

Luronium – 2018



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) **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).

This year, short, observations from the shore were made at the end of June and at the beginning of July. Using hot and dry weather and low water level in Maridalsvannet ashore observations on Western and Southern part of the lake were completed.

In the second half of July all lakes have been investigated using boat and diving. **The result of this work is a map of the distribution of the entire *Luronium* population (also a hardly known underwater vegetative form) in all 5 lakes.**

Description of this method:

I cooperate in this work with Dr Katarzyna Bociąg – hydrobotanist and skilled diver.

We sailed on a boat or a pontoon along the shore, checking the presence of *Luronium* in a belt with a depth of 0 - 5m. The diver penetrated deeper places and the person on the pontoon checked the shallow places often with the help of "vatennkikare".

The size and depth range of each found vegetation patch was recorded in the GPS with an additional description of the growth forms and densification. Then, based on these data, digital maps of the *Luronium* distribution were made for 4 of the lakes studied. The research on Svartkulp took place (in 2016) only by diving method without the participation of boat and GPS. The map was sketched on the basis of direct information from the diver.

Location: 1. DAUSJØEN

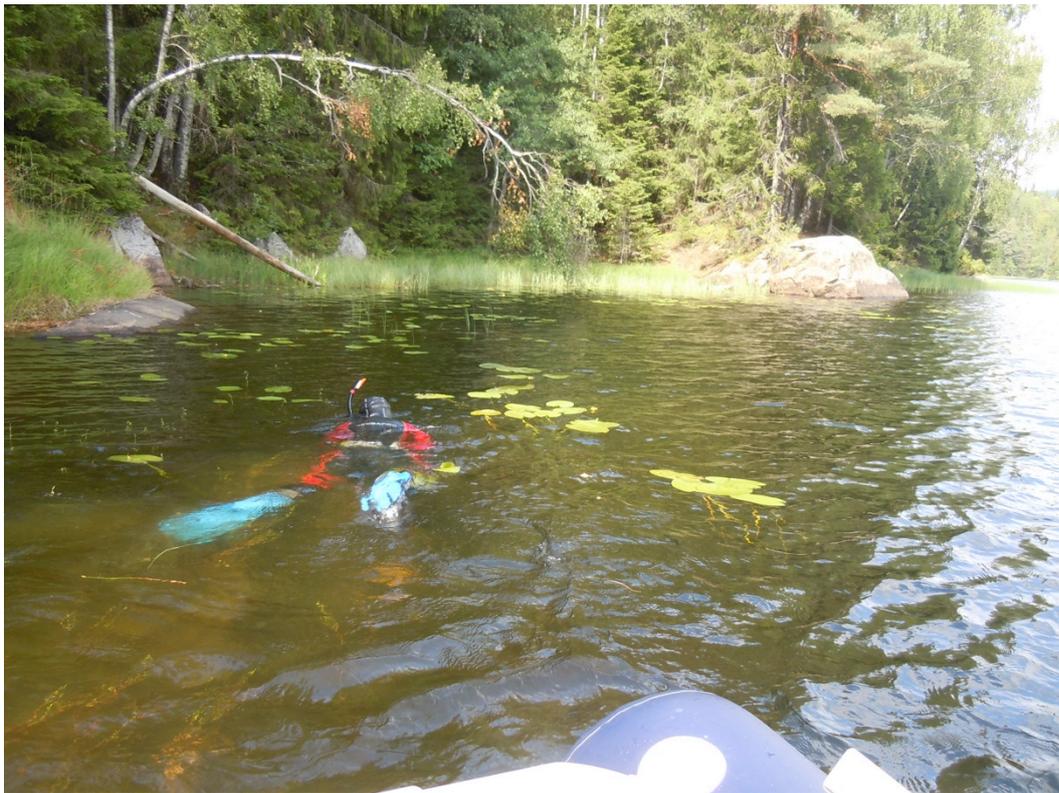


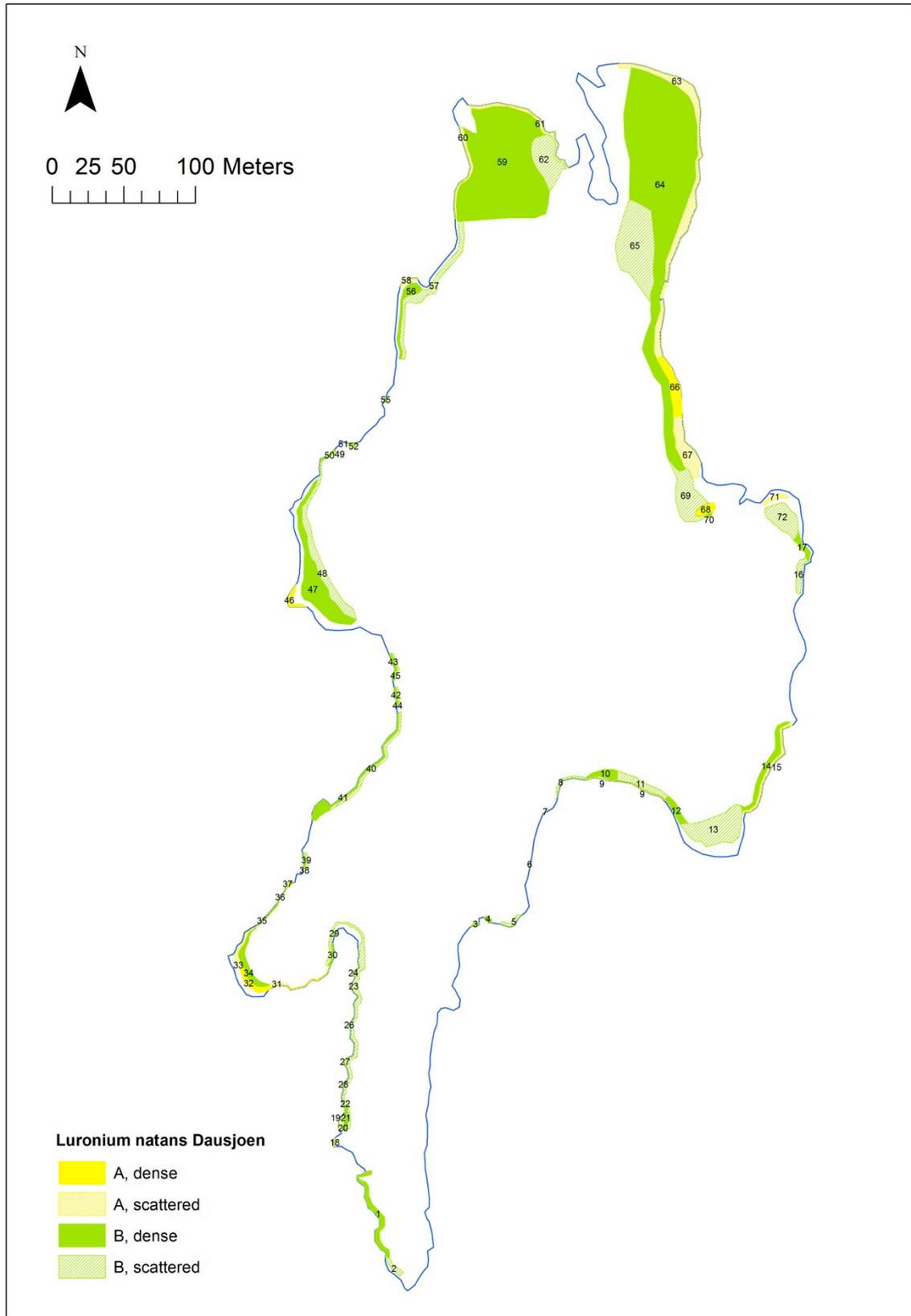
Photo 1. Researches on Dausjøen using a pontoon and diving. 31.07.2018.

