

## Luronium – 2022



### 2.1. Latinsk navn (Latin name)

*Luronium natans* (L.) Rafin.

### 2.2 Rødlistestatus (red list status)

Sterkt truet - Endangered (EN)

### 2.3 Utbredelse (spreading/place)

*Luronium natans* is an European endemic. It occurs in Western and Central Europe, southern part of Scandinavia, in the range of the Atlantic and Subatlantic climate. The Oslo populations seems to be the northernmost in the whole range (and the only natural sites in Norway). The main range of distribution of this plant is Western and Central Europe, including Poland.

### 2.4 Lokalteter i Norge (locations in Norway)

In Norway *Luronium natans* is known from 5 lakes in Oslo municipality where their occurrence were noticed during last 100 years. Information about *Luronium* in “Kinnhalvøya i Brunlanes, Larvik i Vestfold” was based on the false identification of the species. The location of Opegård given in 1999 is not confirmed and “Roppestaddammen” from Fredrikstad was implanted.

#### 2.4.1. Lokalteter i Oslo (locations in Oslo)

##### 5 known locations:

- Alunsøen, Breisjøen, Dausjøen, Maridalsvannet, Svartkulp.

#### 2.4.2. Location in Fredrikstad – Roppestaddammen.

Information on the occurrence of *Luronium* in two small ponds at **Krutthuset i Skar** was also checked - **no *Luronium* was found.**

**Sognsvann** and nearby **Svartkulp** were also tested **negative.**

## ***Luronium natans* growth forms and Methodology.**

According to the English botanical literature, *Luronium natans* has two distinct forms: *submersum* - with submerged linear-lanceolate leaves, which are flat and only grow in water, and *repens* - with “expanded” leaves. Expanded leaves have petioles and blades, and may float or be submerged (WILLBY & EATON 1993, LANSDOWN & WADE 2003). Thus, the division line is between forms having only submerged leaves and forms having both submerged and expanded floating leaves. Forms growing on the not flooded, exposed substrate, are not described in details.

In turn, in Polish botanical literature (f.e. SZMEJA 2001) there are described two forms either. The division line is between submerged plants (even they have expanded floating leaves) and terrestrial forms. The latter grow on the exposed substrate, not in the water, and they have aerial ovate leaves, sometimes with remnants of a rosette of submerged leaves. However, the causes of variation in growth form are apparently environmental rather than genetic, and these forms are not consistent.

So, we distinguish three forms for the purposes of this study - it makes it easier to inventory *Luronium* in the field and better shows the diversity of the population of this plant in the area of research although these forms are often a continuum in space or in time:

(i) **Submerge vegetative form** - completely submerged form with rosettes of linear-lanceolate leaves connected with white or green stolons but without “expanded” floating leaves. It occurs in deeper water – one to several meters.

(ii) **Form with floating leaves\*** - form with submerged leaves rosettes, stolons and with “expanded” floating leaves (elliptical to ovate, on long petioles which grow out of underwater leaves rosette); white flowers (~1 cm of diameter) occur on the water surface (on long pedunculates); forms grow in not very deep water, usually up to 1 m depth.

\*I decided to shorten the name of the "**Submerge form with floating leaves**" category by removing the term "**submerge**". It is more correct in the light of the hydrobotany definition. A plant with some organs on the surface of the water is no longer strictly "submerge".

(iii) **Terrestrial form** - with “expanded” aerial leaves, elliptical to ovate shape, on short petioles, sometimes with white flowers; they occur on exposed muddy bottom or in not very deep water (up to several centimeters).

**In 2022, observations of *Luronium* were carried out only from the surface of the water (no diving). In Alunsjøen, Breisjøen, Dausjøen and Svartkulp, observations were made using a pontoon and an underwater observation tube (vattenkikare) and in Maridalsvannet only from the shore.**

**This method of observation only gives the opportunity to examine shallow-growing plants (depending on water transparency max. 0.5 - 1.5 m)**

**Location: 1. DAUSJØEN**

**Individuals:** Very abundant, sometimes as many as 200 (500 – 700)\* individuals / 1m<sup>2</sup>. If we estimate as average: 30 individuals /m<sup>2</sup> x 20223 m<sup>2</sup> = **606 690 individuals** (for 200 individuals / 1m<sup>2</sup> = over 4 millions! Individuals).

