
A mix of rooted vascular aquatic plants, potamogeton species, Canadian pondweed and hornwort species (seen in this image) stabilises the lakebed of Slåensø, provides oxygen through photosyntesis, and constitutes a physical habitat for fishes, amphibeans and insects.


Picturesque setting of Slåensø, which is located in the Lake Highland region of Jutland

# Denmark's Slåensø: Freshwater Diving

Text by Peter Symes. Photos by Peter Symes and René B. Nielsen

**Approximately right in the centre of Jutland, the western peninsular part of the realm, there is a region called Søhøjlandet, which translates to "The Lake Highland." It is a sparsely populated and largely forested area with many lakes, a large part of which make up a reserve.**

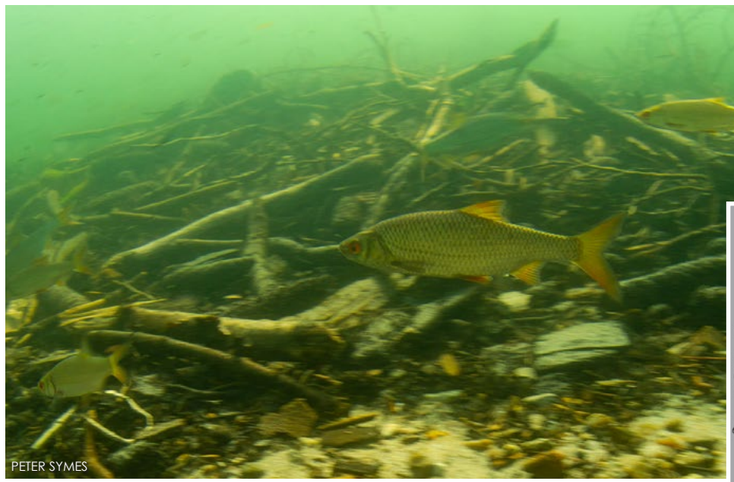
Denoting it as a highland is a bit of an embellishment, causing some Scandinavian brethren in Norway and Sweden, who have real mountains in their outback, to scoff. Afterall, the highest "peaks" are only about 150m above sea level. However, in Denmark, which is otherwise largely flat and predominately farmland, it stands out—and for good reason. It is picturesque!

Generously scattered among rolling hills, which are draped in forest or heath, are plenty of freshwater lakes and they are among the cleanest and clearest in the country.

Somewhat tucked away inside the hilly terrain of the Sønderskov wood, we find Slåensø. It is the cleanest lake in the country and its water is drinkable, as the local tourism office likes to point out. The only inflow to the lake comes from a few springs in the southern end, and since it is in a forest and a good distance from farmland where there is run-off from agriculture (which can leach into the lake), no pollutants can get into it.

The springs also give the lake its name. The Danish term "sø" means "lake," so Slåensø means Slåen Lake. Originally, it was called Slaugen Sø, and the term "slaugen" comes from the Old Norse term "slagna," meaning "springs."

The lake, which is about one kilometre long and 275m at its widest point, is also known for it is high biodiversity of fish, insects, reptiles, amphibians, plants and more. In particular, it is known for its rich and varied aquatic flora. It is one of the only locations in the country where you can find all the species of aquatic vascular plants in Denmark, of which there are some 70 to 80, depending on which source you consult.




Roach (*Rutilus rutilus*) mostly inhabit freshwater ecosystems that are somewhat vegetated, because its larvae and young fish are protected by the vegetation and the mature fish can use it for food.

Slåensø


*Potamogeton natans*, commonly known as broad-leaved pondweed, produces both floating and submersed leaves on the same plant (see first image in this article).

## About vascular plants

A vascular plant is any one of a number of plants with specialized vascular tissue. The two types of vascular tissue, xylem and phloem, are responsible for moving water, minerals, and the products of photosynthesis throughout the plant.

This sets them apart from kelp, which we encounter in saltwater. Kelp is large brown algae, and what appears to be its roots are holdfasts, which lock onto substrates made of rock, or cobble.

Although it functions in this way like a root, a holdfast does not absorb nutrients, and kelp has no vascular tissue.