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 milions! Individuals)

Area: Sum = 20223 m². The size of set surfaces - see map 1. :

razem	wszystkie	20223,13401	m2
	A dense	529,827	m2
	A scattered	2108,165	m2
	B dense	12105,58	m2
	B scattered	5479,563	m2

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. See the map. Maximum depth where *Luronium* is growing in Dausjøen – 2,2 m



Map. 1 On the map: "A" - underwater form with floating leaves and flowers (usually growing not deeper than 1.5 m), "B" - underwater vegetative form (growing deeper than 1.5 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 this summer 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 (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: During first visit to the lake (11.06) I have already notice floating leaves at the depth 20-25 cm (with 15 cm lower than max water level). It was the earliest time that floating leaves were noticed in this lake during observations since 2008. The hot and dry weather continue during most of summer with a temperature of surface water 25-27°C at days of observations. In the end of July water level rise to maximum. Plants developed a lot of floating leaves and flowers this year but they were sunk and thus less visible.

Some interesting observations:

-We observe floating leaves (floating on the surface when water level was 15 -20 cm lower) now submerge in water and yellowing. Probably petioles when the leaf reaches the surface of the water ceases to grow and can not resume growth when the water level rises.

- in the particularly warm water this year the "clouds" of filamentous algae spread enormously. (photo 2.)

- in many places the oldest leaves of underwater vegetative rosettes reached a length of 30 - 35 cm! (usually it is 5 - 15 cm). (photo 3.)

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

[Luronium-Dausjoen1](#)

