

### Local Conditions and Landscape

Breiðafjörður is an extensive and shallow bay on the west coast of Iceland, between the Snæfellsnes peninsula and the West Fjords, approximately 125 km long and 50 km wide. The bay is surrounded by a jagged coastline and mountains. Lowlands are limited and are found almost exclusively along the coastline. A few villages are found around the bay. The largest ones are situated on the south side of the bay. These are, respectively from east to west: Búðardalur, Stykkishólmur, Grundarfjörður, Ólafsvík, Rif and Helliðsandur. The most prominent feature of Breiðafjörður is the abundance of islands, islets and skerries, which seem countless. Nevertheless, their number has been estimated to

### Photos

Looking over the islands at the mouth of the fjord Hvammsfjörður, with Rifgirðingar closest. The islands in Breiðafjörður seem countless but their number has been estimated to be close to 2,500. The islands form a bottleneck at the mouth of Hvammsfjörður, causing strong tidal currents, which make the area unsuitable for boating by those unfamiliar with the area.

Basalt columns on Vaðsteinabjarg, Hergilsey, on the north part of Breiðafjörður. The island is in the periphery of a central volcano, named after Flatey.

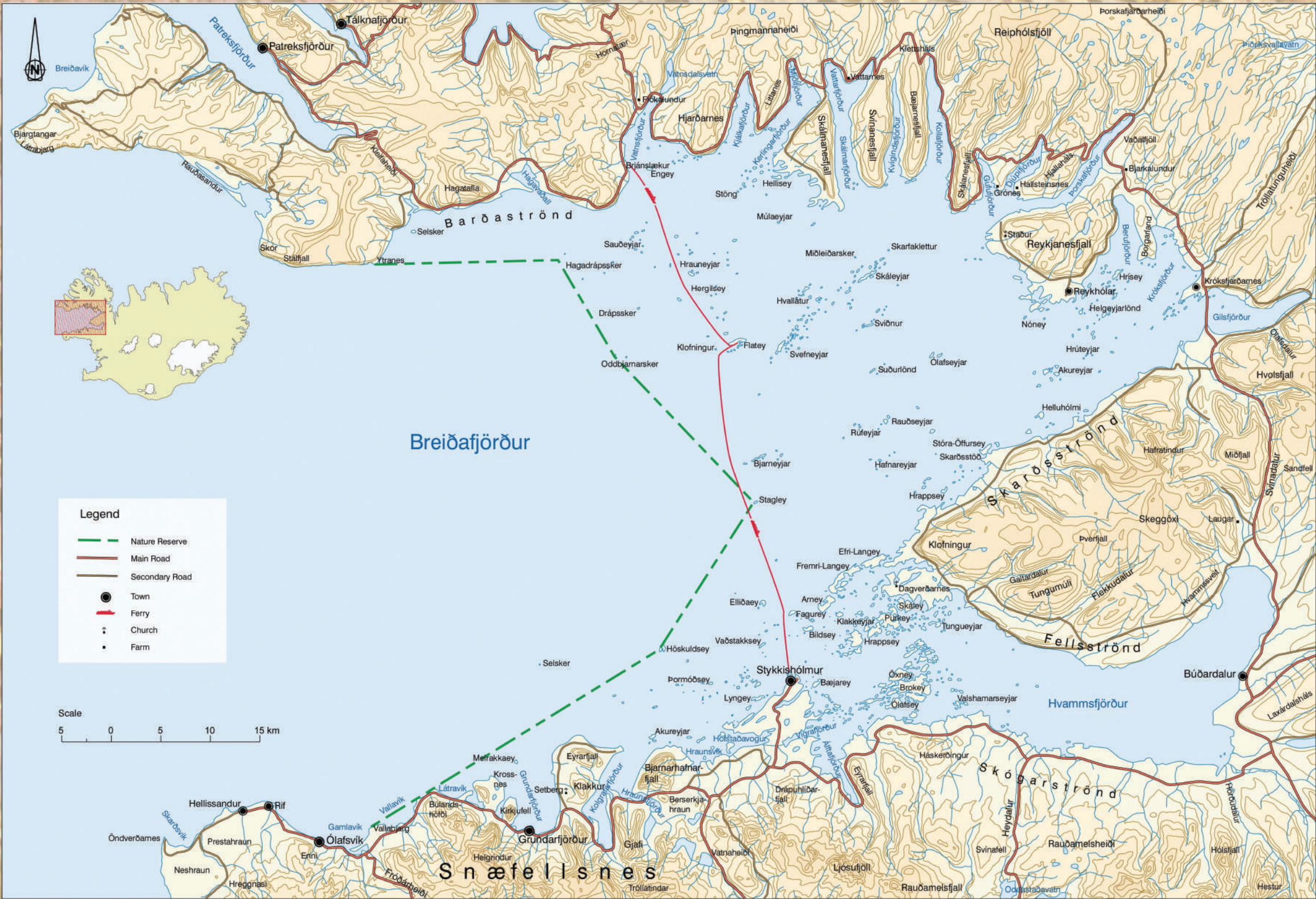
be close to 2,500 — a number that only includes those that are not submerged during spring tide and where some vegetation of terrestrial origin is found. In some parts of the bay, the difference between high and low tide is up to six metres during an average spring tide, which is more than is found anywhere else around Iceland. Because of the tides and extensive shallows, around a quarter of Icelandic littoral areas (shores) are found in Breiðafjörður. In some areas, sea level changes drastically transform the landscape.

