Luronium – 2016

2.1. Latinsk navn (Latin name)

Luronium natans (L.) Rafin.

Luronium natans growth forms and Metodology.

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 latters 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) **Submerge 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.

(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).

2.2 Rødlistestatus (redlist satus)

Sårbar. (Vulnerable)

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 Lokaliteter i Norge (locations in Norway)

"Flytegro (Luronium natans) vurderes som sårbar (VU) fordi den bare er sikkert dokumentert fra fem små vatn innen to 4-km²-ruter, og fordi antall reproduktive individer fluktuerer sterkt. Flytegro er belagt i de offentlige herbariene fra Ak Oslo: Maridalen: Alnsjøen (1923-1978), Svartkulp (1948-2002), Breisjøen (1949-2002), Dausjøen (1995), og ei vik i Maridalsvatnet (1996-2009). Mye tyder på at den er kommet inn, trolig med fugl, til Alnsjøen tidlig på 1900-tallet og har spredt seg videre derfra. Forekomstene i Nordmarka synes stabile og er pr. idag ikke utsatt for negative påvirkningsfaktorer, men bestandene har store fluktuasjoner. I tillegg er arten rapportert fra Øf Fredrikstad: Roppestaddammen i 2009, men der som innplantet. En rapport fra Ak Oppegård i 1999 er ikke bekreftet, og en fra Vf Larvik bygde på feilbestemt materiale. Flytegro ser ut til å være lite påvirket av den tidligere drikkevannsreguleringen i Breisjøen, og den nåværende i Maridalsvannet. Arten omtales med kart hos Fægri & Danielsen (1996)." - Text from: Norsk_rřdliste_for_arter_2010_pjuZH.pdf

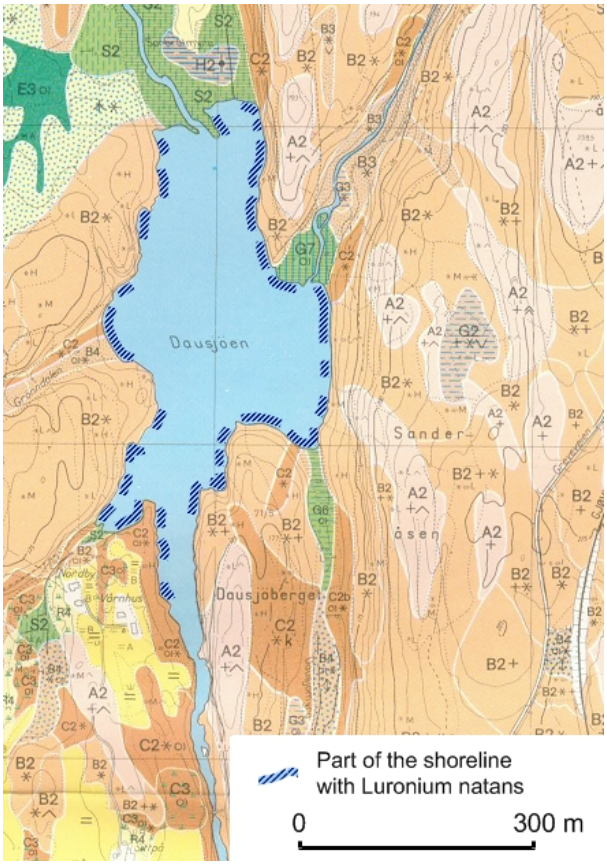
2.4.1. Lokaliteter i Oslo (locations in Oslo)

5 known locations:

- Breisjøen, Dausjøen, Svartkulp, Maridalsvannet – confirmed in this year.
- Alunsøen – not confirmed.

2.4.2. Location in Fredrikstad – Roppestaddammen (new for our observation)

Location: 1. DAUSJØEN



Observations were made from a shore, in eastern part of a lake. Plants could be observed only to the water depth of about 1 m and 3 – 5 m from the shoreline. In a small bay on the SE part of the lake underwater observations were conducted by diving. See map 1.