Date of watch: 11.06; 27; 29; 31.07.2018

Photos: R. Gramsz

Observer: R. Gramsz and K. Bociąg

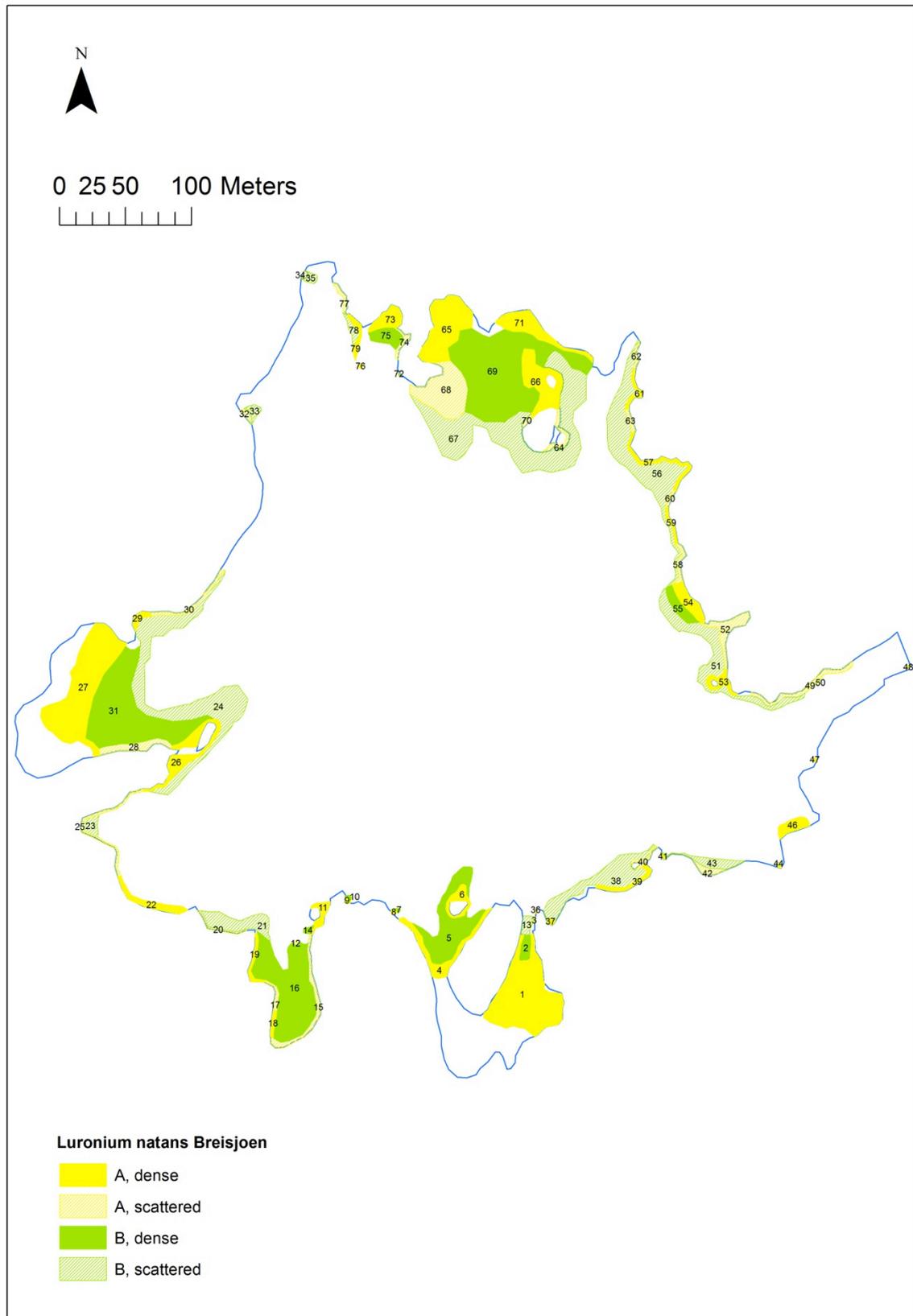


Photo 2. "Clouds" of filamentous algae spread enormously. 31.07.2018.



Photo 3. The oldest leaves of underwater vegetative rosettes reached a length of 30 - 35 cm!
31.07.2018.

Location: 2. BREISJØEN



Map. 1 On the map: "A" - underwater form with floating leaves and flowers (usually growing not deeper than 1.5 m), "B" - underwater vegetative form (growing deeper than 1.5 m)

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 only 30 individuals / m², we will receive more than 1 million individuals.

Area: Sum = 37716 m². The size of set surfaces - see map 1. :

RAZEM	wszystkie	37716,50745	m2
	A dense	11295,89	m2
	A scattered	3682,576	m2
	B dense	10998,78	m2
	B scattered	11739,26	m2

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. See map 1.

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 (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: *Luronium* grows particularly abundantly this year due to hot weather and high temperature of water – ca. 26^{oC} in surface water. Floating leaves appears on the surface of water even from plants growing on the depth of 2m (usually 0.2 – 1m). Plants were blooming very abundantly.

Some interesting observations:

- Very often in places with a depth about 1m and deeper the plants were produced a lot of flowers but without floating leaves.

- In many places the progeny plants created on the stolons have not taken root on the bottom but still attached to the mother plant formed very dense thickets in the water depth. (Photo 2.)

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

[Luronium-Breisjoen2](#)

Date of watch: 6; 9; 19; 20; 21.07.2018;

Photos: R. Gramsz ;

