



LITHUANIAN
FUND FOR
NATURE



Project **LIFE12NAT/LT/000965**
LIFEAUKSTUMALA Restoration of Aukstumala Raised Bog
in Nemunas Delta Regional Park

Action D2:

HYDROLOGICAL MONITORING AT THE TARGETED SITES

Authors: Leonas Jarašius
Dr Jūratė Sendžikaitė

Vilnius,
2016

Hydrological monitoring. Material and methods

To assess the drainage effect and the efficiency of project action on the hydrology of the Reserve, a hydrological monitoring system consisting of 123 water level measurement wells was installed (twelve transects with 6–10 water level measurement wells in each). The water level measurements were carried out with monthly interval during vegetation season in May–October, 2014–2016. All hydrological monitoring profiles were grouped into 5 sites depending on hydrological conditions and the foreseen actions (*Fig. 1*).



Fig. 1. Location of hydrological monitoring sites in Aukštumala Telmological Reserve

Hydrological monitoring transects:

- **Site 1.** Two transects (110 m length) with 6 water level measurement tubes in each. Due to the old drainage system this site is characterised as degraded raised bog with intensive tree cover. In order to improve hydrological conditions, this site will be dammed. However, tree cuttings will not be carried out.
- **Site 2.** One transect (360 m length) with 10 water level measurement tubes. The site is also qualified as degraded raised bog. Tree cuttings and dams will be carried out to improve hydrological conditions.
- **Site 3.** Six transects (170 m length) with 9 water level measurement tubes in each. Profiles are located in the contact zone of the Reserve and peat harvesting fields (southern, south-eastern part of the reserve). None of the restoration measures will be taken. The site represents general hydrological condition of Aukštumala raised bog.
- **Site 4.** Two transects (170 m length) with 9 water level measurement tubes in each. The site is located in the northern part of the reserve, which in 2011 was damaged by fire. The northern edge of the site is also drained by 5–6 deep ditches. To improve hydrological conditions drainage ditches will be blocked.
- **Site 5.** One transect (190 m length) with 10 water level measurement tubes. The site is located in the northern part of the reserve, which was damaged by fire in 2011. **This hydrological monitoring transect was installed in April, 2016 as an additional measure to follow the success of project actions (tree cutting and ditch blocking).** The area is also characterized by the dense network (every 20 m) of drainage ditches. Recently the first

actions of restoration have been carried out in the site. Instalment of peat dams started in November 2015, tree cutting is continuously performed since November 2015.

- **9 Separate water level measurement wells in the central part of the bog** represents the control data of pristine active raised bog.

In this report data from all transects is not provided, because measurements of year 2016 is still not over. Moreover, foreseen project actions in the sites 1, 2 are still in process, therefore essential data from site 4 is only provided and summarized.

Results

According to previous hydrological studies and the data gained from the central part of the bog water level in typical open raised bog communities during the vegetation season does not decrease less than 25–30 cm below the peat surface. Therefore in order to recreate favourable conditions for peat accumulation and natural functioning of the bog ecosystem, the water level should be raised at least up to -30 cm.

The results of hydrological monitoring obtained in 2014–2016 in site 4 shows, that after implementation of project actions in 2016 (ditch blocking using several types of dams), the average water level had increased from 5 to 15 cm. Almost in all treated sites average water level did not fall lower than 30 cm beneath peat surface, which is considerate to be minimal limit for the formation of raised bog habitats (*Fig. 2*). Whereas in the drained sites, where project actions are not implemented recorded average water level is 50 cm beneath peat surface or even lower.

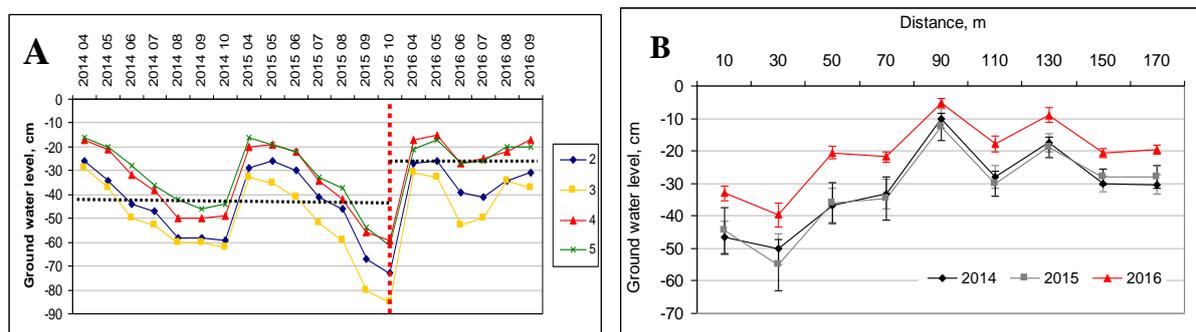


Fig. 2 Monthly water level fluctuations (A) and average water level (B) in the site where old drainage system was blocked. Curves indicate data from different water level measurement wells

Vegetation cover monitoring. Material and methods

The percentage cover of *Calluna vulgaris* was estimated in August of 2014 – 2016. Three linear transects (A, B, C) were established in the degraded parts of Aukštumala Telmological Reserve (*Fig. 3*).

- **Transect A:** 380 m length transect was established in degraded raised bog area with dense net of drainage ditches and low water level. The site is characterised by dominant tree cover (*Betula pendula*, *B. pubescens*, *Pinus sylvestris*), *Sphagnum* cover was sparse (up to 5%). 20 study plots, each measuring 1.0×1.0 m in size (*Fig. 3*) were distributed every 20 m.

