years, says:⁵ "The main cause of the great change in our fisheries is the extension of our railroad system. At present the cost of carrying fish a hundred miles is very trifling, and the railroads, whose lines run along the coast, or which from the interior of the county extend to places on the coast where fish are landed, have had the good sense to encourage the transportation of fish in every possible way, because they saw that thereby a regular and profitable carrying trade might be built up. The means thus obtained, of bringing a large quantity of fish, whilst they are still fresh, into many different markets, and in a condition which years ago would have been considered an impossibility, encouraged the

⁵ BRITISH INDUSTRIES: Sea fisheries by E. W. H. Holdsworth; Salmon fisheries, by Archibald Young. London, 1877, pp. 4, 5.

fishermen to ply their trade with renewed energy. The change has not been less noticeable because it has been brought about gradually; *for in every case where a railroad has reached the coast the fisheries have increased, the fishermen have got better pay for their day's work, and a hitherto unknown impetus has been given to the fishing industries.*" Instances are not wanting where rich sea fisheries have sprung up on coasts, where they were formerly unknown, simply by the construction of a railroad to a harbor which hitherto had had no connection with the interior of the country, or where the condition of the fishermen was miserable to the last degree, simply because they could not sell the fish they caught, owing to the lack of proper means of communication. This whole subject is well understood in other countries, and in the large and comparatively sparsely settled Dominion of Canada the sea fisheries, which are an important source of revenue to that country, have been very materially aided by the construction of railroads, which were needed for the transportation of fish. The fish commissioners of other countries have in the most urgent manner pointed out the great importance of railroads to the development of the sea fisheries. Quite recently the Danish fish commission has recommended the construction of a number of short lines of railroad, which will doubtless—especially if the Swedish railroads proposed below are not built—cause the larger portion of the great *Skagerack* sea fisheries to pass into the hands of the Danes. The construction of railroads is a much more efficient means of furthering the development of the fisheries than the system of premiums, which was so common with us during the eighteenth century and in Scotland during the first thirty years of the present century. It should, moreover, not be forgotten (and this assertion hardly needs proof) that the increase of any fisheries presupposes a corresponding demand for fish and other products of the fisheries, and that a higher price for fish will, more than anything else, encourage the fishermen in their work, and will enable them to employ improved (and more expensive) apparatus and methods. There is not the slightest doubt that the yield of the Bohus-län fisheries could be doubled and trebled, and that the condition of our coast population would be vastly improved in every respect, if there was proper railroad connection with the interior of the country. The Bohus-län sea fisheries would thereby prove of national benefit, and would be able to supply the greater portion of Sweden with good and cheap fish. At present Sweden imports fish and products of the fisheries to the amount of many millions of crowns per annum. All the fish required by our country could be supplied by the Bohus-län fishermen, and if there were proper railroad connection between the interior and the coast of Bohus-län the fish would reach our population in a fresh and healthy condition. Without such railroad connections there is great danger that not only our sea fisheries but also our fish trade will, in great part at least, pass into the hands of foreigners. It will not do to say that Bohus-län, with its comparatively good water communication, needs no

railroads, for experience has sufficiently proved that the former can never replace the latter; for which reason railroad lines have been constructed to most of the fishing stations on the east coast of Scotland, a country which, especially in the northern portions, is but sparsely populated and by no means wealthy; and this has been done in spite of the fact that navigation there is never (as is the case with us) impeded by ice. The Scotch sea fisheries have, through these railroads, increased in the most wonderful manner; and they must certainly be considered as the principal cause of the present flourishing condition of these fisheries. The first and foremost condition of the well-being of the sea fisheries is *a well-regulated fish trade, implying a rapid and regular sale of the fish* soon after they are caught.

Among the benefits which the herring fisheries in particular will derive from short lines of railroads connecting the outer harbors with the railroad system of the country, we must mention the consequent competition, which will keep the price of fresh fish at a profitable height, the decrease of the steamship traffic, which is calculated to more or less disturb the coast fisheries, and the greater ease with which the coast can receive the products of agriculture and forestry from the interior of the country. As the population of the interior learns to use the herring as a regular article of food, the transportation of fresh fish from the coast to the cities and towns of the interior will increase correspondingly. Such railroads will also serve to *concentrate the herring industry* and cause every kind of business to flourish at the fishing stations; there will be better order at these places, more chances than formerly for the fishermen to earn a living during that part of the year when there is no fishing, and every industry connected with the fisheries, and trade and navigation in general, will flourish more, and whenever the fishing period comes to an end the railroads will, more than anything else, tend to compensate the population for the losses which such an event will cause.

As the experience of former fishing periods has shown that rich herring fisheries are apt to injure to some extent the agricultural interests of our province, it will be evident that this could be, to a considerable degree at least, counteracted by constructing the lines of railroad in such direction as will prove useful to agriculture, which, after all, is the principal source of revenue not only of our province, but also of the entire kingdom. Another benefit would accrue to our people if these lines of railroad were constructed in such a manner as to unite as much as possible the widely-separated districts of our province, and to create a livelier intercourse not only between these districts, but also between the province of Bohus-lån and the rest of Sweden. All these objects would be reached by the construction of the railroads proposed, all of which should have the same gauge as the other Swedish railroads.