Eurasian watermilfoil (*Myriophyllum spicatum*) has slender stems up to 250cm long.


Gotcha! Grass snake (*Natrix natrix*) captures a common frog (*Rana temporaria*), which is having a really bad day.

Vascular plants play a crucial role in freshwater lake ecosystems by transporting oxygen from photosynthesis to their roots, where it diffuses into the sediment or lakebed. This oxygen has two important effects. Firstly, it enables aerobic decay of organic matter, which sinks to the bottom, by microorganisms that use oxygen in their metabolism. By contrast, anaerobic breakdown is what we see in oxygen-depleted lakes, where the lakebed is smothered in thick layers of black loose sediment, which releases bubbles of "swamp gas" that smells like rotten eggs when you poke a stick in it. The unpleasant smell comes from hydrogen sulphide, which is a by-product of anaerobic metabolism.

The vascular plants not only sustain aerobic breakdown but also oxidise the top layer of the lakebed, creating a crust-like layer, which seals off any underlying composing matter and prevents the breakdown of this layer from consuming oxygen in the water column. The images in this article show how the lakebed is brown and firm, and not black and loose.

## Habitat

The plants also create a habitat and hiding places for fish and their fry, as well as aquatic insects. Here, we can also find amphibians and reptiles, both of which are threatened and protected. It was probably pure serendipity, but on my latest photoshoot, a grass snake (*Natrix natrix*), also known as a water snake, caught a frog right before my very eyes. The grass snake is a Eurasian non-venomous colubrid snake that feeds almost exclusively on amphibians.

Along the banks there are patches of water lily and potamogeton species, which are rooted in the lakebed, with leaves and flowers floating on or emergent from the surface.

Water lilies are rhizomatous herbs. A rhizome is a modified subterranean plant stem, which runs underground horizontally, sending out roots and shoots from its nodes. Rhizomes are also called creeping rootstalks, or just rootstalks, and they are high in starch.

Of potamogeton, there are about a dozen species in sizes ranging from large (stems of 6m or more) to very small (less than 10cm). The predominant and most recognisable is floating pondweed, *Potamogeton natans*. However, many of these species are difficult to tell apart, and their tendency to hybridise does not make a botanist's life any easier.

## Pondweed & hornwort

Among the stems of lilypads and potamogeton, we can find clusters or mats of Canadian pondweed and hornwort, both of which are invasive species.

Canadian pondweed (*Elodea canadensis*) is a popular aquarium plant. It came to Europe, allegedly via a load of timber imported to the United Kingdom from Canada around 1836, and in a little over a century, it has managed to spread over the entire European continent.


Water lilies do not have surface leaves (lily pads) during winter but set new shoots from a perennial rhizome in the lakebed.


European perch (*Perca fluviatilis*) is a predatory species.


PETER SYMES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A tuft of hornwort (*Ceratophyllum sp.*) among roots and stones (above); Bogbean (*Menyanthes trifoliata*) sometimes creates big quagmires with its thick roots. It has a characteristically strong and bitter taste, which can be used in akvavit, also known as snaps (left).


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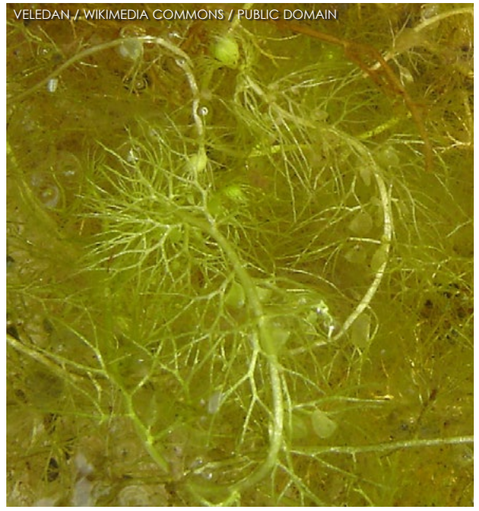
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An intriguing species is common bladderwort, *Utricularia vulgaris,* which is a free-floating plant that does not put down roots. It sets delicate yellow flowers, which bely the fact that the plant is carnivorous. It catches small organisms with its tiny bladder-like traps, which appear as small nodules among the finely pinnately-divided leaves. Triggered by protruding hairs on the door, the trap bladders open in about 0.5 milliseconds, sucking the animal in, and closing in about 2.5 milliseconds, operating at speeds that rank among the fastest plant movements known.