\* Under favorable conditions, *Luronium* can produce a lot of progeny plants growing on the stolons during the season. Then their number, together with progeny plants, may reach 500 - 700 pcs. / m<sup>2</sup>

**Area:** Sum = 20223 m<sup>2</sup>. (The size of set surfaces - see map 1. And data from 2018 report.)

In summer of 2018 we discovered (by diving) the area which is covered by submerge vegetative form of *Luronium*. Appears that it makes up 87% of the entire population in Dausjøen.

This year surface observations confirm estimation that *Luronium* is present on ca. 70% of the lake shoreline.

**Environment (habitat):** Lake with stable (not regulated by dam) water level. Plants which are growing on the depths between 10 -100 cm, usually with floating leaves and flowers could be visible from ashore. *Luronium* grows preferably on empty sandy and clayey (mineral) bottom with a thin layer of organic sediment, but also together with: *Lobelia dortmanna*, *Juncus bulbosus*, *Equisetum fluviatile*, *Carex vesicaria*, *Lysimachia thyrsiflora*, *Alisma plantago –aquatica* (rarely), *Nuphar luteum* and in deeper parts with *Isoetes lacustris*, *I. echinospora*.

**Condition:** With the exception of the beginning of summer, the water level in the lake was very low, 30 - 60 cm below the maximum. Water temperature was 18 degrees C and pH 6.5. (24.07). Throughout the summer of 2022 *Luronium* produced virtually no floating leaves or flowers. If only observations were made from the shore, it would be difficult to determine the presence of *Luronium* in this lake. Observations from the pontoon gave the opportunity to see vegetative rosettes, but only to a depth of ca. 0.5 m (low water transparency).

**Care:** I wonder about the influence of feeding ducks (*Anas platyrhynchos*) on the development of *Luronium*, especially its floating leaves and flowers. Often, even a single nesting pair on a small lake eats a lot of soft vegetation available from the surface of the water. Another (possibly) threat is the strong growth of thread algae in some years.

**GPS-coordinates:** 60° 0'31.70"N 10°47'23.08"E

**Date of watch:** 8, 24.07, 5.09.2022

**Photos:** R. Gramsz

**Observer:** R. Gramsz



Photo 1. The shallow part of the N bay at Dausjøen. *Luronium* vegetative rosettes grow densely on the bottom among *Lobelia dortmanna* and *Nuphar luteum*. 24.07.2022.



Photo 2. One of the few places where you can see floating *Luronium* leaves this year. 8.07.2022.



Photo 3. Mallard ducks can eat a lot of soft plants from the surface of the water.



Photo 4. "Clouds" of filamentous algae overgrowing vegetative *Luronium* rosettes. 5.09.2022.

## **Location: 2. BREISJØEN**

This year, the observations were made from the surface of the water (without diving) using a pontoon. This gave the opportunity to review the *Luronium* population in the coastal zone of the entire lake (ca. to a depth of 1.5 m)

**Individuals:** The most abundant population in Norway. In some places can grow as much as 200 individuals/m<sup>2</sup>. Even if we accept as average only 30 individuals / m<sup>2</sup>, we will receive about 1 million individuals.

It is impossible to assess the size of the entire population of *Luronium* by examining only the part of it growing in the shallowest places. But in relation to this shallow zone, which suffered the most during the reconstruction of the dam (more than 50% reduction in the number of individuals) - after this year's observations, I assess the increase in both the number of individuals and the area occupied by them.

**Area:** Due to the lack of detailed data, I estimate that the area occupied by *Luronium* populations is similar to that determined in 2021 - **27,746 m<sup>2</sup>**, which is 73% of the area occupied in 2018.

**Environment (habitat):** This lake has variable water level. Plants can grow both on the expose shore and submerge in water. *Luronium* grows preferably on empty sandy and clayey (mineral or mix mineral-organic) bottom. Observations from 2020 confirmed that the most favorable substrate for *Luronium* is possibly a thick organic-clay layer covered with a thin, liquid organic layer. Such conditions occur on the flat fragments of the bottom. *Luronium* can also grow on underwater rocky shelves and on not very steep slopes if it is covered with a layer of silt. On the depth of water to about 1m *Luronium* grows together with: *Lobelia dortmanna*, *Juncus bulbosus*, *Ranunculus reptans*, *Isoëtes echinospora* (?), *Equisetum fluviatile*, *Carex vesicaria*, *Lysimachia thyrsiflora*. Vegetation at a places deeper than 1.5m is very pure so, it is less competition for *Luronium*. The water in the lake is very transparent which allows the plant to grow to a depth of 4 m.