Individuals: Very abundant, sometimes as many as 200 individuals / 1m^2. If we estimate: 10 individuals /m^2 and 2000 m of shoreline x 3 m wide belt of occurrence = 60 000 (for 200 individuals / 1m^2 = 1 200 000) individuals, or more.

Our diving observations confirm that in this lake exist population of submerge vegetative form which is impossible to detect from ashore. These observations confirmed our suspicions that the *Luronium* population in Dausøen are more numerous than can be seen from the shore.

Area: We estimate that *Luronium* is present on 60 – 70% of the lake shoreline (or more after our diving observation). It grows more often on the Eastern side of the lake with the exception of a steep cliff in the southern part. It does not grow only in shallow, very muddy bays and in places where the water is immediately very deep. See the map.

Environment (habitat): Lake with stable water level. Plants prefer the depths between 10 - 100 cm. At that depth floating leaves can be visible. We still do not know how is distributed submerge vegetative form in the whole lake. *Luronium* grows preferably on empty sandy (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: *Luronium* plants were noticed in many already known places on Eastern shore. Floating leaves could be found only on shallow water – not deeper than 50 cm and there were only few flowers. Submerge vegetative form have been noticed in few chosen places in the same quantity as last years. Our diving observations confirmed the existence of dense concentrations and single *Luronium* plants to a depth of 2.1m. In estuary of Movannsbekken on wet muddy soil terrestrial form of *Luronium* has been notice.

GPS-coordinates: 60° 0'31.70"N 10°47'23.08"E Luronium-Dausjoen1

Date of watch: 5.07; 10.07.2016

Photos: R. Gramsz

Observer: R. Gramsz, Katarzyna Bociąg

Map.1. Diving observation of Luronium in part of Dausjøen limited by blue line.

- white marked places - **submerge form with floating leaves** (growing in depth 0 – 0.5m) possible to observation from ashore (not every year).
- red marked places - **submerge vegetative form** (growing in depth 0.5 – 1m, dense concentration) not possible to observation from ashore.
- yellow marked places **- submerge vegetative form** (growing in depth 0.5 – 2m (max 2.1m), scattered concentration and individual plants) usually not possible to observation from ashore.

Photo 1. Diving observation of Luronium in SE part of Dausjøen. 10.07.2016.

Photo 2. Location of terrestrial form of Luronium in estuary of Movannsbekken. Flooded with 10cm of water on a date of observation. 5.07.2016.

BREISJØEN , ALUNSJØEN, SVARTKULP.

Location: 2. BREISJØEN

Individuals: Very abundant.

Area: *Luronium* is present on ca. 50% of the lake shoreline. It does not grow only in shallow, very muddy bays and where the water is immediately very deep. Also there is lack of *Luronium* close to the dam in Eastern part of a lake. See map. Our diving observations in SW part of the lake confirm existence of submerge vegetative form on quite large area on the mineral bottom to 3m deep. Those locations are impossible to detect from ashore. See map 2.

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 (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 thyrsiflora.* Vegetation at a places deeper than 1.5m is very pure so, if *Luronium* is growing there it has no competition.

Condition: Two forms of *Luronium* were found:

1. **Submerge form with floating leaves** (usually 0.2 – 1m). The highest concentration is observed along water depth of about 0.5 - 1m below maximum. Plants growing at the depth 0.2 -1m very often generate flowers (white, blooming on the surface of water and submerge).
2. **Submerge vegetative form** is growing quite abundant on the depth from 1 – 3m without a competition of other plants.

Terrestrial form of *Luronium* can be seen in this lake (on exposed bottom) during longer periods of low water.

Care: !!! – It will be very interesting to know (if it exists – data from limnigraph) the record of water level changes during as many years as possible.