Aahhhh! It is nice with some peace and quiet. One thing is for sure, one will not get blown out in this spot (top left).

Hornworts, *Ceratophyllum sp.*, have stems that reach lengths of 1 to 3m (3 to 10ft), with numerous side shoots making a single specimen appear as a large, bushy mass. It grows completely submerged but can often be found floating on the surface in dense mats. The plants have no roots at all, but sometimes they develop modified leaves with a rootlike appearance, which anchor the plant to the bottom.

## Fish

Pike (*Esox lucius*) has a very typical hunting behaviour. It lurks, perfectly still among the foliage. Before striking, it bends its body and darts out to the prey, catching its prey sideways in the mouth.


RENÉ B. NIELSEN

Pike lurking in the vegetation. They are typical ambush predators, lying in wait for prey.


RENÉ B. NIELSEN

A canopy of lily pads against the canapy of the surrounding forest


PETER SYMES

The best point of entry is at the eastern end where there is a short path leading down to the lake from the parking lot. Here, there is also a ledge on which to sit while kitting up. A trolley can come in handy to get the equipment back and forth to a car. Otherwise, just walk twice. Carrying both tanks and lead can be heavy. Boats of any kind, including inflatables, are not allowed!

Fish species (not depicted here) frequently encountered in the lake include the common bleak, brown trout, pike and common rudd. The bleak (*Alburnus alburnus*), a small freshwater coarse fish of the cyprinid family, lives in great schools and feeds on small molluscs, insects that fall into the water, insect larvae, worms, small shellfish and plant detritus. Brown trout (*Salmo trutta*) feeds on several animal prey species, with aquatic invertebrates being the most abundant prey items. The common rudd (*Scardinius erythrophthalmus*) prefer clear waters rich in plants feed and hunt for living prey in the upper levels but also feed on aquatic vegetation when the temperature exceeds 18°C. ■



# The Bubbling Reefs

East of Denmark's northern tip, and a short trip with a small ferry from the town of Frederikshavn, we find a small group of picturesque islands called Hirsholmene (*holm* means *islet* in Danish). They are surrounded by a shallow archipelago that has been declared a sanctuary, which covers about 2,400 hectares. The islets themselves are just about 45 hectares altogether and a popular day-trip destination for leisure boaters. For divers, it is in the surrounding waters where we find perhaps the most intriguing dive spot in the country: the Bubbling Reefs.

## Methane

The bubbles, which seem to fizz out of some sandstone poles and archers that stick right out of the otherwise flat sandy bottom surrounding them, are methane that stems from ancient subterranean deposits of organic material being decomposed by microorganisms.

This is natural gas that is being produced and released through channels in the seabed. Denmark is the only place on earth where active bubbling reefs are found at shallow depths. In fact, the bubbling reefs around Hirsholmene can be found at depths of only 9 to 12m.

## Sandstone structures

The striking structures, which come in the shape of both telegraph poles and intricate arches, are made of sandstone created by bacterial activity.

Microorganisms, which utilise the seeping methane as a source of energy, excrete compounds that fuse grains of sand into a solid structure, hard as concrete, which forms along the underground channels of seeping gas as it makes its way up through the seabed.

Once the sand shifts with changing currents, as they do over time, these solid structures get exposed and are left standing free and erect above the surrounding seabed. Soon they become covered with an assortment of kelp, sponges, anemones and other sessile life. In turn, this forms a habitat for fishes and crustaceans.


Unique Dive Site

The Bubbling Reefs

The Bubbling Reefs article was published in Issue#23. Click on the cover above to go to the article.

## Getting there

The islets and reefs are close enough to the shore of Jutland for a RIB to be launched from the beach or one of the marinas. ■