

Luronium – 2019



2.1. Latinsk navn (Latin name)

Luronium natans (L.) Rafin.

2.2 Rødlistestatus (redlist 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 Oppedgård 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.

***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 this year I focused on protective work - transplanting *Luronium* plants from Breisjøen to Alunsjøen. (* See report to Norsk Naturarv.)

In the other lakes: Dausjøen, Maridalsvannet and Svartkulp observations were carried out as in previous years only from the shore.

Location: 1. DAUSJØEN

Individuals: Very abundant, sometimes as many as 200 individuals / 1m². If we estimate as average: 30 individuals /m² x 20223 m² = **606 690 individuals** (for 200 individuals / 1m² = over 4 millions! Individuals)

Area: Sum = 20223 m². (The size of set surfaces - see map 1. And data from last year report.)

We estimate that *Luronium* is present on ca. 70% of the lake shoreline. The most abundantly it grows in Northern bays of Dausjøen with the exception of very muddy bays and in places where the water is immediately very deep -as along a steep cliff in the southern part. Maximum depth where *Luronium* is growing in Dausjøen – 2,2 m

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. **In summer of 2018 we discovered the area which is covered by submerge vegetative form of *Luronium*. Appears that it makes up 87% of the entire population in Dausjøen.** *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 thyrsoiflora*, *Alisma plantago –aquatica* (rarely), *Nuphar luteum* and in deeper parts with *Isoetes lacustris*, *I. echinospora*.

Condition: Summer 2019 was relatively cold and temperature of water seldom exceeded 20°C. The plants scarcely produce floating leaves and flowers. On the day of observation, despite the 20 cm lower water level, only a few floating leaves and flowers were visible on the water surface and only from plants growing to a depth of 40 cm.

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

Date of watch: 31.07.2019.

Photos: -

Observer: R. Gramsz

Location: 2. BREISJØEN

Individuals: The most abundant population in Norway. In some places can grow as much as 200 individuals/m². After our research, it turned out that *Luronium* is growing on an area of 37 716 m²! Even if we accept as average only 30 individuals / m², we will receive more than 1 million individuals.

Area: Sum = 37716 m². (The size of set surfaces - see map 1. And data from last year report.)

Luronium is present on ca. 70% of the lake shoreline. It does not grow only in shallow, very muddy bays and where the water is immediately very deep and stony.

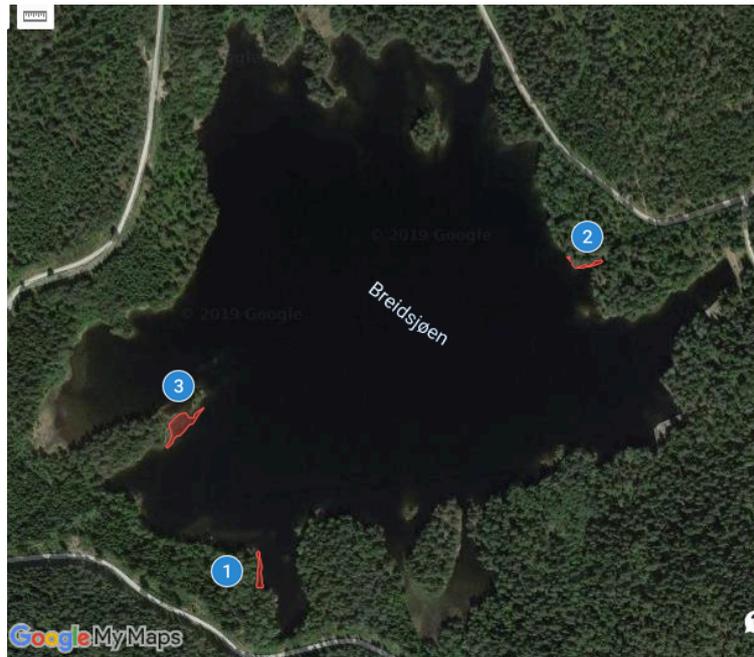
Maximum depth where *Luronium* is growing in Breisjøen – 3,2 m.

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. 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 thyrsoiflora*. 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 3.2 m.

Condition: Summer 2019 was relatively cool and so the water temperature in the lakes did not reach 20°C. It caused that only the shallowest growing (to ca. 20 – 25 cm) *Luronium* plants produced floating leaves and flowers. Several hot days at the end of July rise the water temperature above 20°C and a lowering of the water level by 40 cm caused more rapid growth of floating leaves and flowers from rosettes growing up to 60 cm deep. But plants growing in places shallower than 40 cm remained on a dried bottom. This very quickly caused the rosette of delicate underwater leaves to die off, but for a few days the floating leaves (if they already existed) did not die and the flowers were in excellent condition. If the ground on the exposed shore was sufficiently moist, the plants began to form oval land leaves on stiff ascending petioles.