The proposed lines of railroad would also prove a benefit to the interior of Sweden by furnishing a way for importing the products of for-

sign countries, and exporting Swedish products directly to and from the interior by way of well-located outer harbors. These railroads would, especially if the gauge of the line *Uddevalla-Venersborg-Herrljunga* is changed to the normal Swedish gauge, prove of immense benefit not only to trade industry, but also for the defense of the country by greatly facilitating the connection between Sweden and Norway west of *Lake Venern*.

In examining the different plans, special attention should be paid to the length of the proposed lines of railroad, the technical conditions, the cost of construction, the prospects of answering the purpose in view, and of paying, to the requirements of the sea fisheries, the coast, the province, and the whole country, and finally to the construction of such lines as will most successfully work together with the rest of the railroads of the country. In determining the termini of such lines of railroad regard should be had to the location of the harbors, as to their nearness to a large number of fishing stations, to already existing railroads, to the number of fish consumers at home, to their being unobstructed by ice during winter, to their capacity, entrance, &c. The experience of other countries, especially Great Britain, teaches us that the trade in fresh sea fish demands outer harbors, connected with the rest of the country by railroads, whose water (even at the surface) is so salty all the year round that large sea fish, as well as lobsters and oysters, may be kept alive in inclosed waters. It is well known that *Gottenburg* and the harbors near the mouth of the *Göta River* are just as inconveniently located for this branch of the fish trade as London and its outer harbors on the Thames. The same applies, though in a less degree, to *Strömstad* and *Uddevalla*. Taking all these conditions into consideration, it will be seen that the two lines of railroad which will best answer all reasonable purposes are the following:

(1.) A line from *Uddevalla*, past *Herrestad* and *Qvistrum*, to *Grebbestad-Krossekärr* (with a branch line to the southern point of the *Sannäs fiord* in case the projected canal between that point and *Krossekärrshamn* is not constructed); and

(2.) A branch line from *Herrestad* either to *Fiskebäckskil* or (and this would be preferable) to *Ellös*.

The first line would be about 60 to 65 kilometers in length, and the last 32 to 35; therefore, both together, about 100 kilometers, a length which cannot be considered excessive, in view of the fact that Bohus-län, one of the most densely-populated provinces of the country in proportion to its extent, and at the same time one of the most fertile, has so far had but little benefit from the most important means of communication of our times, the length of the Bohus-län railroads being less than that of any other provinces of the kingdom, with the exception of *Norrbotten* and *Vesterbotten*. The Economical Association of Bohus-län has furnished the means for a preliminary survey of both lines.

The terminus near the sea of the first-mentioned line (*Grebbestad-Krosse-*

kürrshamn) has by competent authorities (see the pamphlet, "*Om den stora bergslagsbanan*," Stockholm, 1870, p. 45 to 47) been determined as follows: "Requested by the commission for the proposed railroad *Falun-Krossekürr* to give an opinion as to the most suitable terminus on the coast of said railroad, we have carefully examined the most recent maps of this coast prepared by the Coast Survey, the hydrographic descriptions of the same, and other documents relating to the subject, and give it as our opinion that the harbor of *Grebbestad* and the harbor of *Krossekürr*, close to it, the latter a winter harbor for those vessels which during the period when the former harbor is full of ice cannot come close to the coast, are the most suitable points for the purpose in view."

The reasons for our opinion are as follows :

"The harbor of *Grebbestad* is completely sheltered from the sea; its depth varies between 4 fathoms in the inner to 11 fathoms in the outer portion; it is of easy access from the sea from the north, west, and south, and can, if light-houses are erected in suitable places, be safely entered and navigated even at night-time; it is so near to the sea that there is perfectly safe anchorage half a nautical mile from the outer coast, and that the innermost portion of said harbor is hardly more than one nautical mile from the outer coast-line; it is very spacious and has convenient anchorage for a large number of vessels, which here are thoroughly protected from the fury of the sea; it offers every facility for constructing extensive embankments, close to which the largest vessels may safely ride at anchor; and it possesses all the above-mentioned advantages to a higher degree than any other harbor on that coast. The harbor of *Grebbestad* is located on the south and southeastern side of the peninsula, on whose western side is the harbor of *Krossekürr*, the distance between the two being hardly more than half a nautical mile. United by a canal, sheltered from the sea, these two harbors may practically be considered as one, and the entrance to them from the sea is only half a nautical mile distant. This entrance will be perfectly safe by placing buoys and marks in proper places. From reports by the commission for the *Falun-Krossekürr* railroad and the naval officers of the squadron which visited this coast last summer it appears that even during severe winter weather the *Krossekürr* harbor remains entirely free from ice. This is a great advantage, for during the period when the *Grebbestad* harbor is frozen the near *Krossekürr* harbor may be used as a winter harbor for the comparatively small number of vessels which during the winter months keep up trade connections with the North Sea.

"The *Krossekürr* harbor offers nearly the same advantages of depth and protection from the sea; but it is smaller, and can, therefore, not give shelter to as many vessels, although, in our opinion, its capacity is amply sufficient for any vessels that may enter it during winter.

"If compared with the harbor of *Strömstad*, we find that the harbor of *Grebbestad* has the advantages of being of easier access from the sea

and being larger, so that, for the additional reason that the neighboring harbor of *Krosseskärr* remains free from ice, we must decidedly give the preference to the harbors of *Grebbestad* and *Krosseskärr* above that of *Strömstad*.

