

## SOME PROBLEMS OF WILD LIFE CONSERVATION IN ICELAND

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Iceland has an area of approximately 40,000 square miles or some 20 per cent larger than Ireland. It lies between  $63^{\circ} 24'$  and  $66^{\circ} 32'$  N. latitude and from  $13^{\circ} 30'$  to  $24^{\circ} 32'$  W. longitude, at the convergence of two oceanic currents. To the south the North Atlantic Drift brings the warm waters of the Gulf Stream along its southern and western coasts, while to the north the Icelandic Polar Current carries the colder waters of the north to its northern and eastern shores. Although now enjoying a reasonably mild climate, it has in the past, due to the southerly advance of drift ice brought down by the Polar Current, experienced catastrophic disasters, both to its human and wild life population.

Geologically, Iceland is very young. Its oldest rocks date from the early Tertiary, about 60 million years ago, but a great proportion of the island consists of rocks which have only been built up within the last million years and at least one-tenth of it is covered by lava flows less than 10,000 years old. The main formations are of Basalt and Palagonite, each covering roughly equal areas of the island's surface. The basalt formation is supposed to be the remains of a plateau which, during the Tertiary, joined Iceland in the north-west to Greenland and in the south-east to Britain. To this youthfulness is due the fact that Iceland is poor in indigenous species of land vertebrates, birds being by far the most numerous; but even so, the island is not noted for its number of species (there are only seventy-six nesting birds) but rather for the abundance of those that are present, particularly the seabirds, and for the number of species not found elsewhere in Europe. There are few mammals and no reptiles or amphibians.

The island's main interest lies in its unique position geographically; it is at one and the same time the westernmost outpost of the Old World species and the easternmost of some of the New World forms. For both botanist and ornithologist, therefore, it offers splendid opportunities for research.

A fuller account of the climatic fluctuations is given by Sigurdur Thorarinsson in his paper "The Thousand Year Struggle Against Ice and Fire", Reykjavik, 1956.

### THE SOIL

The balance between the soil-building and the soil-destroying forces is a delicate one in Iceland. During the absence of man and of natural herbivores the equilibrium between the two processes was maintained, but it was soon destroyed by the advent of man and his livestock. Here, as elsewhere, over-grazing, tree-felling and forest fires have destroyed the great birch forests that once covered a great proportion of the island; consequently, soil destruction has been catastrophic. Large areas of sand

and boulder desert have been produced ; for instance near Hvitarvatn, a lake on the south-eastern edge of the Langjökull, there is an extensive area of desert which is growing year by year. Near the lake, the once luxuriant grassland that covered this area can still be seen as islands 7 to 10 feet higher than the surrounding desert. They are separated from each other by erosion channels, the long axes of which lie in line with the prevailing winds. This desert developed during the last hundred years or so, due primarily to overgrazing and secondarily to amelioration of the climate. In the summer months trucks crossing the desert can be seen approaching for many miles by the dust plume they throw up behind them. In 1961, during my stay in the region with the Central Icelandic Expedition, small dust devils were seen almost daily crossing the horizon and the high winds carried dust clouds for miles. The loss of soil from this area alone must be colossal ; in places bedrock is laid bare showing the striae caused by the ancient glaciers that once covered the whole of Iceland. The erosion is rapid in these regions owing to the nature of the rock and the rapid changes in temperature that go on in the early spring and summer. Although much useful land has been lost, the effect on the wild life, which is in any case meagre, has been small, possibly only the pink-footed geese being affected. From the human point of view active measures are being taken to stay the erosion by the building of stone walls and the planting of lyme grass. Reafforestation programmes are gaining momentum and will prove, it is hoped, an addition to the country's economy, as well as holding the soil.

In addition, the country's sheep population has been greatly reduced, due mainly to diseases that were accidentally imported with foreign stock. Other livestock have increased both numerically and in quality, but only in specially farmed land where the dangers of overgrazing have been avoided.