GPS-Coordinates: 59°58'47.17"N 10°51'38.11"E Luronium-Breisjoen2

(See the map. Map datum (Kartdatum): WGS 84; Position format (Posisjonsformat): UTM UPS) GPS 1: 0603737/ 6650352; GPS 2: 0603700/ 6650374; GPS 3: 0603661/ 6650387; GPS 4: 0603616/ 6650450; GPS 5: 0603672/ 6650527; GPS 6: 0603661/ 6650635

Date of watch: 5.07; 12.07.2016

Photos: R. Gramsz,

Observer: R. Gramsz, Katarzyna Bociąg

Map.2. Diving observation of *Luronium* in part of Breisjøen limited by blue line.

- white marked places - **submerge form with floating leaves** (growing in depth 0.2 – 1m) possible to observation from ashore.
- red marked places - **submerge vegetative form** (growing in depth 1 - 2m, dense concentrations) not possible to observation from ashore.
- yellow marked places **- submerge vegetative form** (growing in depth 1.5 – 3m, scattered concentration and individual plants) not possible to observation from ashore.

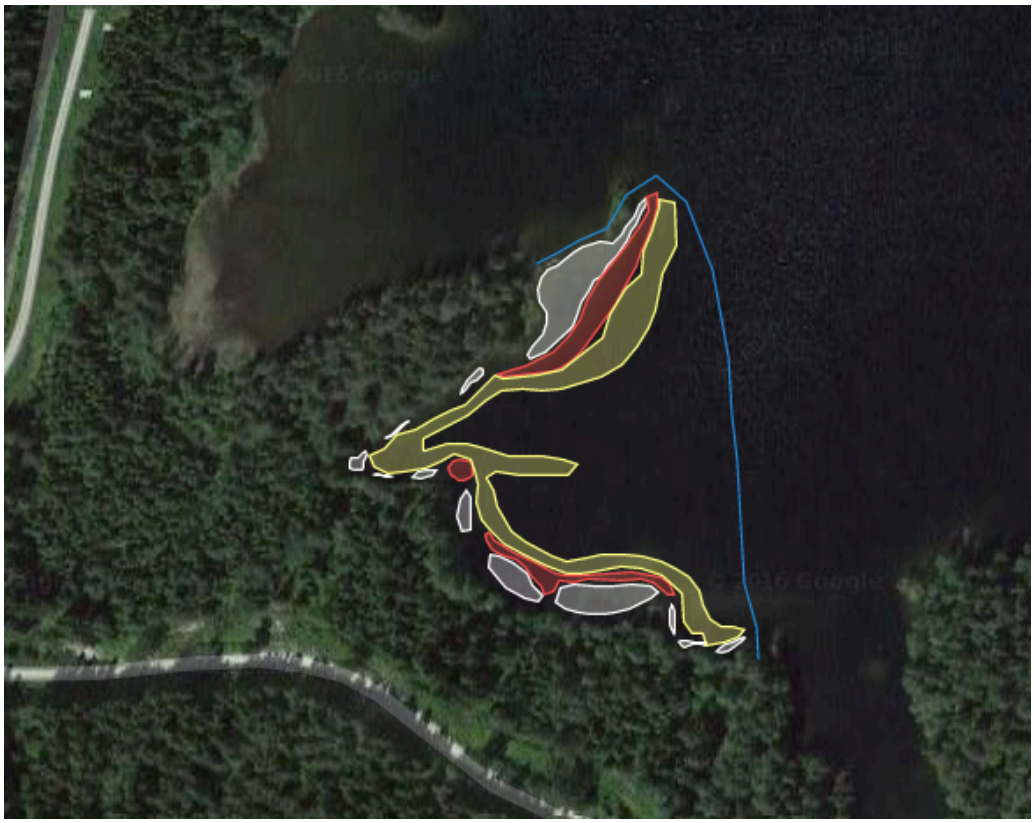


Photo 1. Diving observation of Luronium in SW part of Breisjøen. 12.07.2016.

Photo 2. *Luronium* with floating leaves and white flowers blooming on the surface of water and submerge flowers growing on depth 20 -50 cm. 5.07.2016.

Location: ~~**3. ALUNSJØEN**~~

Individuals: Not found

Area: 2 places in small bays in Eastern and Southern part of a lake.