“Stockholm, January 9, 1871.

TH. ARVIDSSON.
FING. v. SYDOW.”

The importance of the railroad *Uddevalla-Grebbestad-Krosseskärr* to northern portion of Bohus-län will appear from the following extract from the report adopted by the Bohus-län Economical Association at its last annual meeting: “A glance at the map will show at once that the coast of Bohus-län is divided in two portions by the *Soten* inlet, which is entirely open towards the sea; the northern of which, owing to its insufficient means of communication, is in its development far behind the southern. On the coast north of the *Soten* inlet *Grebbestad* is undoubtedly the most central and convenient place for the terminus of a railroad, and a railroad extending to that harbor was already under contemplation when the construction of the *Bergslagernas* railroad was first discussed. *Grebbestad* has a most convenient and advantageous location not only with regard to navigation, but also with regard to the sea fisheries; and there is no doubt that if the contemplated railroad is constructed, *Grebbestad* will become a great center for the fish trade. Northwest of *Grebbestad* is *Koster*; southwest, *Väderö*; and west, the so-called *Pers-grounds*, all places which are exceedingly rich in fish, and which are specially adapted to winter fishing, to bank-fishing, and to great sea-fisheries, all of which could here be carried on to great advantage, provided they would receive the much-needed impetus which a railroad would give. A railroad from *Grebbestad* to *Uddevalla*, besides connecting the central point of the northern coast with the railroad system of the country, would benefit not only the coast, but also the entire northern portion of the province of Bohus-län, as it would bring into closer connection all the widely-separated divisions of the province. The proposed railroad, the greater portion of which has been surveyed at the expense of the association, would be identical (for a considerable portion) with a line which doubtless will sooner or later have to be constructed along the entire length of the province, and from which short branch lines in both directions could easily be constructed.” It must also be taken into consideration that, in all probability, the northern coast of Bohus-län, after having become properly connected with the natural center of the province, will develop its herring fisheries more than is possible now, owing to its remoteness from the principal city of the province.

As regards the end-points of the other line which has been proposed, viz, either *Fiskebäckskil* or *Ellös*, both located in the western district of *Orost*, it must be remarked that there are no other suitable harbors near

the starting-point of the line at *Uddevalle*, where connection should be made with the railroad system of the country; and that the above-mentioned harbors, as will be seen from the Coast Survey maps, possess in the highest degree all those advantages which are required. Nor is there any outer harbor on the central coast of Bohus-län to which a railroad might be constructed, which, in point of space, depth, accessibility, &c., could compete with them (with the possible exception of *Kräksunds* harbor, in the western district of *Orost*, which, however, is farther from *Uddevalle*. Both harbors being desirable, mere excellence cannot decide which of the two shall be chosen. The harbor of *Ellös*, which is one of the most spacious harbors in the kingdom, offers special advantages, because if the railroad terminates there it would not only become of great importance in a military point of view in connection with our system of coast defenses, but it would also get all the local trade of the populous and fertile island of *Orost*. The two above-mentioned harbors are centrally located both as regards the middle portion of the coast of Bohus-län, and the entire coast of the province. They are surrounded by the most important fishing stations of the province, and are located near a portion of the sea which for seven centuries has during the herring period been justly considered as one of the most important fishing waters. They are particularly adapted to act as outer harbors for a great portion of central Sweden, both for the import and export trade. In view of the fact that the watering places on the coast of Bohus-län are annually visited by a large number of people, and that many steamships ply along this coast, the connecting of one of these outer harbors with the railroad system of the country will prove another inestimable advantage. None of the other lines of railroad which have been proposed offer any such advantages, both as regards the sea fisheries and navigation and trade, as a line ending either at *Ellös* or *Fiskebäckskil*, and we must repeat it, *that the construction of such a line is absolutely necessary if the sea fisheries on the middle portion of the Bohus-län coast are to reach the highest possible degree of profitableness.*

As regards other measures tending to encourage the herring industry we must mention, in conclusion, the great necessity for some sort of manual giving all *the different methods of preparing herring*. Many a person is afraid to go into the herring industry, simply because he fears that his ignorance of suitable methods of preparing herring will cause losses, and in the light of the experience of the year 1878 such a fear is not entirely unfounded. Although the compiling and publishing of such a manual may be attended with many difficulties, the idea ought certainly to be carried out as soon as possible. The official reports of our consuls in foreign countries, and extracts from the reports of other governments, would furnish much valuable material. Special attention should be paid to everything in such reports which is calculated to throw light on the reasons why many of our competitors succeed in keeping Swedish herring out of foreign markets. Reports on the her-

ring fisheries and the herring trade should from time to time be published in a number of our newspapers having a large circulation. This should be done at government expense, and there is no reason to doubt that the effect would be very beneficial to our herring industries. Proper measures should be taken by our authorities to prevent the exportation to foreign countries of an inferior article, for a few mistakes in this direction may prove fatal to the entire export trade. The herring trade will also be greatly encouraged by furnishing our outer harbor with all the conveniences belonging to first-class ports, and by granting certain customs privileges to ships bringing articles necessary for the herring industry, or taking the products of these industries to foreign countries. The desire for such privileges has been repeatedly expressed even during the eighteenth century.