Observer: R. Gramsz and K. Bociąg

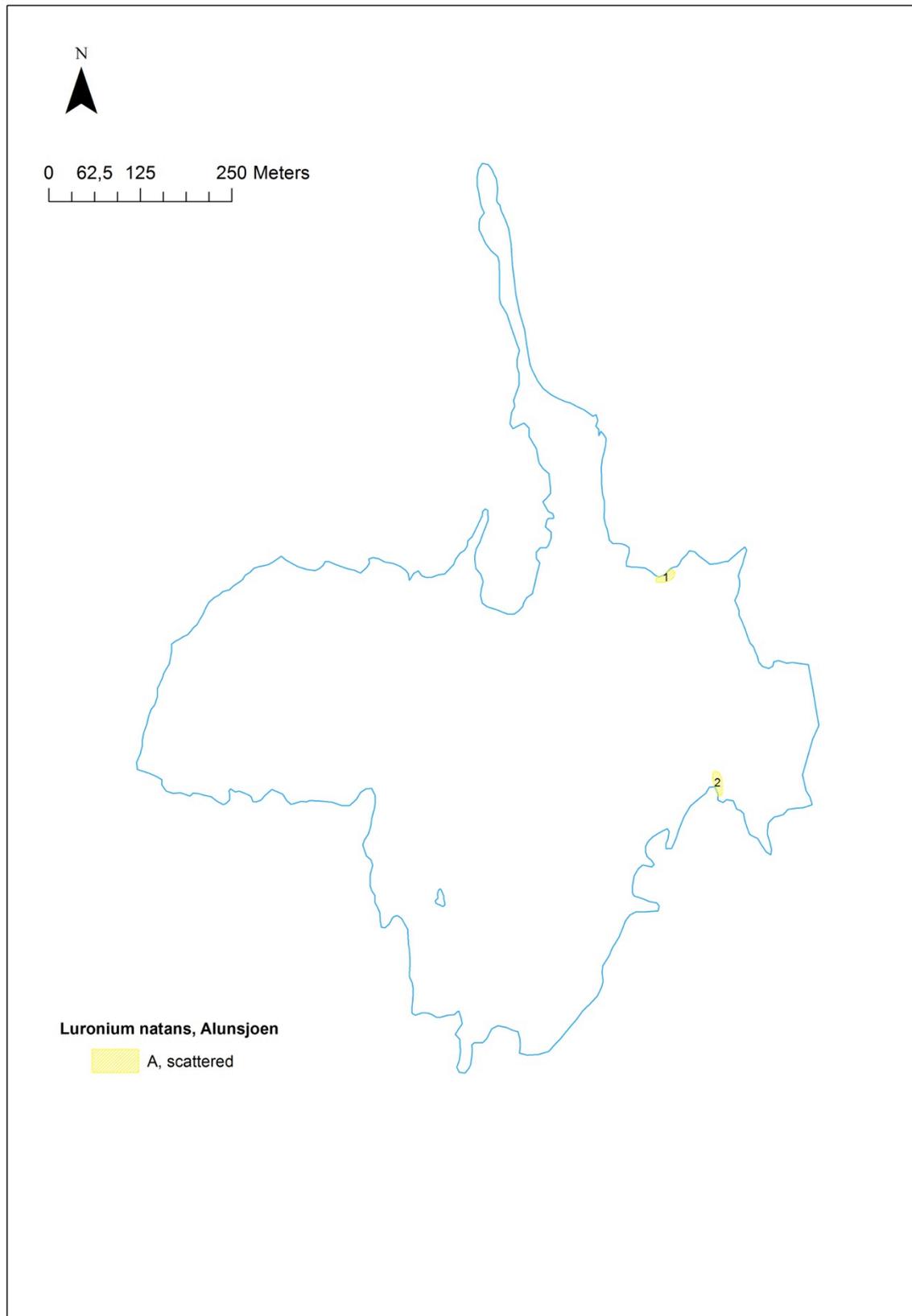


Photo 1. Abundant growth of *Luronium* in a depth ca. 50 cm. Together with blooming *Lobelia Dortmana*. Breisjøen. 6.07.2018.



Photo 2. Thicket of *Luronium* with a lot of flowers but not so many floating leaves. Western bay of Breisjøen. 20.07.2018.

Location: 3. ALUNSJØEN



Map.1. On the map: "A" - underwater form with floating leaves and flowers (usually growing not deeper than 1.5 m).

Individuals: Plants are spread in both locations creating one bigger and a dozen or so small concentrations (clusters) with a 100 – 200 as a sum of individuals.

Area: Sum = 586m². 2 places in SE and NE part of a lake, close to the dam.

	forma	zagęszczenie	area [m2]
1	A	scattered	258,146346
2	A	scattered	328,175164
		suma powierzchni	586,32151

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 day of observation water level was about 60 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 -30 cm produced floating leaves and flowers.

Care:

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

[Luronium-Alunsjoen3](#)

Date of watch: 23.07.2018

Photos: R. Gramsz

Observer: R. Gramsz and K. Bociąg



Photo 1. Alunnsjøen. Big cluster in SE part of lake with 60 cm lower water level. 23.07.2018.



Photo 2. In NE location most of clusters grow as terrestrial form. With *Ranunculus reptans* in this photo. 23.07.2018.

Location: 4. SVARTKULP



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

- 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.

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 clusters of 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: 6.07.2018

Owner:

Photos: R. Gramsz

Observer: R. Gramsz (+ K. Bociąg -2016)



Photo 1. A few floating leaves growing from plants on the depth about 20 – 30 cm. SE part of Svartkulp. 6.07.2018.