Environment (habitat): These sites were found a few years ago when there was no water in the lake. Plants grows in a very shallow, both standing and flowing water in places where flow in streams forms pools still full of water. During maximum water level in the lake this places are submerged.

At a day of observation the lake water level was at maximum. That means, it was 1 – 2 m of water over usually dry bottom of a bays were *Luronium* plants has been recently found.

With other plants:

Site 1. in water- *Alisma plantago-aquatica, Glyceria fluitans, Hippuris vugaris*. On shore- *Carex lasiocarpa* (dominant), *Carex stellulata, Carex rostrata, Carex vesicaria, Comarum palustre, Epilobium palustre, Equisetum fuviatile, Galium palustre, Juncus bufonius, Lysimachia thyrsiflora, Menyanthes trifoliata, Peucedanum palutre, Polygonum minor, Ranunculus reptans, Rorippa palustris cfr., Sphagnum squarrosum, Veronica scutelata*

Site 2. in water- *Alisma plantago-aquatica, Alopecurus aequalis, Glyceria fluitans, Juncus bufonius, Rorippa palustris cfr.,*

Condition: In so high level of water it was not possible to find *Luronium* (even with a help of diving this year) but we hope that it still subsist in those places. The bottom of a lake is now only slightly inhabited by underwater macrophytes. Only a few small agglomerates of *Juncus bulbosus* and a few individuals of *Hippuris vulgaris f. Submersum* was found.

Care: !!! – It will be very interesting to know (if it exists – data from limnigraph) the record of water level changes during as many years as possible.

GPS-coordinates: 59°57'57.94"N 10°51'4.54"E	Luronium-Alunsjoen3
Site 1. 59°57'50.45"N 10°51'18.85"E	Luronium-Alunsjoen3.1
Site 2. 59°57'41.56"N 10°51'5.12"E	Luronium-Alunsjoen3.2

Date of watch: 12.07.2016

Owner:

Photos: R. Gramsz

Observer: R. Gramsz, Katarzyna Bociąg

Photo 1. Alunsjøen, diving observation in location 1 with maximum water level in the lake. 12.07.2016.

Location: 4. SVARTKULP

Individuals: This year's observations by the help of diving found occurrence of *Luronium* along approximately 70% of the shoreline. *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^2. That means (if we use 10 individuals/1 m^2) = 16000 individuals.

Area: Ca. 1600 m^2. *Luronium* is spread on ca.70% of the lake shoreline usually on the depth 0 – 1.5 m (max 3 m)

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: There were not very many floating leaves and flowers visible on surface of water coming from plants growing not deeper than 0.5 m. (at the date of observation).
Two forms of *Luronium* exist in Svartkulp:

1. **Submerge form with floating leaves** growing not deeper than 0.5m.
2. **Submerge vegetative form** is growing on the depth from 1 – 3m.

Care:

GPS-Coordinates: 59°58'30.95"N 10°50'51.30"E Luronium-Svartkulp4

Date of watch: 5.07, 14.07.2016

Owner:

Photos: R. Gramsz

Observer: R. Gramsz, Katarzyna Bociąg

Map.3. Diving observation of *Luronium* in Svartkulp.

- white marked places - **submerge 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.

Photo 1. Svartkulp from Northern shore. Only few floating leaves were visible. 5.07.2016.