**Condition:** The maximum water level was maintained in the lake throughout the summer. Temp 20 degrees C, pH 6/6.5 (23.07.)

In many places, at a depth of 20 - 100 cm, where *Luronium* was not found last year, scattered vegetative rosettes have now appeared, and in others they grow more abundantly. *Luronium* continues to grow together with *Glyceria* sp. and *Juncus bulbosus* where these two species have spread more during the reconstruction of the dam. *Luronium* with floating leaves and flowers could be seen in very shallow places (0 - 20 cm), where it died almost completely during the reconstruction of the dam. This may be the result of rooting of drifting plant parts. Plants growing in places deeper than 0.5 m (up to approx. 2 m) produce long inflorescence shoots that branch near the surface. They often do not reach the surface of the water, but they have many flower buds and a few small floating leaves, forming tangled underwater thickets.

**Care:** There are also evident signs of duck feeding - large amounts of debris floating on the surface, mainly *Luronium* and *Juncus bulbosus*. In the spring and early summer, nesting pairs with young nestlings in the lake are feeding. In late summer and autumn, flocks of ducks often come to spend the night and also during this time they intensively forage. Such flocks of ducks arriving at night completely destroyed *Luronium* from dam No. 3 in autumn 2020.

**GPS-Coordinates:** 59°58'47.17"N 10°51'38.11"E

**Date of watch:** 9, 19, 21, 23.07, 5.09.2022

**Photos:** R. Gramsz

**Observer:** R. Gramsz



Photo 1. Plants growing in places deeper than 0.5 m (up to approx. 2 m) produce long inflorescence shoots that branch near the surface. They often do not reach the surface of the water, but they have many flower buds and a few small floating leaves, forming tangled underwater thickets. West bay of Breisjøen. 21.07.2022.



Photo 2. Plant debris torn out by ducks. West bay of Breisjøen. 21.07.2022.



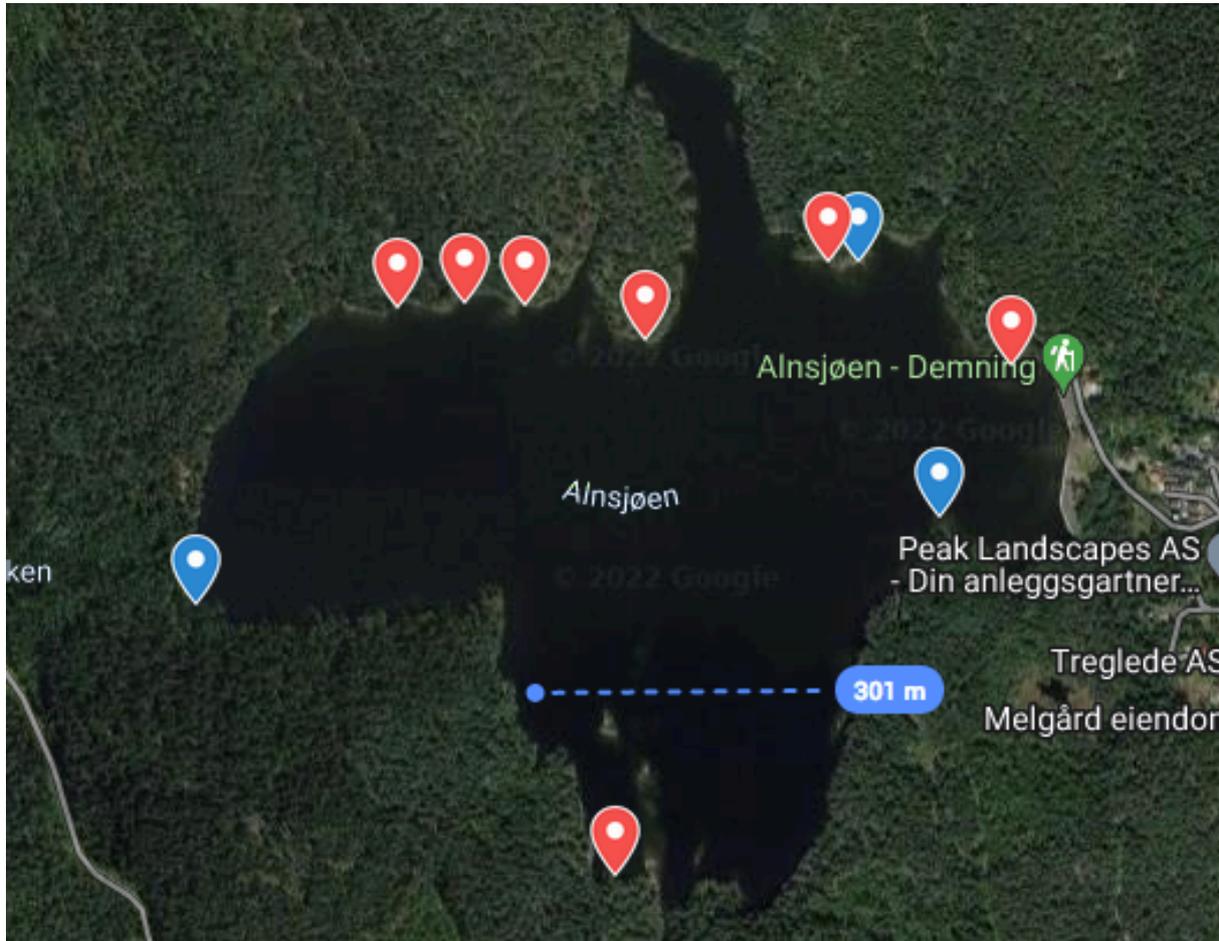
Photo 3. And they are the perpetrators of this destruction 21.07.2022.