Any measures taken by the government should aim at lessening the disadvantages which accompany the fisheries, and which make themselves felt at the close of the fishing period. This object will, amongst the rest, be reached by (1) developing the fishing industry in such a direction as to combine the most profitable financial results with the least possible sinking of capital, and to limit the number of persons engaged in said industry; (2) by concentrating this industry as much as practicable in a small number of favorably located ports; (3) by limiting the sale of liquor during the fishing season, and by issuing all the necessary rules and regulations, and by entrusting the maintenance of law and order to an efficient coast police; (4) by extending and encouraging the activity of churches and schools; (5) by establishing savings banks, insurance and other beneficial associations; (6) by encouraging, as much as possible, the various industries connected with the herring fisheries, *e. g.* the other sea fisheries and navigation; (7) by establishing new and better means of communication, and by encouraging agriculture and all industries throughout the province. It is well known from former herring periods how much the slow financial development of the province was disturbed by the rich herring fisheries, and that drunkenness and immorality, fostered by the great ease with which money was made during the fishing season, finally caused poverty and suffering among the lower and middle classes of our coast population, who had become unfit for any other occupation. Agriculture suffered seriously, as labor, which was urgently needed, was drawn away to the fisheries during the very time of the year when it could hardly be dispensed with for agricultural purposes. The government should, therefore, use all the means in its power to prevent, or at least to lessen, the injurious effects of these disadvantages which are inseparably connected with the fisheries.

It is evident that much will be gained by limiting as far as possible the number of persons engaged in the herring industry. It will, under all circumstances, be hurtful to the best interests of a people, if a large number of persons scattered along a great extent of coast are dependent

for their living on, so to speak, accidental and sudden work. This disadvantage makes itself peculiarly felt in a country like ours, where the fishermen cannot, when the Bohus-län fisheries come to an end, move to another part of the kingdom and there follow their accustomed avocation; and where we do not find a population well acquainted with the fisheries moving with them from place to place; but where, at the beginning of every fishing period, new hands have to be trained. That under these circumstances the employment of seines offers great advantages over drag-nets will not be astonishing. A single fact will prove this assertion, viz, that about 6,000 Bohus-län seine fishers could, during the most favorable portion of the last herring period, catch more fish during one fishery than 47,000 Scotch drag-net fishers during the fisheries of an entire year. The value of the Scotch fishing vessels for the year 1880 was officially reported at £556,946, and that of the drag-nets at £619,012, making a total of £1,175,958; whilst the boats and the apparatus of our Bohus-län fishermen during the same period were hardly worth more than about £40,000 to £50,000. As our fisheries positively come to an end after a certain number of years, it is highly important that the number of men who, by such an event, are suddenly deprived of their means of earning a living should be as limited as possible; and that the capital invested in boats, apparatus, &c., should be as small as possible. In judging of this matter, one should not be led astray by the childish and utopian proposition, showing anything but knowledge of the subject, that our fishermen should, after generally adopting the drag-nets for fishing on our coast, follow the herring in their migrations, and, if necessary, be ready at once to engage in the so-called great fisheries in the North Sea according to the Dutch method. The above-mentioned nets, which require boats specially adapted to them, are not suited to our circumstances and our remote location. Whenever they have been introduced, sometimes at a great expense, *e. g.*, in other parts of Sweden, Denmark, Norway, and Germany, they have not led to any desirable results as far as the herring fisheries are concerned. From this reason it will be advantageous if the sale of fresh fish in our own country could be encouraged as much as possible; and if the remaining portion of the fish could be prepared for the market by employing as few persons as possible in this process. Our herring industry during the eighteenth century had a great advantage in this respect over that of the sixteenth century; for the manufacture of oil required a much smaller number of persons than the salting and smoking of the herring. Another inconvenience is occasioned by the circumstance that since Bohus-län has been united with Sweden we have no longer a sufficiently large population which is thoroughly acquainted with the process of salting herring. This is another reason for making the chemical and technical investigations above referred to, viz, that of finding out the most approved methods of deriving the proper benefit from the large quantity of herring caught, by preparing them in other ways besides salting.

As has been said, the herring industry would be greatly benefited if it could be concentrated in a limited number of favorably located ports, which would gradually assume the importance of cities or towns, as has been the case in Scotland, where in this manner many of the inconveniences were avoided which followed our great fisheries in the sixteenth and eighteenth centuries. The advantages of such a concentration, both as regards the keeping of good order in the fishing stations, and the gradual building up of industries connected with or springing from the herring fisheries, which at the close of a herring period will furnish a means of gaining a living to our coast population, is so self-evident that it does not need further proof. It is not so clear, however, in what way such a concentration shall be brought about. To do so by forcible means, as in olden times, is at present out of the question; a good deal, however, might be accomplished by granting special rights and privileges to the most favorably located ports, and by introducing various improvements, such as establishing telegraph stations, building embankments, improving the harbors, reducing the customs duties, &c. The most important means of reaching the object in view, but which of course will only apply to a small number of places, is the construction of railroads connecting such parts with the rest of the country, especially if thereby a regular trade in fresh fish can be built up. It is more than a mere conjecture that a town will spring up at such a port, and that, if it is judiciously selected, the fishing industries of that whole neighborhood will be concentrated there. In selecting a place for building salt-houses and other establishments needed for the herring industry, care should be had to find a place where there are telegraph post, steamship, railroad, and custom-house stations, and suitable dwellings for the workmen, from the same reason that people move into cities to follow various trades and industries, in spite of the fact that ground costs a great deal more there than in the country. If the herring industries could be concentrated in the way indicated above, and if new towns could be made to rise on our coast, the present herring period would leave a lasting memento behind it, and would be forever memorable in the history of Bohus-län.