#### THE EFFECTS OF VOLCANISM ON WILD LIFE

Volcanic eruptions cause death to individuals and wholesale destruction of habitats in a number of ways ; first is the obvious destruction by the physical violence of the explosion, lava flows and hot ashes, but a great deal of damage is done after the eruption, sometimes going on for many months, or even years, after the cessation of volcanic activity.

The Laki eruption of 1783 gave rise to the greatest lava flow in the world in historical times ; the lava covered an area of some 450 square kilometres—its total volume would have covered the whole of England with a layer nearly 4 inches thick—but despite the destruction by the lava, by far the most dangerous part of the eruption to man and livestock was the tephra fall ; the ash was deposited over the greater part of the country, stunting grass crops, poisoning the pasture, and killing the livestock ; in consequence, famine hit the island. It is interesting to note that crops were destroyed as far away as Scotland by the Laki ash. Some figures show the extent of the damage done to the domestic animal population by the Laki eruption : cattle, 50 per cent ; ponies, 76 per cent ; sheep, 77 per cent.

The resulting famine killed off one-fifth of the entire human population.

The effect on the wild life must have been tremendous and, in particular, the grazers, such as the pink-footed geese, which at that time would be in the island; but birds at least can be reintroduced from other areas within their range.

More recently, the 1947 eruption of Hekla caused a great deal of loss of life long after the eruption had ceased. G. Kjatansson gives some interesting facts about the after-effects of this eruption, among them being the contamination of the water with carbonic acid. This was noticed just before the end of the eruption and went on for some thirteen months and was still noticeable in 1956. Abnormal deposits of calcareous scale in boiling vessels were still noticed nearly ten years after the eruption, and also the accumulations of heavy gases, forming invisible "carbon-dioxide lakes" in depressions and hollows in lava fields. It was in these "death valleys" that numbers of animals were killed. When the danger of these death valleys became known, the farmers tried to keep their animals away from them, but still fifteen sheep found their way to the death valleys and were killed. Further loss of domestic stock was prevented by fencing off the areas, after which only one Arctic Fox and sixteen birds were found dead. Still more birds were probably killed and their carcasses removed by foxes and ravens; possibly the Arctic Fox was killed while feeding on the dead sheep.

To sum up, it appears that although volcanism can affect great areas of habitat and cause great destruction, it does not produce any lasting effect except to those species that have a limited habitat, or are in some way restricted locally, and cannot be reintroduced from other areas.

#### FLOODING

Though flooding is not unique to Iceland, it has perhaps had more disastrous effects there than in other parts of the world. It has been known to sweep away vast areas of arable soils, especially in the south of the island, causing great havoc among the farming communities, and in this sense is second only to volcanic activity for the destruction it causes.

Much of the flooding in Iceland is caused by volcanic activity under the icecaps, such as Katla under the Myrdalsjökull, which, during its last eruption in 1918 the maximum discharge of the flood that followed was estimated at 200,000 m<sup>3</sup>/sec., or, as Thorarinsson puts it, "at about three times the discharge of the Amazonas. Katla made a clean job of it." But, like the eruptions, the floods are generally local and have little lasting effect on the total wild life picture.

#### MYVATN—A SPECIAL CASE

The Myvatn area has from ancient times been a place of unique and disturbing beauty, set in a volcanic wilderness among some of the most fantastic rock formations on earth. It is the home of some of Iceland's most interesting birds, such as the Gyr Falcon, and Barrow's Goldeneye and the Harlequin. The lake itself is rich in minute animal and plant life and this rich food supply is responsible for the abundant waterfowl population.