Location: 5. MARIDALSVANNET

In the beginning of July water level in Maridalsvannet was 60 -80 cm lower than max. Using this possibility for making observations from ashore I manage to check W and S shore of Maridalsvannet (part of a shore remained for investigation after 2013). Later in the end of July together with Katarzyna Bociąg we check whole lake and the outlet section of Dausjøelva using observations from boat and diving. At that time water level was a little higher but still ca. 40 cm below max.



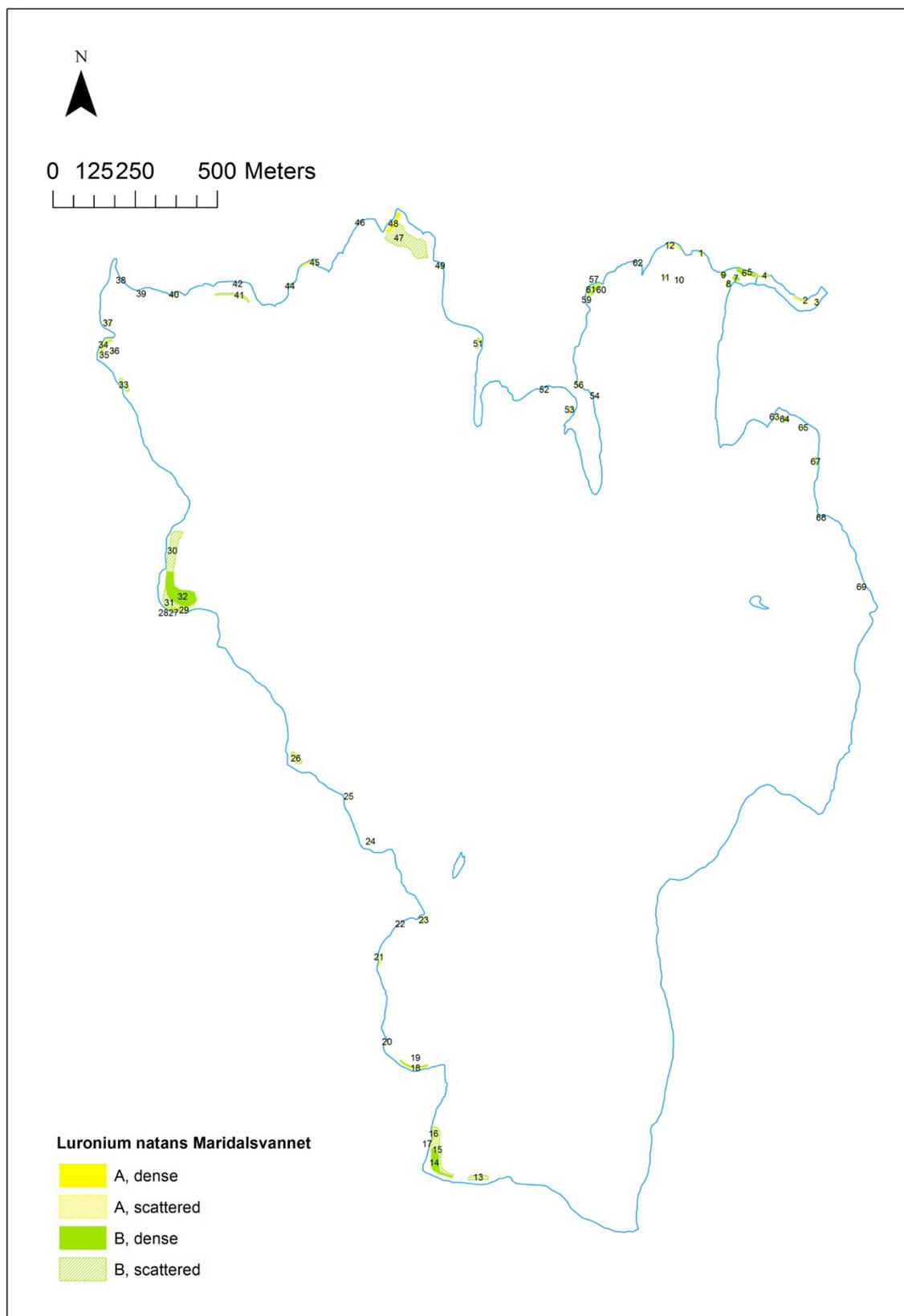
Photo 1. Researches in Maridalsvannet were made in the period 24.07 – 30.07.2018 by using boat and diving. 30.07.2018.