Location: 5. MARIDALSVANNET

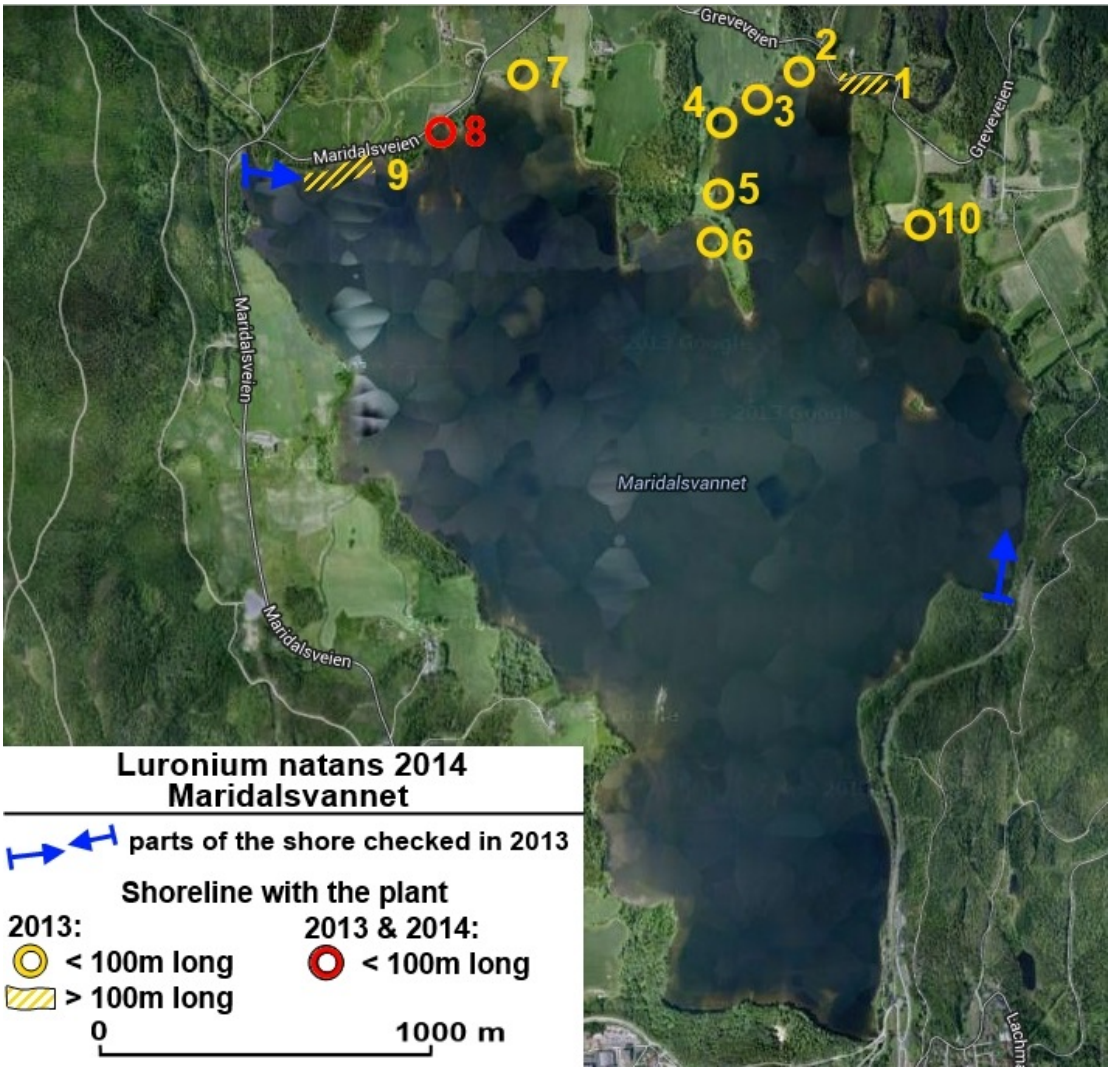
Most of this summer the water level in Maridalsvannet was close to maximum. That situation as we know from former years makes very difficult to do *Luronium* observations from ashore. The problem is:

- To get access to sites of *Luronium* (we discovered them in 2013 when the water level was 60 -80cm lower)
- To notice their presence while *Luronium* very seldom forms floating leaves and flowers in this lake.

During some visits in sites 1 and 8 (the only places from which you can perform, standing behind the fence, general observations) in 10.07 a small bundle of floating leaves was observed on location 8.