On the shore, in the accumulation area of organic matter pushed from the lake surface by waves and wind, considerable clusters of small rosettes with land leaves were found. Probably they are clusters of plants germinating from seeds that abundantly grew last summer.

Care: Next year, it is planned to rebuild the dam in the lake and lower the water level by 6.5 m for a period of over 1 year. This can completely destroy the *Luronium* population in Breisjøen as it did 10 years ago in Alunsjøen. To prevent this, over 5000 plants from Breisjøen to Alunsjøen were transplanted this summer. This is to enrich the population in Alunsjøen and to provide for possible security (in replanted plants) if the planned conservation measures in Breisjøen were not successful during the reduced water level. Places from which plants from Breisjøen were taken in this summer are shown on map 1.



Map 1. Places of plants collection from Breisjøen. Marked red.

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

Date of watch: 13.04; 21.06; 19.07 – 8.08; 16.08; 29.08; 10.09.2019

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



Photo 1. New, terrestrial leaves appear after few days of emersion. 3.08.2019.



Photo 2. If the substrate is continuously wet *Luronium* can live as a terrestrial form. 5.08.2019.

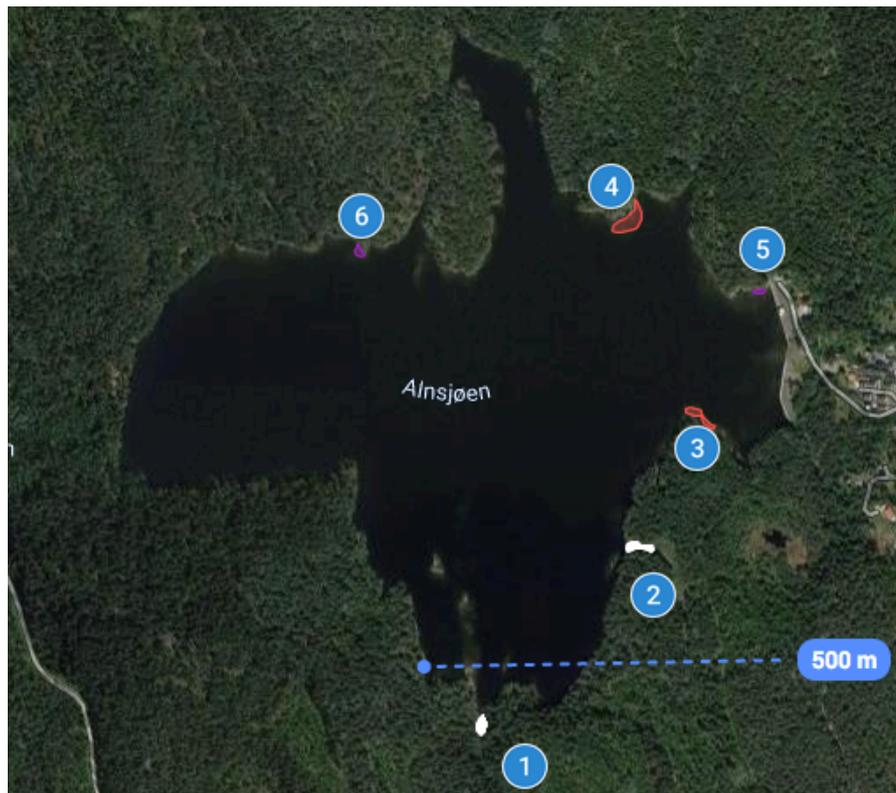


Photo 3. Luxuriantly grown floating leaves and flowers with shoots lying on the lowered water surface. 31.07.2019.



Photo 4. Cluster of young seedlings of *Luronium*. 5.08.2019

Location: 3. ALUNSJØEN



Map.1. On the map - Natural location of *Luronium natans*:

- No 1, 2 – extinct locations observed only in 2008 and 2009
- No 3, 4 – locations observed after 2014 (3) and after 2017 (4)
- No 5, 6 – locations observed in 2019

Individuals: Plants are spread in locations creating one bigger and a dozen or so small concentrations (clusters) with a 100 – 200 as a sum of individuals. On the newfound, small locations there were only about 20 plants (location 5) and just 1 in location 6.

Area: Sum = ca. 600m².