When it comes to wildlife, geology and landscape, the nature of the area is especially diverse and rich, but the area is also known for the unique utilization of nature by the inhabitants and the cultural remains associated with it.

Puffins are the most numerous birds in Breiðafjörður during summer. Colonies can hold up to tens of thousands of puffins, but the colonies are rarely found close to inhabited areas.

**Front page:** Shags and kittiwakes on basalt columns. Almost all Icelandic shags nest in Breiðafjörður as do approximately 90% of cormorants. The kittiwake is among the most common bird species in Iceland.

**Back page:** The sunset in Breiðafjörður is renowned for its beauty. The Klakkeyjar islands (top right), at the mouth of Hvammsfjörður, are the highest islands in the bay (72 m).



### Geology and Landscape Formation

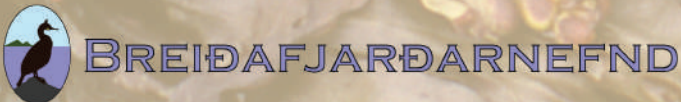
The bedrock of the Breiðafjörður area is 6-12 million years old and belongs to the Tertiary basalt formation. The bedrock was built up by volcanic activity connected to a former drift zone, the Snæfellsnes volcanic zone. About 6 million years ago, the volcanic activity shifted east towards the former Reykjanes-Langjökull volcanic zone. The youngest part of the bedrock in the Breiðafjörður area is located in the southeastern region, near the fjord Hvammsfjörður, closest to the former

volcanic zone. The oldest bedrock is located in the northwestern part of the fjord. The bedrock is mainly composed of layers of basalt lava, dipping southeast towards the former volcanic drift zone. The volcanic activity in a drift zone is associated with eruptive fissures and central volcanoes. Several ancient central volcanoes can be found in the area, such as in Reiphólsfjöll, Króksfjörður, Flatey, Hrappey, near Hvammur, and at Setberg. The island Hrappey is the only place in Iceland where anorthosite, one of the two main rock types on the Moon, can be found.

During the last ice age, which ended around 10,000 years ago, most of Breiðafjörður was covered

with ice. Glacial erosion sculptured most of the landscape we see in Breiðafjörður today.

Geothermal activity occurs in many places in the littoral zone and below sea level in Breiðafjörður. The largest hot spring is located on a small island close to Hergilsey, and spouts 10 litres per second. Some of the hot springs have a temperature close to the boiling point. The historic hot spring in the old fishing station on Oddbjarnarsker has a temperature of 73°C. However, the hot spring only emerges at low tide.



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### ***Vegetation and Wildlife***

Breiðafjörður is known for its unusually rich and diverse wildlife — partly because the diversity of habitats, both in the littoral zone and on the sea floor, is greater than elsewhere around Iceland. The bay contains great kelp forests and an abundance of small creatures. Much of the richness of the bay can be explained by the vast areas of shallow water and extensive shores. Breiðafjörður encompasses around 65% of all rocky coasts and about 40% of mudflats in Iceland. The bay is also an important breeding area for many economically important species, including cod, shrimp, Iceland scallop and lumpfish. The ecosystem of Breiðafjörður is important on a national and international scale, including for its birdlife.