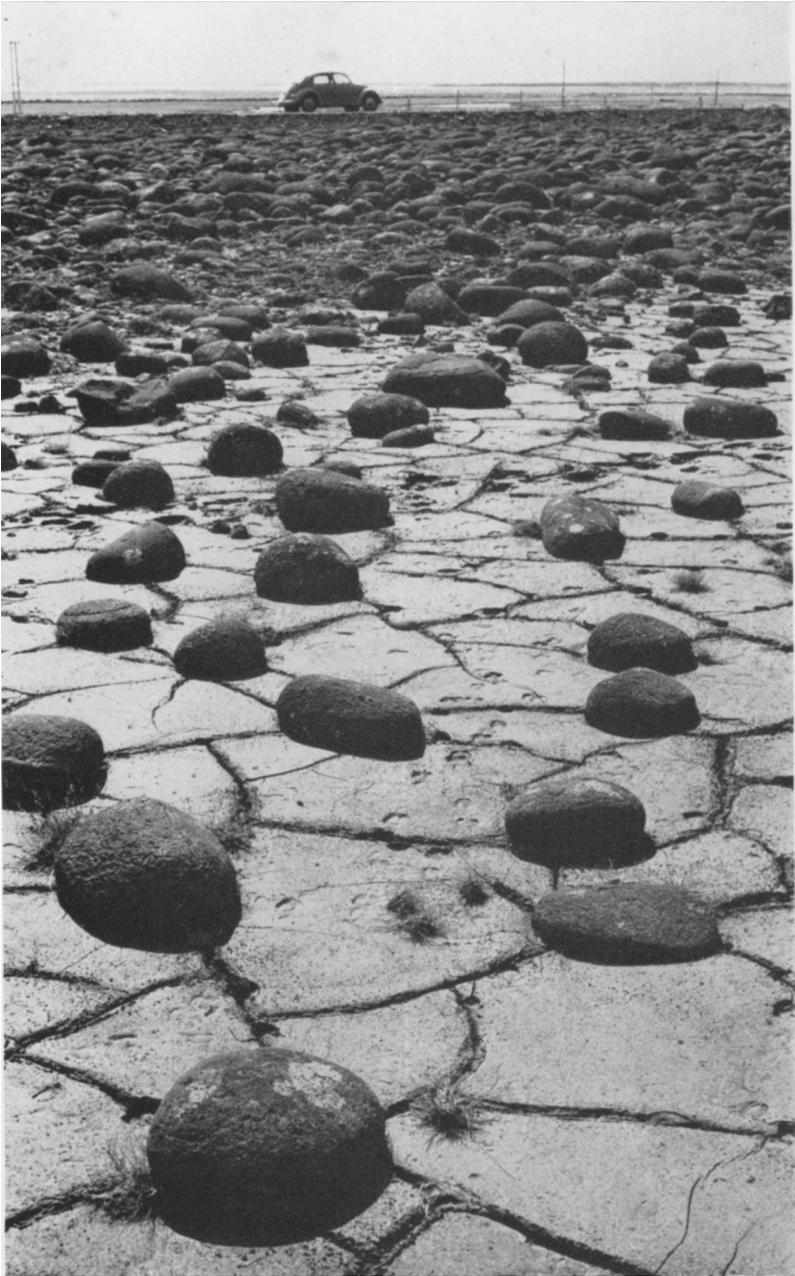
*Photo : Iceland Tourist Bureau.*

**Hekla Erupting.** Note the clouds of ash ; this can cause damage to habitats over hundreds of square miles.



*Photo : Icelandair.*

The Eider Duck breeds in great numbers ; every year down is collected from these nests and a certain amount of eggs for human consumption. Complete protection, however, is given to the birds and only one egg is taken from each nest.



*Photo : Anglo-Icelandic Field Research Group.*

Once luxuriant with grass, overgrazing started the events which produced this stony desert.

The increase of tourism has brought prosperity to the area and with it the inevitable threat to the wild life by the advent of the egg-collector and the over-ambitious photographer; there is even the story of the "gentleman" who took the young Gyr Falcons from their eyrie and smuggled them out of the country in his car—after receiving the hospitality of the Icelanders, who had quite innocently showed him the eyrie because he wanted to photograph it.