Environment (habitat): The littoral belt of Alunsjøen is still very pure with vegetation after dam rebuilding in 2007 -2008. So, *Luronium* behaves a little as pioneer plant. In a days of observation water level was about 40 cm lower than max.

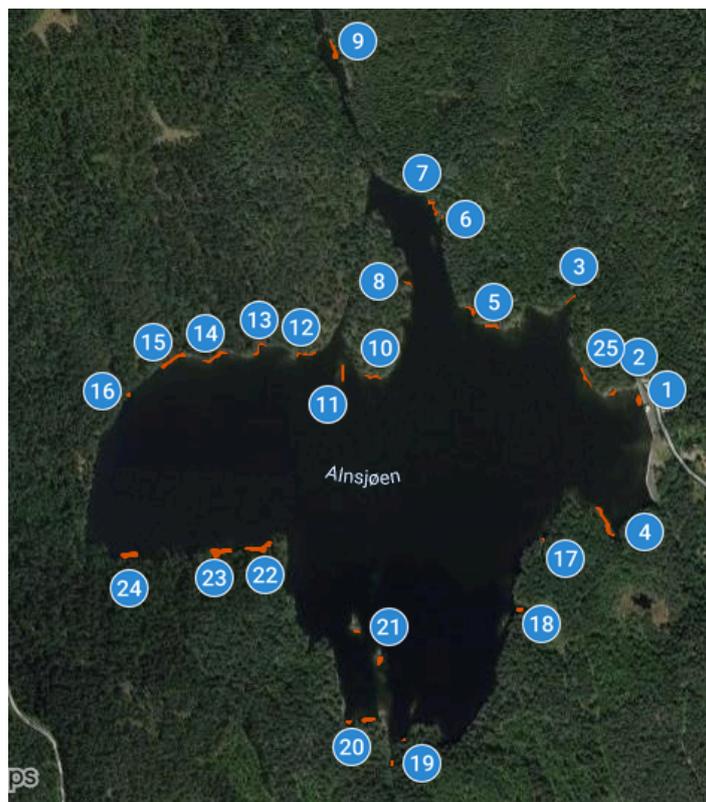
Condition: Plants that grew on the exposed bottom have taken the terrestrial form. The rest of them growing not deeper than 20 -50 cm produced floating leaves and flowers.

Care: Over 5000 plants have ben replanted to 25 locations along all Alunsjøen shore from Breisjøen. Map 2.

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

Date of watch: 19.07 – 8.08; 16.08; 10.09.2019

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



Map 2. Planting places in Alunsjøen along with the numbering of these stands. Planting places are marked in red. More information – “Transplanting *Luronium* plants from Breisjøen to Alunsjøen”. (* See report to Norsk Naturarv.)



Photo 1. At reduced water levels, *Luronium* grows as a terrestrial form. Natural location 4. 3.08.2019.

Location: 4. SVARTKULP



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: This year observations, **only from ashore**, confirm *Luronium* existence (floating leaves) in few places on Northern and Eastern shore. *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 m². That means (if we use 10 individuals/1 m²) = 16000 individuals.

Area: Ca. 1600 m² – 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 mineral (or 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.

Condition: Only a few floating leaves were visible on Northern and Eastern shore. (As usually with observation from ashore.)

Care:

GPS-Coordinates: 59°58'30.95"N 10°50'51.30"E [Luronium-Svartkulp4](#)

Date of watch: 19.07.2019.

Owner:

Photos: -

Observer: R. Gramsz

Location: 5. MARIDALSVANNET

Individuals: *Luronium* in most places is growing spread, not as dense as it can grow in Breisjøen and Dausjøen. So, if we estimate $20 \text{ individuals/m}^2 \times 29650 \text{m}^2 = 593\ 000$ individuals. Maximum depth – 2m.

Area: Sum = 29650m^2 . (The size of set surfaces - see map 1. And data from last year 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 thyrsiflora*, *Nuphar luteum*, *Myriophyllum alterniflorum*, *Potamogeton natans*, *Sagittaria sagitifolia*, *Sparganium sp div.*

Condition: Summer 2019 was relatively cool and so the water temperature in the lake did not reach 20°C. At the days of observation it was maximum level of water. Several well-known on the occurrence of *Luronium* places on the N and W shore of the lake were checked but the floating leaves or flowers were not noticed. It is a typical situation for Maridalsvannet that with maximum water level for most of the summer and relatively cool water *Luronium* very rarely or does not produce floating leaves and flowers at all, so observing plants from the shore is practically impossible. Even in a shallow bay on the W shore of the lake, where last year, when the water level was lowered, there were dense patches of terrestrial form of *Luronium*, no plants could be seen this year. Photo 1.