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

Area: Sum = 29650m^2 . The size of set surfaces - see map 1. :

razem	wszystkie	29650,69935 m2
	A dense	1380,594 m2
	A scattered	2573,699 m2
	B dense	7738,293 m2
	B scattered	17958,11 m2

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



Map.1. On the map: "A" - underwater form with floating leaves and flowers (usually growing not deeper than 1.5 m), "B" - underwater vegetative form (growing deeper than 1.5 m)

150 cm (max. 2m) from maximum water level. In this year for a few weeks in beginning of summer water level in the lake was 60 – 80 cm lower than max. That made possible to do some observations from ashore and notice terrestrial form of *Luronium* on the exposed lake bottom. We also have a chance to check a slow flowing estuary part of Dausjøelva with 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*, *Littorella uniflora*, *Juncus bulbosus*, *Heleocharis acicularis*, *Ranunculus reptans*, *Isoetes lacustris*, *Equisetum fluviatile*, *Carex vesicaria*, *Lysimachia thyrsiflora*, *Nuphar luteum*, *Myriophyllum alterniflorum*, *Potamogeton natans*, *Sagittaria sagitifolia*, *Sparganium sp div.*

Condition: Very hot weather during June and July warms the surface water of the lake to 26^oC. Under such conditions, a large part of the *Luronium* population produces floating leaves and flowers. In addition low water level caused that the exposed plants continued to grow as a terrestrial form.

Date of watch: 11.06; 11; 14; 15; 24; 25; 26; 29; 30.07.2018

Photos: R. Gramsz, **Observer:** R. Gramsz and K. Bociąg

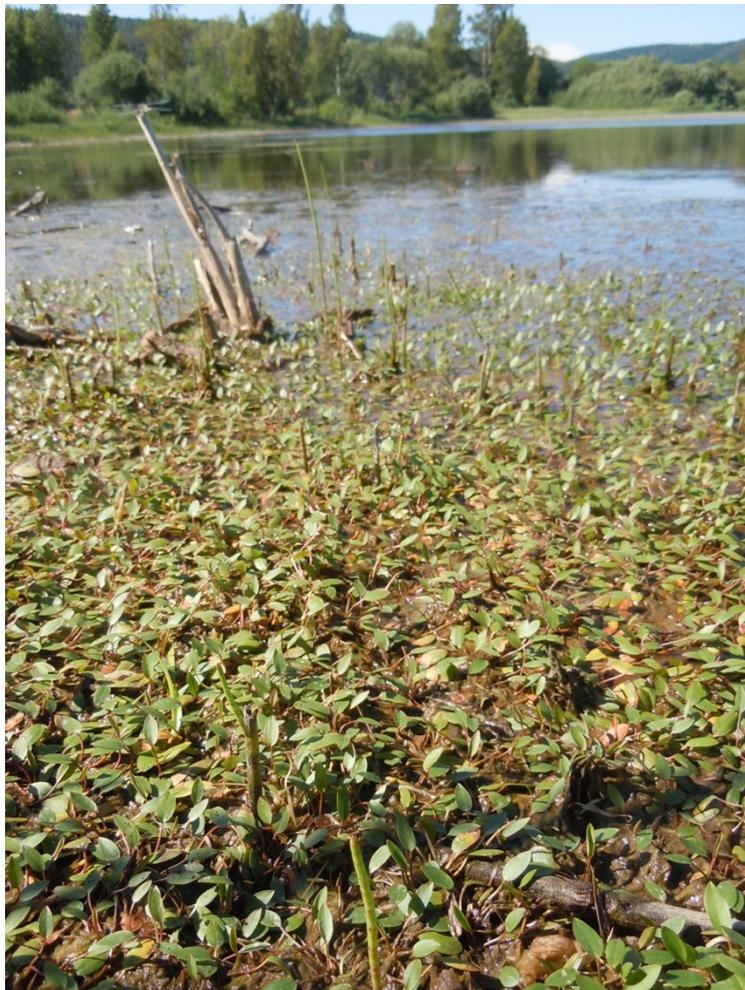


Photo 2. Terrestrial form of *Luronium* growing on exposed bottom in Western bay of Maridalsvannet. 14.07.2018.