It will be evident that so vast and so peculiar an industry as our periodical herring fisheries cannot be properly regulated by our existing laws, which all apply to normal and not to extraordinary conditions. Exceptional cases demand exceptional legislation; amongst the rest with regard to the vice of drunkenness, which during the last herring period prevailed to such an alarming extent. There is urgent need to limit the right of selling liquor on the coast during the fishing season. Proper regulations as regards the maintenance of good order, the appointment of vigilant and energetic police officers and inspectors, will, as the fisheries continue to grow in importance, also prove of incalculable benefit.

No one will deny that the influence of churches and schools is indis-

pensable to the proper development of our coast; and this influence will be heightened by concentrating the herring industry in a comparatively small number of favorably located ports, where churches and schools would give to the young growing up during the great fishing period an education which would fit them to successfully grapple with the difficulties which will doubtless confront them at the close of the herring period. The school of navigation at *Strömstad*, a place which has never played an important part in the history of our herring fisheries, should be moved to a more central location—central not only with regard to its geographical location on our coast, but also with regard to the herring fisheries. The high school for farmers at *Tyft*, founded and richly endowed by the late mayor of *Lund*, Mr. *L. Billström*, and which is located near to one of the principal places where herring fisheries are carried on, might easily arrange its course of instruction in such a manner as to give to our coast population a suitable education beyond that which they receive in the elementary and intermediate schools. The establishment of technical schools where the young people could be instructed in various trades should also be encouraged.

Savings banks and loan institutions, where the fishermen could deposit their savings, and where they could borrow the necessary money for fitting out boats and buying apparatus, would also prove highly beneficial, as they would tend to free the fishermen from the cruel clutches of usurers. The founding of life insurance and mutual benefit associations among our coast population would aid in avoiding much trouble, and would make the future brighter and more promising to our fishermen. In order that such institutions may do the greatest possible good, it would be well for the government to publish in pamphlet form an account of their working in other countries.

One of the principal causes of the misfortunes which followed the close of our last great herring period, must be found in the circumstance that the persons engaged in the herring fisheries made these fisheries the only and exclusive source of their living; and when the herring left our coast, and our fishermen could not follow them, the natural consequence was great and general suffering among the coast population. One of the first duties of the hour is, therefore, to prevent the recurrence of such misfortunes at the end of the present herring period, and in the above various hints have been given as to the best way in which this should be done. We must once more point out in this connection the great importance of the railroads which have been proposed, as thereby an undoubted impetus will be given to the deep sea fisheries, whose continuance at all times, at least on the middle and northern coast, is sufficiently guaranteed. If by a judicious concentration of the herring industry new towns are established on the coast, many other industries will spring up, through which the fishermen can earn a living during that part of the year when the herring are away from the coast, and which at the close of a herring period will in some manner

compensate them for the losses which such an event will cause even under the most favorable circumstances.

It is well known that during the herring periods agriculture was sadly neglected in Bohus-län; but this undoubted evil would be greatly lessened, if not altogether remedied, by opening new ways of communication, which would benefit not only the fisheries but also the agricultural interests, and by concentrating the herring industry in a limited number of towns, which would become good markets for agricultural produce. As agriculture advances, it will be better able than hitherto to compete with the herring fisheries in engaging labor. Much of the refuse from the herring industry could be utilized in agriculture to a much higher degree than is the case at the present time; and a great deal might be accomplished in this direction if the government would make investigations and experiments relative to this matter, and publish the results.

The importance of the above considerations should not be underrated for the reason that none of those evils which beset the fisheries during the last century have as yet made their appearance; for they can hardly be looked for until the herring fisheries have in the course of years reached a high degree of development.

As in the above I have only mentioned such measures whose beneficial influence cannot be doubted, and which would prove beneficial to other industries after the close of the herring period, I feel convinced that they will receive the attention which they deserve.

Tjörn, December 12, 1881.

AXEL VILHELM LJUNGMAN.

APPENDIX.

I.

ATTEMPTS TO CATCH HERRING WITH DRAG-NETS.

To the Council of State and the Chief of the Department of the Interior :

In reply to a request by telegram of the 9th instant, to give my opinion as to the desirability and practicability of attempts to catch herring in the Skagerack with drag-nets, with the view of increasing our knowledge of the herring, and as to the benefit such attempts would confer on the Bohus-län herring fisheries, I have the honor to report as follows :*

(1.) *The importance to science and industry of attempts with drag-nets.—*

*The great haste with which this report had to be drawn up, under the most unfavorable circumstances, must serve as an excuse for its fragmentary character. The same subject has been treated more fully in the article in the Gottenburg *Handels-och Sjöfarts-Tidning*, referred to below.