### **Vegetation**

Only 1-2% of the islands in Breiðafjörður have been botanically surveyed, but around 230 species have been recorded, which is roughly half of the natural Icelandic flora. The vegetation can be diverse, but is influenced by various physical factors: island size, distance from the mainland, landscape, groundwater and soil. Some of the islands are very fertile, while others are rather barren. Grassy moors and salt marshes are amongst the most frequent types of habitats, but hay-

fields can also be found on some islands. Two species close to extinction in Icelandic nature are found in the area: lesser sea-spurrey and the lichen *Umbilicaria hirsuta*. Other species, which are rare in Iceland, are field garlic, club sedge, sea milkwort, Arctic poppy, burnet rose and common twayblade.

### ***Photos***

The wildlife of Breiðafjörður is not only unusually rich but diverse as well, especially in the littoral zone. Around 65% of Icelandic rocky shores are by the bay.

Sea sandwort is conspicuous in some places along the shore. About half of Icelandic vascular plant species have been recorded on the islands of Breiðafjörður.

A juvenile white-tailed eagle. The stronghold of the eagle population is in Breiðafjörður, where 70% of Icelandic eagles reside.

The harbour seal is one of two seal species breeding in Breiðafjörður. Around 20% of the Icelandic harbour seal population resides there.

### **Birds**

Breiðafjörður is one of the most important bird areas in Iceland. Of 75 bird species breeding in Iceland, 37 breed regularly in the area, but a few more species breed irregularly. Seabirds characterize birdlife here, with puffin and eider duck as the most numerous species. Fulmar, cormorant, shag, kittiwake, glaucous gull, black-backed gull, Arctic tern and black guillemot are also very prominent, whereas greylag goose, mallard, oystercatcher, ringed plover, redshank, common snipe, meadow pipit, white wagtail, and snow bunting are only fairly common in the area. Grey phalarope and white-tailed eagle, which are rare in Iceland, can also be found.

Almost the entire Icelandic shag population nests in Breiðafjörður, as well as about 90% of cormorants. This area is also the most important one for the white-tailed eagle, where 70% of Icelandic eagle pairs have their territories. Even though Iceland is on the southern range limit for the grey phalarope, a few pairs nest in Breiðafjörður.

Beyond Breiðafjörður being important for breeding birds, large flocks of Brent geese, turnstones and knots use the area as feeding stops on their way to and from their breeding grounds in Greenland and Canada. Furthermore, flocks of greylag geese and whooper swans moult in the area during late summer.

### **Mammals**

Seals are common in Breiðafjörður and are an important part of its wildlife. Both of the Icelandic seal species breed in the area, and it has been estimated that 15-20% of the harbour seal population and around half of the grey seal population reside there.

Whales are frequent, but smaller cetaceans such as porpoise and white-beaked dolphin are the most common. Killer whales and minke whales can also frequently be seen in the outer part of the bay. Of 20 whale species seen around Iceland, 9 have been reported in Breiðafjörður.

Terrestrial mammals in the area are the wood mouse, mink and Arctic fox, but the house mouse is rare. Wood mice can be found almost everywhere on the mainland and on many of the islands, where people or drift ice have carried the animals. The introduced mink first came to the islands in 1948, but had already become fairly common all around Breiðafjörður by the mid-60s. The mink can swim to the islands and has been found on most of them, including Oddbjarnarsker, which is as far away from the mainland as can be in Breiðafjörður. Arctic foxes have not been found denning on the islands, but they often forage on the shores and are therefore rather common around Breiðafjörður.



### ***Land Use and Occupation***

Breiðafjörður has long been an important food source for Icelanders and in earlier times people from other areas often came to Breiðafjörður when food was scarce. The people of Breiðafjörður were generally more prosperous than other Icelanders —their main wealth consisting of products from the local nature. Residents on the islands also held an advantage because transportation by boat was easier than on land before the advent of the car. Because of heavy tidal currents, conditions for sailing often differed greatly from other areas. For example, shipbuilders specifically developed for the area a special type of boat that was characterized by curved forms, lightness and some of the characteristics of ancient Viking ships.