Photo 3. Estuary part of Dausjøelva – there is some sites with *Luronium* in water and *Ranunculus reptans* and *Subularia aquatica* growing on exposed shore. 24.07.2018.



Photo 4. *Subularia aquatica* in estuary part of Dausjøelva. 24.07.2018.

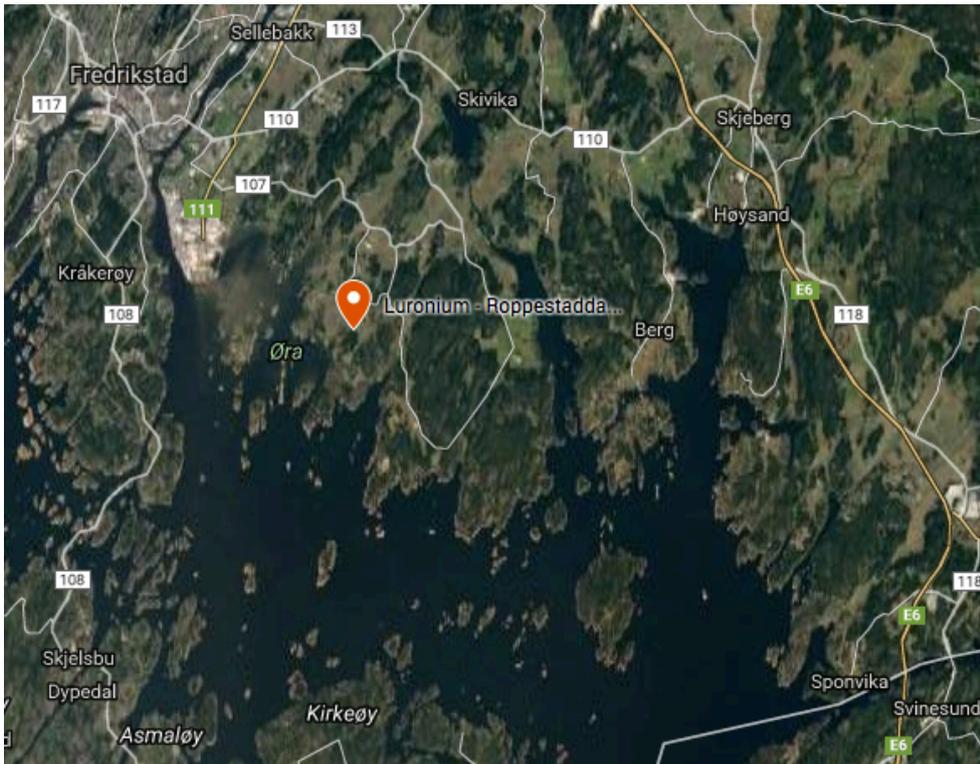


Photo 5. Higher water level... Floating leaves are not following new, higher water level. They are getting yellow and dying (?) 26.07.2018.



Photo 6. Beach on the NE part of Maridalsvannet. Waves makes this part of the beach impossible to live for *Luronium*. 29.07.2018.

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. effusus*, *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 is taking part very early (ca. 10 days earlier than before but the end of May and June was very hot and dry). *Luronium* plants were visible in both pounds with floating leaves and flowers but not as abundantly as last year. 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 - 50% of the entire surface of ponds. In this year water level was about 25 - 30 cm lower than maximum.

Care: *Luronium* was planted in those pounds.

GPS-coordinates: 59.1667, 11.02638

Date of watch: 19.06.2018.

Owner:

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



Photo 1. Ropestadmyra. Not so many *Luronium* flowers as last year, but it is 10 days earlier- 19.06.2018.



Photo 2. *Luronium* in Roppestadmyra. Floating leaves are very big – up to 2 x 4 cm. 19.06.2018.



Photo 3. *Luronium* with a lower water level. 19.06.2018.