Photo 4. Some of the uprooted plants can take root in the shallow coastal zone. 21.07.2022.

### Location: 3. ALUNSJØEN

This year, the observations were made from the surface of the water (without diving) using a pontoon.



Map.1. On the map - Locations of *Luronium natans* in Alunsjøen found in 2022.

- blue points – natural sites
- red points – planted sites

**Individuals:** During the observation, the presence of *Luronium* was confirmed at 2 known natural sites, and two rosettes with floating leaves were found in the southern corner of the western bay of Alunsjøen (in a place where it was not planted in 2019). The presence of single *Luronium* specimens was confirmed only in 7 sites where they were planted. The total number of individuals in Alunsjøen is only a small fraction of what occurs in Breisjøen or Dausjøen. In Alunsjøen we have no more than about **300 individuals** (of which about 200 in natural habitats and less than 100 in places where they were planted) compared to over a million in Breisjøen.

**Area:** Sum = ca. 500m<sup>2</sup>.

**Environment (habitat):** The littoral belt of Alunsjøen is still very pure with vegetation after dam rebuilding in 2007 -2008. In the last 3 years, I have noticed a massive development of *Characeae* algae - *Chara virgata*. In many places of the lake, especially in Mjøservika and

NE part of the lake it covers the bottom on the depth of 0.5 - 2 m. It often forms a compact carpet up to 50 cm thick, which prevents other plants from growing. In a days of observation (and in most of summer) water level was close to maximum. The water in Alunsjøen is very clear and alkaline (this favors the growth of *Characeae*). Near the dam, the pH of the water was measured at 7.5 and the temperature at 22 degrees C. (July 20, 2022). But the water entering Mjøservika from the tunnel connecting to Breisjøen had a pH of 8.0.

**Condition:** Plants were hard to see, they produced few floating leaves and flowers. Only at natural locations plants were better visible.

