

## **The seal epidemic in Europe and its consequences**

*by J.D. van der Toorn*

In the early 1980's, the situation of the harbor seal, *Phoca vitulina*, in Europe, finally seemed to be improving. Then suddenly in the spring of 1988 thousands of seals suddenly died. The cause was an hitherto unknown disease. In less than a year all the improvements of recent years had been undone. What happened?

Let us first have a closer look at the history of the harbor seal population in Europe. The harbor seal can be found in Europe in the Baltic Sea, around Denmark, throughout the Wadden Sea (a tidal flat area, ranging from the Netherlands to Denmark) and around the British Isles. Especially the population in the Dutch Wadden Sea area has been the subject of intensive research. In 1950, there were about 3,000 harbor seals in the Dutch part of the Wadden Sea alone. At that time there was an increase in hunting effort, which resulted in a dramatic decrease in population size. In 1962, when the hunt was finally forbidden, there were less than 1,000 animals left. The hunt had managed to effectively wipe out the total pup production of 10 years. After this there was an increase in population size, which was followed by yet another drop, which started in the late sixties. The population continued to decrease in size until in 1975 there were less than 500 seals left in the Dutch Wadden Sea. It turned out, that this decrease was caused by an increase in PCB-disposal by the chemical industries. PCB's had a negative effect on the fertility of the animals, so that the amount of pups born each year, was about one third of what it should have been. In spite of this, the population started to increase slowly again after 1975, due to immigration of seals from the German part of the Wadden Sea area. Also the increased activities of seal rehabilitation centres in the Netherlands and Germany have stimulated this increase. The increase became more pronounced, after hunting was finally banned in Germany as well. In 1988, there were probably about 1,000 seals in the Dutch Wadden Sea. In the whole Wadden Sea area, the population at that time was estimated at about 10,000 animals. The total amount of seals around the British Isles at the same time, was about 20,000.



Then, in April 1988, disaster struck. First in northern Denmark, in the Skagerrak and Kattegat area, an increase in seal mortality was noted. The animals seemed to be suffering from pneumonia and viral encephalitis. In May, seals in the Danish Wadden Sea started dying in increasing numbers, with similar symptoms. In June, the disease had spread over the whole Wadden Sea area and in July, the disease was also reported around Sweden and in the Baltic Sea. In August of 1988, the disease appeared in the British Isles as well. In October the disease was found all around the British Isles and Ireland, and along the Wadden Sea area all the way into the Baltic.

The results of the epidemic were devastating. From April 1988, when the epidemic started, until June 1989, 17,000 seals died because of the disease. In the Wadden Sea area, 7,000 of the 10,000 animals died. This means a mortality of 70%, while the natural mortality rate for this population is about 15%. It seems, that the year classes of 1987 and 1988 have been completely wiped out.

What was the cause of this epidemic. At first nobody had any idea. But soon it became clear that a virus was involved. At first a picorna-type virus was suspected, the phocine herpes virus-1. Later Osterhaus et al. demonstrated that the virus that was responsible for this disease was a morbillivirus, which looked very much like the canine distemper virus. This virus was therefore called the phocine distemper virus, PDV.

The examination of blood samples, collected from animals in the North Sea area before 1988, showed no sign of antibodies against this virus, and therefore it is believed, that the virus was introduced into the North Sea only in 1988. How it got there is not known. The most likely explanation is that the virus was introduced by harp seals. In 1987 and 1988 there was a massive migration of harp seals from the Barentz Sea to northern Europe. Some harp seals came even as far south as the Netherlands. It has been shown, that harp seals, as well as Arctic ringed seals, have been exposed to the PDV virus, prior to 1988, since PDV antibodies have been found in earlier serum samples. There are thus far no data on seals in the Barentz Sea.

That the disease spread so rapidly, can be explained by the behavior of the seals. They tend to spend a lot of time in close proximity on tidal flats and rocks, thus creating ample opportunity for the disease to spread. The seals also migrate readily throughout Europe, and its is not uncommon for a harbor seal to cross the North Sea towards Great Britain. Add to that a reduced immune response, caused by a heavy load of pollutants, which is especially true for the Wadden Sea population, and you have a good explanation of why the disease spread so rapidly.

Although this epidemic has received a lot of attention, it is not the only occurrence of PDV infection. In 1987 and 1988 an estimated 80,000 - 100,000 Baikal seals died with symptoms, similar to those of phocine distemper. Recently it was shown from serum analysis, that the Baikal seals were killed by the same or a closely related virus. The cause of this epidemic is also still unknown.

There are still a lot of questions that need to be answered. Is there a relation between the Baikal seal epidemic and the harbor seal epidemic or are these two separate cases? Why were the harbor seals affected, while at the same time only 185 grey seals in the same range succumbed to the disease? Why has the disease not been noted among harp seals and ringed seals, which have been exposed to the virus?

And most importantly, has the epidemic really come to a halt or is there a chance that it will repeat itself. The chances of this happening are present, since recent research has shown, that whereas most of the survivors of 2 years and older have developed some form of immunity against the virus, most of the younger ones have apparently not developed any immunity. So far, there have been a few isolated accounts of more victims of the disease, but luckily no more than that. Let's hope for the best.

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