There has been some talk of making Myvatn into a National Park, but political and land ownership problems are possibly too involved for this to become a reality or indeed practicable. Some believe that the farmers in this area who collect the eggs will ensure that enough are left to carry on the stock; unfortunately there is evidence that the Goldeneye and Harlequin, particularly the latter, are decreasing, due to a combination of egg-collecting and destruction by mink. Mink are rapidly increasing in the area and are almost indestructible, living as they do under the lava fields. Dynamiting has been tried to eradicate this pest, but the area is far too vast for this to be really effective. Mink were introduced, as in Britain, for the fur trade and are now spreading all over Iceland. A suggested solution to the egg-collecting problem would be to ban the export of the Goldeneye and Harlequin eggs to the world's zoos and wildfowl collectors. This would certainly help, but like most laws, would be difficult to enforce.

#### THE SEAS

The banks round the Icelandic coast, like those of Newfoundland, are among the richest fishing grounds in the world, and much of the country's economy and the employment of about 17 per cent of its population rests on the productivity of these waters. The marine mammals have taken advantage of this abundant source of food. By far the most numerous of them is the Common Seal, which breeds almost all round the island's coasts, and though the Grey Seal is common it is confined mostly as a breeding species to Breidafjordur, a large bay on the north-western coast, with a few colonies in the south-east. Occasional Harp Seal, Ringed Seal, and Hooded Seal are recorded. Common Seal pups are killed for their skins; a good skin can fetch about £9 according to its grade; occasional yearling seals and adults are also taken, although the latter are protected by law. Grey Seals are also occasionally taken, mainly for the leather they produce, but the low price they fetch and official protection gives them a certain amount of security. On Hindisvik, a peninsula on the north coast, a large colony of some 400 Common Seals are protected privately by the Rev. Norland, and are rapidly increasing, in spite of cropping on each side of the colony by local farmers.

Whaling is carried out off the west coast of the island and in the Denmark Straits for Common Rorqual and Sperm Whales, though Sei Whales are taken when seen. Iceland has agreed not to take Blue Whales, and during the 1962 season a great many more were seen than is usual. An interesting insight into the conservation mindedness of at least one whaler is given by the following incident on board a catcher. We had been cruising in very poor visibility for some hours looking for whale (which is costly on fuel) when on our starboard bow we sighted two large Fin

Whales (Common Rorqual). After giving chase and eventually moving into firing position, the skipper gave the order to move off. My companion, somewhat amazed, asked the skipper why he had not killed the whales, to which he replied simply, "They are lady and gentleman." Other whales which take advantage of the rich waters round the coasts of Iceland are the Piked Whale or Lesser Rorqual, the Pilot Whale, Killer or Grampus, and the Common Porpoise; other species are seen from time to time.

The sea also provides a living for the tens of thousands of sea birds that inhabit the cliffs and the numerous islets that surround the coast. Common Guillemots, Brünnichs Guillemot, Puffins, Razorbills, Fulmars, and Gannets are most numerous, and have all at one time or another been cropped for food. They have been protected from over-cropping by the self-imposed limits on collecting that have been in operation by generations of collectors. It was on one of these islands, Eldey, that the last Great Auk was killed. On some of the more sheltered islands, the Eider Duck breeds in great numbers; every year down is collected from these nests and a certain amount of eggs for human consumption. Complete protection, however, is given to the birds and only one egg is taken from each nest.

#### SUMMARY

It would appear that the natural hazards present in Iceland have little or no lasting effects on the fauna. Far more important are the threats introduced by man and his domestic stocks, though even here the effect has more significance in relation to the flora, rather than the fauna. Direct predation does occur, and forms part of the economy, but one must presume that the present-day protection laws and conservation in Iceland seem to be adequate for most of the fauna and flora, the exceptions being the Harlequin and Barrow's Goldeneye at Myvatn. The difficulty seems to be not in giving legal protection by law, but in enforcing it.

The cropping of marine mammals does not seem to have had any great effect on their numbers and one must assume that provided cropping does not increase, conservation measures must be adequate. It must be emphasized, however, that this is only a survey of the conditions existing to-day and a great deal of work must be done on the population dynamics, and a closer study of the effects of the particular physical forces mentioned must be made. It is hoped that through the auspices of the Anglo-Icelandic Field Research Group, and with the help of our colleagues in Iceland, there will be many facilities for future workers.

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