**Care:**

**GPS-coordinates:** 59°57'57.94"N 10°51'4.54"E

**Date of watch:** 19, 20.07, 5.09.2022

**Photos:** R. Gramsz

**Observer:** R. Gramsz

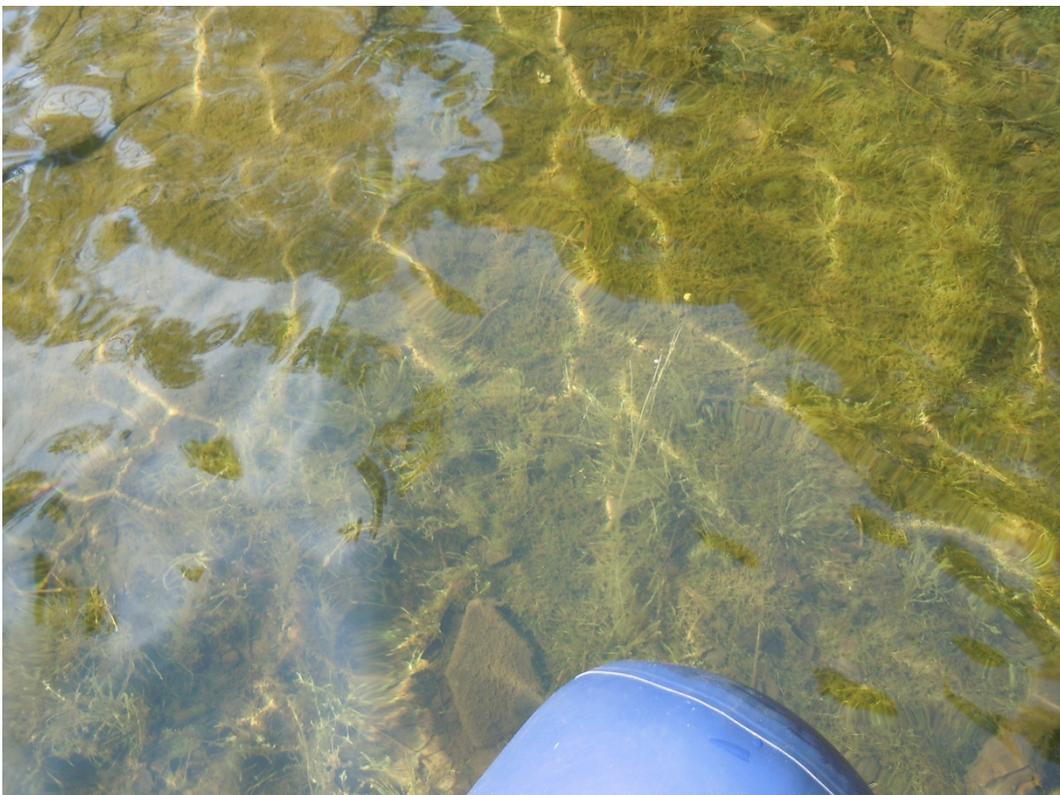


Photo 1. NW shore, ca. 30cm deep, one plant with inflorescence visible and maybe a few vegetative rosettes on the bottom on the planted site. 20.07.2022.



Photo 2. A well-developed concentration of *Luronium* in a natural site. 20.07.2022.



Photo 3. Alunnsjøen. Mjøservika - the bottom of the entire bay is covered with a thick carpet of *Chara virgata*. 20.07.2022

#### Location: 4. SVARTKULP

This year, the observations were made from the surface of the water (without diving) using a pontoon. Such observations, unfortunately, do not give information about plants growing deeper than about 0.5 m (low water transparency). That's why I'm posting a map with data (probably still up to date) taken while diving in the lake.



Map.1. Diving observation of *Luronium* in Svartkulp from the year 2016.

- white marked places - **form with floating leaves** (growing in depth 0 – 0.5m) possible to observation from ashore.
- **red marked places** - **submerge vegetative form** (growing in depth 0.5 – 1.5m, dense concentration) not possible to observation from ashore.
- **yellow marked places** - **submerge vegetative form** (growing in depth 0.5 – 3m, scattered concentration and individual plants) not possible to observation from ashore.

**Individuals:** *Luronium* is not growing so abundant in Svartkulp as in Breisjøen and Dausjøen but after our underwater observation we estimate that it is growing on area of about 1600 m<sup>2</sup>. That means (if we use 10 individuals/1 m<sup>2</sup>) = 16000 individuals.

**Area:** Ca. 1600 m<sup>2</sup> – as found out by diving in year 2016. (With submerge vegetative form)

**Environment (habitat):** This lake has rather stabile water level. Is relatively small and surrounded by forest and high, steep rocks on Eastern side. Western and North - Western shallow shore is overgrown by mire vegetation. *Luronium* plants are growing preferably on empty mix mineral/organic) bottom, but also together with: *Nuphar luteum*, *Potamogeton natans*, *Juncus bulbosus*, *Equisetum fluviatile*, *Carex vesicaria*, *Lysimachia thyrsiflora*.