Care:

Date of watch: 29.07; 31.07.2019.

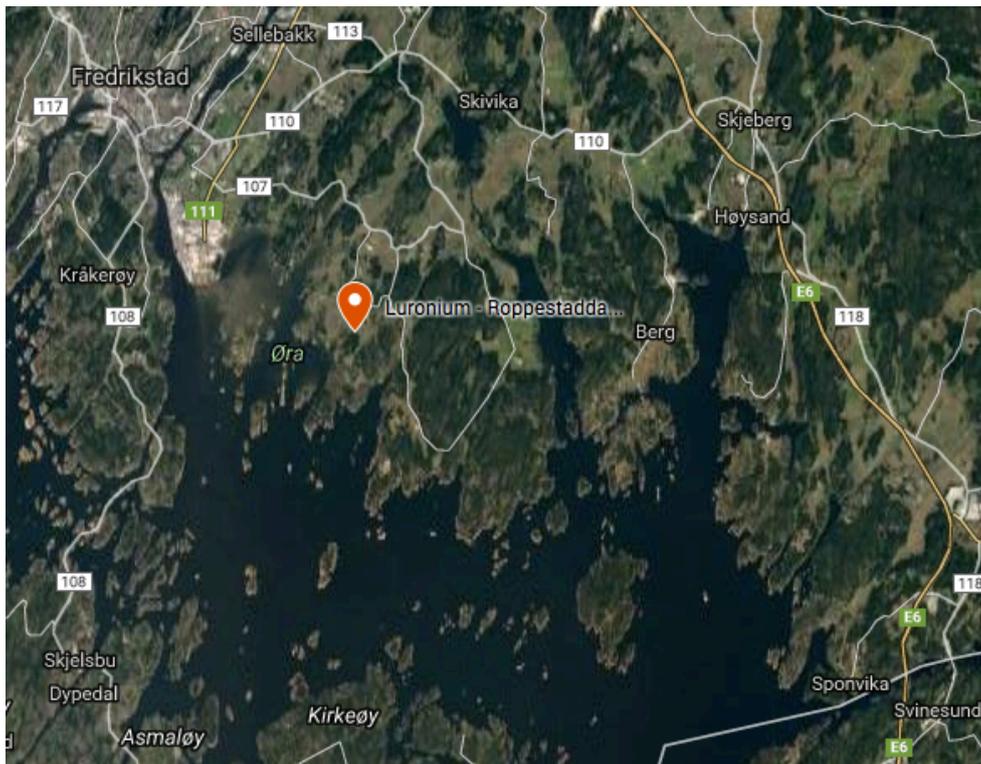
Photos: R. Gramsz,

Observer: R. Gramsz



Photo 1. Place on the Western part of Maridalsvannet where last year, when the water level was lowered, there were dense patches of terrestrial form of *Luronium*. No plants could be seen this year. 29.07.2019.

Location 6: FREDRIKSTSD - ROPPESTADDAMEN



Map. General localization of Luronium site – Roppestaddamen.

Individuals: Very abundant

Area: *Luronium* occurs in two small ponds.

- Roppestaddammen with a size ca. 60m x 15m and *Luronium* is growing on at least 40% of it area.
- Roppestadmyra ca. 20m x 40m with *Luronium* growing on at least 50% of it area in this year (more than estimated in last year).

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 pond 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*, *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: This year observation was taking part late in the summer. At this time *Luronium* was visible on surface of water (floating leaves and flowers) on about 10% of pounds area. Photo 1. Regardless of the competition of other aquatic plants *Luronium* created a compact pieces that concern no less than 30 - 50% of the entire surface of ponds. In this year water level was lower in the beginning of summer and higher at a day of observation. In plants growing to a depth of 20 cm, the floating leaves formed at the beginning of summer probably have disappeared and after re-flooding new ones have not yet formed. In deeper-growing plants a lot of floating leaves were visible - probably survived extending at a lower water level and then together with a new level rose again. Photo 2.

Care: *Luronium* was planted in those pounds.

GPS-coordinates: 59.1667, 11.02638

Date of watch: 27.08.2019

Owner:

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



Photo 1. Roppestaddammen. Not so many floating leaves and flowers of *Luronium* as last years. 27.082019.



Photo 2. *Luronium* with again higher water level. Shallower growing plants have much fewer floating leaves. 27.08.2019.