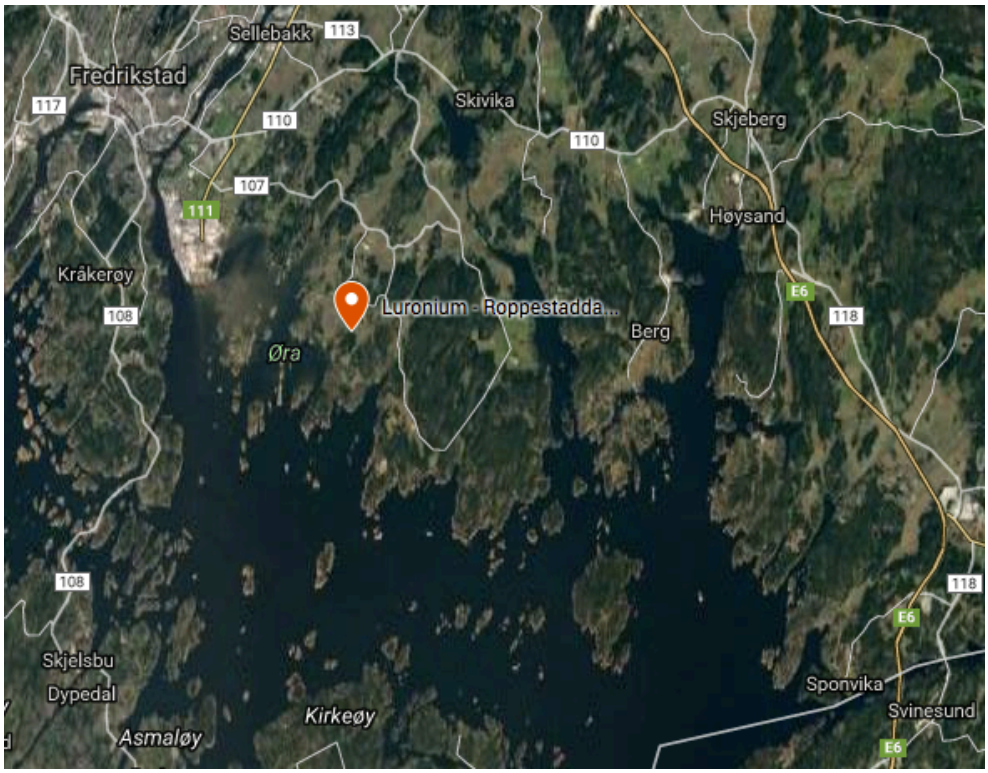
There was no diving observations in Maridalsvannet.

Map – "Luronium natans 2014 Maridalsvannet" (The same as in the year 2014 only on location 8 *Luronium* were noticed)



Location 6: FREDRIKSTSD - ROPPESTADDAMEN

Map 1. General localization of Luronium - Ropestaddammen.



Individuals: Very abundant

Area: *Luronium* occurs in two small pounds.

- 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 30% 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, Glyceria fluitans, Juncus conglomeratus, J. effuses, J. ensifolius? J. bulbosus, Lemna minor, Lysimachia vulgaris, Menyanthes trifoliata, Nymphaea alba, Ranunculus flamula, R. lingua, Utricullaria vulgaris, U. intermedia,*

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

Condition: *Luronium* plants were visible in both pounds with floating leaves and flowers. In this shallow pounds most of *Luronium* population can exist as submerge form with floating leaves. Regardless of the competition of other aquatic plants *Luronium* created a compact pieces that concern no less than 30 - 40% of the entire surface of ponds.

Care: *Luronium* was planted in those pounds.

GPS-coordinates: 59.1667, 11.02638

Date of watch: 27.06.2016

Owner:

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

Photo. 1. Map with detailed localization of pounds. 27.06.2016

Photo. 2. Roppestaddammen. 27.06.2016.

Photo 3. Roppestadmyra. 27.06.2016.

Photo. 4. *Luronium* in Roppestaddammen. 27.06.2016.

Photo 5. *Baldelia (ranunculoides?)* in Roppestaddammen. 27.06.2016.