*Sparganium sp.* Observations with the help of diving discovered the occurrence of single-growing, large rosettes also opposite the muddy western shore.

At the day of observation 23.07 temperature of water was 20<sup>0C</sup> and pH 6.5/7.0. Water was brown and little transparent and its level was 15 cm below the maximum.

**Condition:** This year observations, with use of pontoon and water binoculars (vatenkikare), just like last year could hardly confirm *Luronium* existence only in few places. In shallow places, vegetative rosettes could be seen, but without floating leaves and flowers, deeper flower shoots grew from the rosettes, often strongly branched but not reaching the surface of the water. Some vegetative rosettes were very large - leaves up to 30 cm long.

**Care:** On the surface of the water I did not notice floating leaves and flowers, but there were a lot of *Luronium* debris torn from the bottom floating on the surface. This is again proof of a breeding pair of ducks with young activity. During a visit to the lake on 5.09 however, floating leaves and *Luronium* flowers could be seen in several places.

**GPS-Coordinates:** 59°58'30.95"N 10°50'51.30"E

[Luronium-Svartkulp4](#)

**Date of watch:** 23.07, 5.09.2022.

**Photos:** R. Gramsz **Observer:** R. Gramsz



Photo 1. Vegetative rosettes growing in shallow water without floating leaves or flowers. 23.07.2022.



Photo 2. Duck feeding effect - remains of flower shoots and *Luronium* stolons collected from the water surface... 23.07.2022.

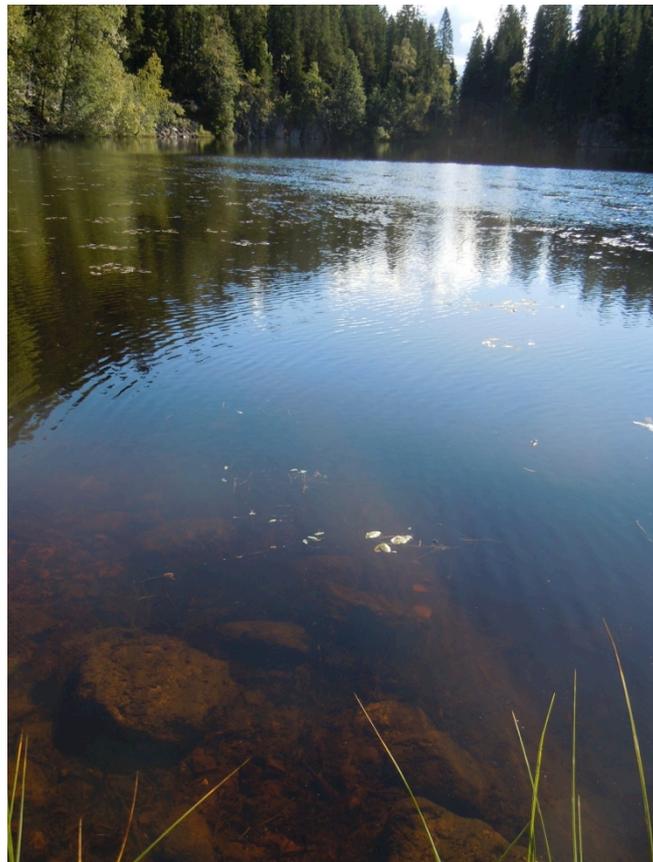


Photo 3. After the breeding season and the presence of ducks on lake *Luronium* at last can make a floating leaves and flowers. 5.09.2022.

## **Location: 5. MARIDALSVANNET**

Observations this year were carried out only from the shore. They confirm the presence of *Luronium* in known places, so I repeat as probable the quantified data collected during the 2018 boat and diving surveys.

**Individuals:** *Luronium* in most places is growing spread, not as dense as it can grow in Breisjøen and Dausjøen. So, if we estimate 20 individuals/m<sup>2</sup> x 29650m<sup>2</sup> = 593 000 individuals. Maximum depth – 2m.