Generally, people of this area possessed more books than other Icelanders. In the eighteenth century, the first book press in Iceland was established in Hrappsey and in the mid-nineteenth century, Flatey had become the centre for trade and culture in Breiðafjörður.

The area is famous for the utilization of nature by the inhabitants. People mostly exploited fish, seals and birds. Fish was the most important food, particularly halibut, lumpfish, cod, haddock and skate. The main fishing stations were on Oddbjarnarsker, Bjarneyjar and Höskuldsey. At the beginning of the eighteenth century, around 300 people resided in the largest fishing station

on Bjarneyjar during the fishing season in spring and autumn.

Seal hunting has long been important for local farmers, although its importance has decreased considerably in the last few decades. Before that time, the meat and blubber were eaten, but the blubber was also rendered down and burnt for a source of light. The skin was used for shoes and clothes.

The utilization of birds can be divided into three categories: bird hunting, egg collecting and down collecting. The species most hunted through the centuries have been guillemot, puffin, kittiwake, black guillemot, black-backed gull, shag and cormorant, but eggs of more spe-

### ***Photos***

The boat *Svanur* in Skáleyjar has a special shape, developed in Breiðafjörður. It was built in Hvallátur in 1907, but restored around 1980 and serves as one of the best examples of the old fishing boats of Breiðafjörður still in use. *Photo: West-Iceland Institute of Natural History*

The old village in Flatey is one of the best-preserved villages in Iceland. The breakwaters on the island are also remarkable.

A female eider on a nest. There is a long tradition for the harvesting of eider down in Breiðafjörður, which is the source of up to a third of Iceland's down production.

The cousins, puffin and black guillemot, are among the characteristic birds of Breiðafjörður.

cies are eaten. Breiðafjörður is very important for the eider down industry and it is estimated that up to one-third of the total eider down production in Iceland comes from this area.

Other exploited wildlife and vegetation include shellfish, especially mussel and Iceland scallop; dulse and other algae collected for food; and whooper swan feathers collected in late summer when the birds moult. The feathers were sold for use as quill pens until the First World War.

Besides the aforementioned utilization of nature, the people of Breiðafjörður have also practised traditional agriculture with sheep and cows. Following the rapid changes in society after the Second World War, island occupation was no longer so popular. Now, only two islands, Flatey and Skáleyjar, are occupied all year round, although many more are utilized.

Agriculture and the fishing industry are still very important for the Breiðafjörður area, but there has been a considerable development of tourism, thanks to a diverse range of outdoor activities. One can, for example, go on a whale-watching tour from Ólafsvík or take a nature cruise from Stykkishólmur around the islands in the mouth of Hvammsfjörður. And there are diverse opportunities for hiking, kayaking and horse riding. Accommodation and restaurants can be found in many places around the bay.

Flatey is the island that draws the highest number of tourists. One reason is that the ferry Baldur, which

crosses Breiðafjörður from Stykkishólmur to Brjánslækur, always stops at Flatey. Flatey also contains one of the best-preserved villages in Iceland and has an unusually interesting history. A monastery was on the island from 1172, whereas *Flateyjarbók* (The Book of Flatey) — an important script about the kings of Norway in the Middle Ages — was kept on the island for some time.

### **Conservation**

A special law on the protection of Breiðafjörður was established in 1995. The purpose of the law was to contribute to the conservation of Breiðafjörður — especially landscape, geology, wildlife and cultural remains. The law's provisions comprise all islands, islets and skerries in Breiðafjörður along with the shores in the inner part of the bay. The area is marked by a line drawn from Ytranes on Barðaströnd, on the north coast of the bay, to Hagdrápssker and then through Oddbjarnarsker, Stagley and Höskuldsey to Vallabjarg on the south side of the bay. The conservation order is supervised by the Minister for the Environment, but the Minister has the Breiðafjörður Committee as advisors. The committee has made a conservation plan for the area, in which it is stated how the objectives of the law should be attained.

Breiðafjörður is on a list of Nordic coastal areas where conservation is considered important. It is also on a European list of 32 marine areas in which it is considered both appropriate and desirable to study biodiversity.