Attempts with drag-nets in the Skagerack have several times been proposed and actually made, partly with the view of thereby increasing our knowledge of the course and migrations of the herrings, and partly to ascertain whether the number of herring was large enough to warrant the establishment of drag-net fisheries. Owing to the limited extent of these experiments and the unsatisfactory apparatus with which they had to be made, they have not led to the desired result. It will however, even in spite of these failures, hardly need any proof that such experiments, made with drag-nets and other fishing apparatus, are indispensable for gaining a more satisfactory knowledge of the nature of the herring and more especially of its course and migration. In view of the great expectations which have been raised by the rich herring fisheries of the present winter, and in view of the hopes that they may prove the beginning of another great herring period, such experiments should be made on a large scale, in order, *first*, to gain some more certain knowledge relative to the future migrations of the herring from our coasts,⁷ and to the portion of the sea which they visit after leaving our coasts, more especially whether they go into the North Sea; and *second*, to ascertain late in summer or in autumn whether a large number of herring are approaching our coast. This second object is of course the more important of the two to our fishermen, as they need to be apprised of such an event in good time; and as it occurs later in the season, it will allow of making all the necessary preparations; attempts with drag-nets might also finally lead to the establishment of drag-net fisheries, if it should be proved that such fisheries can be carried on to advantage.

(2.) *Experiments with drag-nets.*—With regard to the experiments with drag-nets, special attention should be given to time and place of such experiments, to the quality of the boats and nets, and to their extent and probable benefit to science.

As to the *time* when such experiments should be made, spring and early summer will not yield many practical results. During spring our own coast herring spawn near the coast, and in the early part of summer mackerel fisheries are carried on with drag-nets. The latter part of summer and autumn, on the other hand, will doubtless, as far as the Skagerack is concerned, be the most suitable time for searching after herring. If, moreover, the present winter fisheries should prove the beginning of another great herring period, the approach of the herring would have to be looked for, at the latest, about the end of November. During winter, herring are most plentiful off our coast, and sometimes in close proximity to it; but the winter season with its darkness, its frequent fogs and violent storms and the consequent dangers to navigation, will render drag-net fisheries in the Skagerack (at least

⁷The herrings which at present are still found near the coast in large numbers may, after a short time, go out to sea again.

on a large scale) difficult, and probably practically impossible.* It must be remembered that drag-net fisheries must be carried on at night, as during daytime the herring do not go into the nets.

As regards the proper *place* for such experiments, it would not be advisable to confine oneself to that portion of the Skagerack which is nearest to the coast of Bohus-län; but these experiments should be extended to more distant portions of the Skagerack and to the adjoining portions of the North Sea and the Kattegat.

As regards the quality of the *boats and nets*, our Bohus-län mackerel boats will be well adapted to the purpose⁹ during the mild season, whilst for winter stronger and more comfortable boats, such as are used by the Yarmouth fishermen, are required. Suitable nets can be ordered in England. The proposition, which has been made several times, to employ Swedish drag-nets and boats from our southern provinces (*Skåne* and *Blekinge*) shows an utter ignorance of the subject. The net must correspond to the capacity of the boat; and the open boats used by our *Skåne* and *Blekinge* fishermen, adapted as they are to the waters where they are used, are too weak for the Skagerack with its waves and violent storms.

As regards the *extent and the benefit to science* of the experiments with drag-nets, it is evident that, if they are to yield any valuable results, they must be made by a number of boats, properly superintended and continued for a number of years. The experiments made with Dutch, Scotch, and German herring boats, with the view of gaining a more extended knowledge of the herring and its habits, have shown very clearly that no great results may be looked for from experiments made with one or only a few boats, manned with sailors who are entirely unacquainted with the peculiarities of the Skagerack. In order to gain more rapid results and to save labor, as also to better superintend the experiments, a steamship would be exceedingly useful.

(3.) *The introduction of drag-nets as one of the apparatus for catching herring in the Skagerack.*—If drag-net fisheries in the open sea are to be made profitable there is required (1) that an even and good kind of herring, which, both fresh and prepared, can fetch a sufficient price to pay the great expenses of such fisheries, shall come regularly and plentifully during a considerable portion of the year; (2) that the fishermen

*Herring fisheries carried on in the open sea during winter with drag-nets have not flourished in any place, where they were introduced. See O. N. LÖBERG: *Norges Fiskerier*, Christiania, 1864, p. 36.—*Report by the Commissioners of the Fishery Board, Scotland, of their proceedings in the year ended December 31, 1880*, Ediuburgh, 1881, p. 4; "The winter herring fishery did not contribute much to the returns of the year. A herring fishery can never be prosecuted at that season upon the outer coasts of Scotland, except at intervals, the frequent severity of the weather preventing it."

⁹As also for the fisheries in the few fiords on our coast where it can be done. See C. U. EKSTRÖM: *Praktisk afhandling om lämpligaste sättet att fiska sill, torsk, långa, makrill, hummer och ostron*; Stockholm, 1845, pp. 98, 99, and A. V. LJUNGMAN: "*Preliminär berättelse för 1873-'74, öfver de beträffande sillen och sillfisket vid Sveriges västkust anställda undersökningarna*." Upsala, 1874, pp. 68, 69.

should be men of skill and experience; (3) that the conditions as to season, weather, current, &c., should be favorable; and (4) that the fish can at all times find a ready market.