**Area:** Sum = 29650m<sup>2</sup>. (The size of set surfaces - see map 1. And data from year 2018 report.)

**Environment (habitat):** Big lake with variable water level. The spots with *Luronium* we have found at Maridalsvannet are less abundant than in Dausjøen or Breisjøen. Surface of water in the lake can strongly wave because of its size. *Luronium* avoids exposure to waves and it is possible to find it only in sheltered bays, behind rocky spurs or protected against waving by other plants and in places located deeper than 30 cm. Transparency of water is smaller than in Breisjøen and Alunsjøen. Typically, *Luronium* were found at a depth of 30 to 150 cm (max. 2m) from maximum water level. In a slow flowing estuary part of Dausjøelva (during researches in 2018) we have found a few small locations of *Luronium* and some interesting plants like: *Limosella aquatica*; *Subularia aquatica* and other most common plants in Maridalsvannet: *Alisma plantago aquatica*, *Lobelia dortmanna*, *Litorella uniflora*, *Juncus bulbosus*, *Heleocharis acicularis*, *Ranunculus reptans*, *Isoëtes lacustris*, *Equisetum fluviatile*, *Carex vesicaria*, *Lysimachia thyrsoiflora*, *Nuphar luteum*, *Myriophyllum alterniflorum*, *Potamogeton natans*, *Sagittaria sagitifolia*, *Sparganium sp div.*

**Condition:** During the summer of 2022, the water level in Maridalsvannet fluctuated but was below the maximum most of the time. During my 3 visits it was 30 cm, 50 cm and 80 cm lower than the maximum. This situation made it possible to enter and observe *Luronium* on the exposed bottom of the lake. These observations along the N shore of the lake confirmed the occurrence of *Luronium* in places known from earlier studies. Plants that found themselves on the waterless bottom developed terrestrial forms with leaves on stiff petioles, but then a rosette of delicate underwater leaves was lost. Because the water level was changing frequently (also rising for some time), you could observe yellowing, dying land leaves after repeated flooding with water. The plant then continued to produce floating leaves on slender petioles, but revival of submerged leaves was only possible after prolonged water immersion. Few flowers were visible under these changing conditions.

**Care:**

**Date of watch:** 8, 24.07, 5.09.2022

**Photos:** R. Gramsz,

**Observer:** R. Gramsz



Photo 1. Maridalsvannet, location near the outlet of the Dausjøelva. Behind the sedge belt, the land form of *Luronium* is growing. 24.07.2022.