- **Transect B:** 180 m length transect was established in extremely damaged by fire area with dense net of drainage ditches and low water level. Before the fire (2011) the site was characterised by dominant tree cover (*Betula pendula*, *B. pubescens*, *Pinus sylvestris*), *Sphagnum* cover was absent. Currently dwarf-shrubs *Calluna vulgaris* dominate in the vegetation cover. 10 study plots, each measuring 1.0×1.0 m in size were distributed every 20 m.
- **Transect C:** 180 m length transect was established in damaged by fire area, perpendicularly to the contact line of the Reserve and peat harvesting fields. The northern edge of the transect is drained by ditches (degraded raised bog), whereas southern one is characterised by open raised bog. 10 study plots, each measuring 1.0×1.0 m in size were distributed every 20 m.

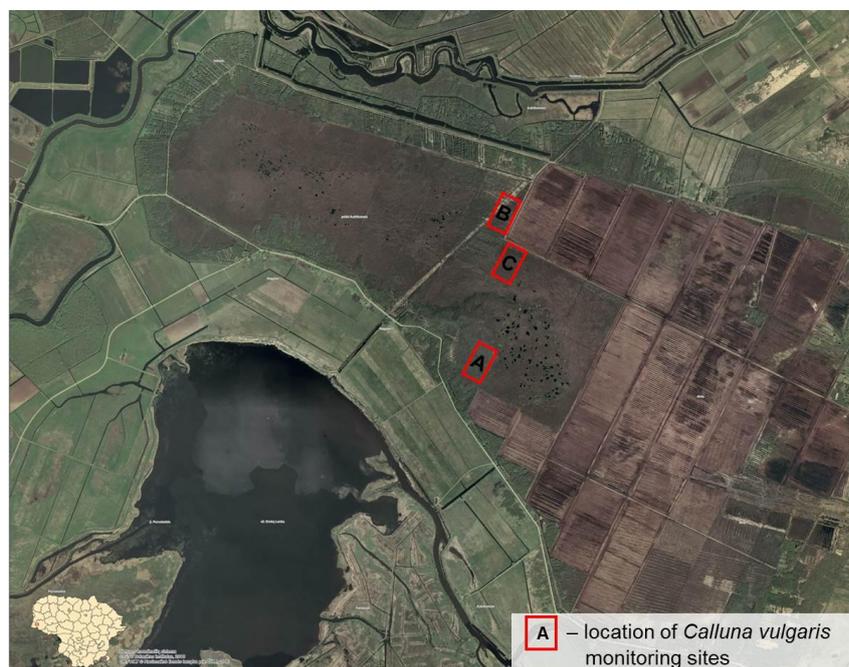


Fig. 3. Location of vegetation monitoring sites in Aukštumala Telmological Reserve

In the every permanent study plots percentage cover of *Calluna vulgaris* was estimated, as well as other vascular plant and mosses were inventoried. In this report data from the transect C is presented.

Results

Vegetation monitoring data in treated sites C don't show clear shifts towards the typical raised bog habitats yet (Fig. 4). These results may be explained by two following reasons:

- only one year has passed since the implementation of project actions;
- some of the sites were damaged by fire in 2011, which has drastically changed the top soil mineralization and thus creating good conditions for not typical raised bog species, such as heath (*Calluna vulgaris*).

However, increased number of poor vitality heath individuals and appearance of sphagnum mosses in some sites indicates, that damming proved to be as an efficient measure to restore vegetation cover in damaged sites. The cover of vital heath individuals in some research plots decreased by 11%.

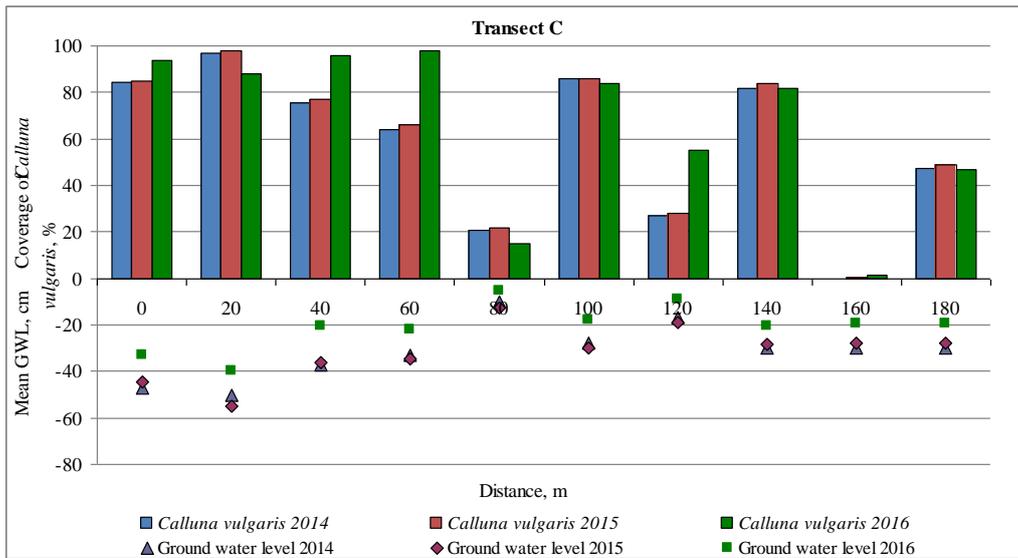


Fig 4. Changes in heath (*Calluna vulgaris*) cover depending on distance from the contact line of the Aukštumala Telmological Reserve and peat harvesting fields in 2014–2016

Although small increment of *Calluna vulgaris* cover was observed during the year 2016, the changes towards sphagnum dominated bog habitats are expected to appear within a next years as the water level rises up. This is partly proved by the data of decrease of vital heath individuals and appearance of sphagnum mosses in the restored site.