As regards the first condition, it is hardly probable that it can be fulfilled except during a new great herring period, for herring of a really *superior* quality have, so far, at least, only been noticed in comparatively small numbers near our coast; the second condition will doubtless be fulfilled gradually, if the herring come in large numbers and the fisheries consequently become more extensive. The conditions as to season, weather, current, &c., will hardly be favorable with us, as at present the herring approach our coast in large numbers during the winter season.¹⁰ As regards a ready market, there would be no great difficulty, as the Swedish-Norwegian railroads, and, in a still higher degree, the Jutland railroads offer considerable facilities for bringing the herring into the markets of Norway, Denmark, and Germany, both fresh and slightly salted; and as a really good and well prepared article will, though gradually, gain for itself the place which it deserves. Under the present circumstances, however, when herring of really *superior* quality are comparatively scarce on our coast, the general introduction of the drag-net in our fisheries will (as I have said in my preliminary report on the scientific investigations of 1873-'74) hardly be advisable.¹¹

(4.) *The employment of drag-nets during a possible herring period.*—If, however, our so-called "old" north-sea herrings should again, as in former times, visit the Skagerack for a longer period, it will be evident that the first and foremost condition of successful drag-net fisheries—viz, large numbers of herring coming near the coast—would be fulfilled. But this by no means implies that these fisheries (with drag-nets) would be profitable or desirable for Sweden. On our coast other apparatus will always be more or less employed, and will yield the by far greater portion of all the herring caught in our waters, and, therefore principally determine the price of Bohus-län herring in the market, and the method to be pursued in our herring fisheries and industries.¹² *Swedish* drag-net fishers will probably find ruinous rivals in the seine fishers,¹³ as the expenses

¹⁰ This would of course be different if, as was the case during the great herring periods of the sixteenth and the eighteenth centuries, the herring came near the coast at the end of summer, or in the beginning of autumn, in which case they would also be of much better quality.

¹¹ See A. V. LJUNGMAN: *Om sillsaltning och sillhandel* in the *Gottenburg Handels- och Sjöfarts-Tidning*, December 9, 1881.

¹² Which for the present aims at bringing into the market a *cheap* herring, and products prepared from such cheap herring. See the *Gottenburg Handels- och Sjöfarts-Tidning*, January 14, 1879.

¹³ This also happened during the great fisheries of the eighteenth century, as experiments with drag-nets on a large scale, though subsidized by the government, did not yield a sufficient result to warrant their continuance. The experiments in the *Kat-tegat* were made in autumn, and the principal station for the herring vessels was at *Käringsö*.—See *Den Svänkska Mercurius*, February, 1756, pp. 454-457, 459-460; also *Nya Handlingar af Kongl. Vetenskaps- och Witterhets-Samhället, Göteborg, Gottenburg, 1808*, p. 46.

of these latter are very small as compared with those of the drag-net fishers, leaving out of the question the fact that they will have to combat much greater difficulties and dangers.¹⁴ As, moreover, the open sea is free to all, drag-net fisheries, if once introduced in the Kattegat, would soon be carried on also by the fishermen of other nationalities, who, in most cases, could do this under *more favorable* circumstances than we. Denmark is much more favorably located in this respect than Bohus-län, and those nations whose herring already enjoy a high reputation in the great markets of the world, and who have the most experienced and skilled fishermen, will certainly, if drag-net fisheries are introduced in the Skagerack, soon outstrip us in the race. They will suffer much less than our own drag-net fishermen from competition with the herring caught near the coast, which, as far as our Bohus-län fisheries are concerned, will (during a herring period) naturally determine the reputation of the herring.¹⁵ The Bohus-län herring, no matter whether they are caught with nets or seines, will most assuredly only gain the reputation of a second-rate article; for if the fisheries on our coast yield an exceptionally large number of herring, people will not be careful in preparing them; and with coast-fisheries like ours the exportation of badly salted and prepared herring would hardly occur in any large quantities or for any length of time,¹⁶ as our herring would very soon lose their reputation, all the more as the other nations who participated in these fisheries with us would doubtless find it to their advantage to decry our goods.

The meeting in the Skagerack of numerous fishermen of different nationalities would also in many other respects cause unpleasantness, and if during stormy weather many of the foreign fishermen should be compelled to seek shelter in the harbors on our coast it would often be extremely difficult to maintain good order.

Drag-net fisheries would also have this disadvantage for Sweden that they would draw a large number of persons from other and far more important trades, which would thereby suffer. During the most productive periods of our last great herring fisheries of the eighteenth century about 6,000 seine fishers caught a much larger number of herring per annum than more than 45,000 catch in Scotland at the present time.

The outfit of the seine fishers is moreover much less expensive. As regards the supposed injurious character of the different apparatus, just as great, if not greater, objections could be raised against the drag-nets as against the *large* seines.

The supposed *advantages* of drag-net fisheries over seine fisheries—viz,

¹⁴See A. V. LJUNGMAN: *Sillfiskefrågan* in the Gottenburg *Handels-och Sjöfarts-Tidning*, 1879, No. 10.

¹⁵The experience gained during the winter herring-fisheries on the west coast of Norway goes to confirm this.

¹⁶See O. N. LÜBERG: *Norges Fiskerier*, Christiania, 1864, pp. 51-52, 54-55, 63, 65; A. V. LJUNGMAN: "*Sillfiskefrågan* in the Gottenburg *Handels-och Sjöfarts-Tidning*," 1879, Nos. 10 and 11, January 14 and 15.

that they are calculated to educate good seamen, and thereby benefit navigation and supply experienced sailors for the navy—are certainly exaggerated; and, as the experience of Norway and Great Britain fully proves, are by no means real.