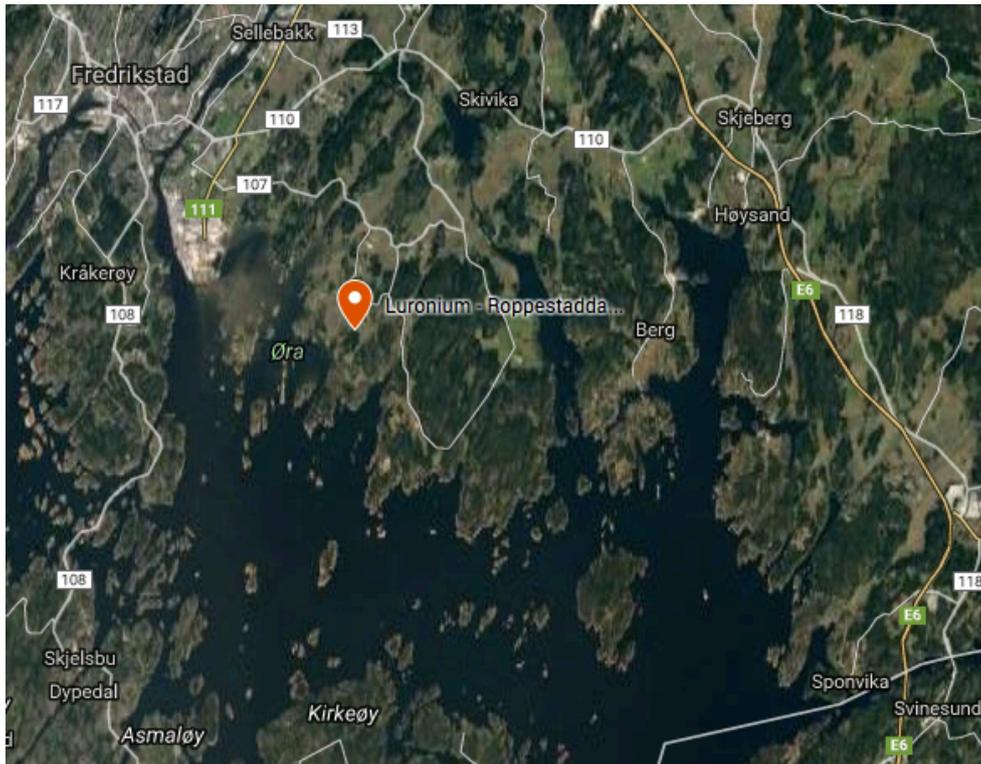


Photo 2. Maridalsvannet, Terrestrial form of *Luronium*. 24.07.2022.



Photo 3. Re-submerged land forms of *Luronium* (among sedges and *Nuphar luteum*) - submerged leaves turn yellow. 5.09.2022

## Location 6: FREDRIKSTSD - ROPPESTADDAMEN



Map 1. General localization of *Luronium* site – Roppestaddamen.

**Individuals:** Still plentiful but diminishing in number.

**Area:** *Luronium* occurs in two small pounds.

- Roppestaddammen with a size ca. 60m x 15m. *Luronium* covers about 20% of the reservoir surface, grows in 2 clusters (10%) and dispersed (10%).
- Roppestadmyra ca. 20m x 40m with *Luronium* growing on at least 20% of it area.

**Environment (habitat):** Both ponds are located on the site of a small, disused granite quarry or close to it. Roppestaddammen fills irregular rock cavity and this place is quite well sunlit. Roppestadmyra has an oval shape and looks as if it was dug in the peat. This pound is surrounded by forest and shaded. Both ponds are not deeper than 1m (Roppestaddamen) and maybe 1.5m (Roppestadmyra).

In Roppestaddamen besides *Luronium natans* is possible to find: *Acorus calamus*, *Baldelia (ranunculoides?)* *Calla palustris*, *Carex acutiformis*, *C. rostrata*, *C. pseudocyperus*, *C. stellulata*, *Comarum palustre*, *Equisetum fluviatile*, *Eriophorum russeolum(!)* *Glyceria fluitans*, *Juncus conglomeratus*, *J. effuses*, *J. ensifolius?* *J. bulbosus*, *Lemna minor*, *Lysimachia vulgaris*, *Menyanthes trifoliata*, *Nymphaea alba*, *Ranunculus flamula*, *R. lingua*, *Utricularia vulgaris*, *U. intermedia*,

In Ropestadmyra: *Luronium natans*, *Carex rostrata*, *C. stellulata*, *Comarum palustre*, *Glyceria fluitans*, *Juncus effusus*, *Nymphaea alba*, *Utricularia sp.div*,

**Condition:** Roppestaddamen 5.07.2022. - pH 4.5/5.0, water temperature 18 degrees C.

During both visits to the ponds, the water level was 20 cm and 40 cm lower than the maximum. *Luronium* was visible over a much smaller area than in previous years. Small amounts of floating leaves and flowers were visible only in the central part of Roppestaddamen. In other places there were rosettes of underwater leaves but very difficult to notice among the *Sphagnum* mosses overgrowing them from the shores and *Utricularia sp.div.*, *Juncus bulbosus* and *Nymphaea alba* overgrowing them in deeper water.

In Roppestadmyra it was difficult to see anything among the densely covering the water with the leaves of *Nymphaea alba*, but closer to the shore there were floating leaves of *Luronium*.

It seems, therefore, that the succession in these ponds leads to the displacement of *Luronium* from this habitat. Very low water underscored these trends this year.

**Care:** *Luronium* was planted in those pounds.

**GPS-coordinates:** 59.1667, 11.02638

**Date of watch:** 9.06, 5.07.2022.

**Photos:** R. Gramsz **Observer:** R. Gramsz



Photo 1. Roppestaddamen, 20 cm lower water level. *Eriophorum russeolum* in the foreground. 9.06.2022.



Photo 2. From the shore, *Luronium* is overgrown with *Sphagnum* mosses. 5.07.2022.



Photo 3. On the water is overgrown by *Utricularia sp. div.*, *Juncus bulbosus*, *Nymphaea alba*. 5.07.2022.



Photo 4. Roppestadmyra. Floating *Luronium* leaves seen at the edge of open pond water.  
5.07.2022.