Tjörn, February 12, 1878.

AXEL VILHELM LJUNGMAN.

II.

THE CARE OF THE SICK ON THE COAST OF BOHUS-LÄN DURING THE HERRING FISHERIES.

To the Committee of the Gottenburg and Bohus-län provincial parliament for regulating the care of the sick in these provinces :

In view of a notice from the committee, in the papers, the undersigned ventures to lay before the members of said committee a plan (in briefest outline) *for regulating the care of the sick on the coast of Bohus-län, more especially during the expected great herring fisheries.*

The large number of persons who, during great periodical herring fisheries, gather in that portion of the coast where the fisheries are carried on, the majority of whom are strangers unaccustomed to the mode of life and climate of our coast during the cold season, are therefore more liable to diseases than the natives. This circumstance certainly deserves the attention of our sanitary authorities. It should be borne in mind that the number of strangers who visited our coast for a greater or less period during the most productive season of the last great herring fisheries is supposed to have been about 50,000 (see *Handlingar rörande sillfisket i bohusslänska skärgården*, Stockholm, 1843, p. 11). In Norway, where, till within about ten years, there have been similar large herring fisheries, special physicians were appointed to attend the sick on the coast, and sick-houses or hospitals were established at various points along the coast. But as the Bohus-län herring fisheries (as far as we can judge from former fishing periods) are mainly carried on in a much more limited stretch of coast which is more densely populated, and where the fisheries therefore are much more concentrated than is the case on the west coast of Norway, the care of the sick during the fisheries could with us be easily combined with the permanent and general care of the sick on our coast. This might be done in the following manner: In the *first* place, the physicians in the sea-ports of the province and in the town of *Lysekil* should attend to the sick in the neighborhood of these places, and new district physicians should be appointed for *Tjörn* and the southwestern coast of *Orost*, and stationed near *Kyrkesund* (or *Hallsbäck*). These should only be increased by one or at most two extra physicians during the fishing season, who might be stationed in suitable places on the coast, or on the

guard vessels which are generally ordered to these waters during that season. In the *second* place, new sick-houses, or at the less important fishing stations so-called sick-rooms,¹⁷ should be established, where the sick find better care than in their accidental and often narrow and inconvenient dwellings. Such sick-houses should be established in (1) *Grebbestad*, (2) *Lysekil*, (3) *Kyrkesund*, and (4) *Marstrand*.¹⁸ If the fisheries, as was the case during the greater portion of the last herring period, *should principally be carried on on the southern and central portions of our coast*, a sick-house would be required, at least during the fishing season, in some place on our southern coast; the most suitable place for such a sick-house, or at least for a physician during the fishing season, would be *Kalsund*, or, if a railroad should be constructed to the southwestern coast of *Hisingen*, someplace on that coast.¹⁹ The sick-bays or rooms in the above-mentioned places could easily be attended to by the resident physicians for a comparatively small compensation.

As the herring fisheries, however, are as yet so little developed, and as their future is uncertain, in the beginning only the adoption of such measures can come into question as would be of decided benefit and are positively demanded by the circumstances. Among such measures we must here mention the appointment of a district physician, to be stationed at *Kyrkesund*, and the establishment of sick-rooms near *Grebbestad*, *Lysekil*, *Kyrkesund*; even the general demand for sick-houses would thereby be fully met for a long time to come. An essential condition for the carrying out of these measures will be that the expenses are kept within reasonable limits, and that the physicians stationed in the respective districts would attend the sick-rooms, so that there would be no necessity for appointing special physicians. If, however, the most northerly of the proposed sick-rooms should be established, *e. g.*, in *Fjellbacka* or some other place far from any resident district physician, it might be necessary to appoint an extra physician. Under all circumstances, however, it should be considered whether the establishing of the three above-mentioned sick-rooms would be more advantageous and would benefit a larger extent of coast than a larger sick-house with a special resident physician in some place between *Uddevalla* and *Strömstad*.

As regards the appointment of an extra district-physician for *Tjörn* and the southwestern coast of *Orost* (*i. e.* a district having a population

¹⁷ See C. GRILL: *Om sjukvården på landsbyggen*, Hedemora, 1869.

¹⁸ In case one or several railroads should be constructed, at whose terminal points on the coast the fisheries would naturally be concentrated, these points would also be the most suitable places for establishing sick-houses or sick-rooms, or for stationing physicians.

¹⁹ It is to be regretted that, in view of the possibility of great herring fisheries in the near future, the quarantine buildings at *Känö* have not been transferred to the coast of *Hisingen*, as they would have made excellent hospitals during the fishing season.

of about 12,000), it would be well to bear in mind how difficult, not to say impossible, it would be for one physician alone to attend to the wants of so large a district in the proper manner. The experience of former physicians stationed in this district tells us that this is well-nigh impossible. The neighboring districts have, for this very reason, been recently subdivided into smaller districts, and this may very soon also become necessary for the district comprising *Orost* and *Tjörn*.²⁰

Tjörn, April 28, 1879.

AXEL VILHELM LJUNGMAN.

²⁰In subdividing the provincial district of *Orost* and *Tjörn* it becomes indispensable that one of the physicians should live near the sea on either island, so that he is just as easy of access by sea to the coast population as by land to the inland population.