



Restored Kauhaneva from air. Photo: Metsähallitus / Jari Ilmonen

Boreal Peatland LIFE LIFE08NAT/FIN/000596

FINAL REPORT

Covering the project activities from 01/01/2010 to 31/12/2014

Reporting Date
31/3/2015

Data Project

Project location	Finland
Project start date:	01/01/2010
Project end date:	31/12/2014
Total budget	6 726 614 €
EC contribution:	3 363 307 €
(%) of eligible costs	50 %

Data Beneficiary

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1. List of abbreviations

EC = European Commission

CoB = Coordinating beneficiary, Metsähallitus Natural Heritage Services

CL = Commission Letter

GA = Grant agreement

JyU = University of Jyväskylä, associated beneficiary

KS ELY = Keski-Suomen ELY-centre, associated beneficiary

N2000 = Natura 2000

PM = Project manager

PSG = Project Steering Group

PR1 = Progress Report number 1

PR2 = Progress Report number 2

METLA = Finnish Forest Research Institute

MH or MH NHS= Metsähallitus, Natural Heritage Services, coordinating beneficiary

MoE = Ministry for Environment

MoT = External monitoring team (Astrale-ELLE)

MP = Management plan

NP = National Park

PR = Press release

REC = Regional coordinator

RSBP = Royal Society for Bird Protection

SYKE = Finnish Environment Institute

TAMK = Tampere University of Applied Sciences

2. Executive summary

2.1. General progress

Background

Peatlands are critical for biodiversity conservation and essential as carbon sinks. They support specialised species and unique habitat types. The greatest threats to the peatlands in Finland are related to ecological degradation, habitat destruction and a lack of social appreciation of their importance. Drainage for forestry has negatively affected almost two-thirds of the original peatland area. At the global scale degradation of peatlands is recognised as a major and growing source of anthropogenic greenhouse gas emissions. In Finland drainage is the major cause of ecological degradation of peatland habitats and drainage for forestry has affected almost two thirds of the original peatland area. Habitat degradation has been most intensive in Southern and Central Finland where only 25% of peatlands remain intact.

Peatland drainage has decreased the representativeness and species diversity of the Natura 2000 habitat types. Moreover, according to a national assessment, drainage is the most common cause for the peatland habitat types being threatened in Finland. Drainage and habitat degradation are also major threats for many HD Annex II, IV and V, and Birds Directive Annex I species.

The Boreal Peatland Life project aimed to improve the habitat quality and/or recreational value of 54 N2000 sites. The project concentrated especially on restoration of priority habitats such as Aapa mires (7310), Bog woodlands (91D0), and Active raised bogs (7110) and increasing public awareness of the values and threats of peatlands.

The project really made a difference

The project actions are highly important as part of the work towards reaching the biodiversity targets of the EU Biodiversity Strategy to 2020, especially the target of restoring at least 15% of degraded ecosystems. At the beginning of the project Metsähallitus Natural Heritage Services and the Finnish Environment Institute estimated that approximately 15 000 ha of peatlands which are nationally and internationally valuable as an essential part of Natura 2000 network were in need of restoration. During the project restoration of hydrology was completed at 51 N2000 sites on an area of 4 790 ha. As a result the hydrology and eventually also the natural succession of mires of the N2000 sites is regained on almost 1/3 of the area that was estimated to be in need of restoration. The substantial monitoring effort by the project enhances our understanding on the expected effects restoration measures when aiming at the 15% target in EU countries and globally.

The restoration actions in the project were undertaken on 4 673 ha of habitats that have been classified as HD Annex I habitats: 1 278 ha of Aapa mire (7310), 827 ha of Active raised bogs (7110), 2 183 ha of Bog Woodland (91D0), 221 ha of Degraded raised bogs (7120), 65 ha of Alkaline fens (7230), 78 ha of Transition mires (7140), 0,3 ha of Mineral-rich springs and springfens (7160) and 21 ha of Western Taiga (9110) (see annex 1). The area of the HD Annex I habitat types that has been directly positively affected by the restoration actions is even larger, 5 759 ha and includes Natural dystrophic lakes and ponds (3160) where natural

water level was restored as a result of restoration of mires in the catchment (annex 1). The area of direct impact is larger than the area where the actual restoration actions have been undertaken as ditch-filling may rewet hydrologically disturbed areas hundreds of meters away from the in-filled ditches.

Pristine peatlands are the most efficient terrestrial ecosystems as carbon sinks. Peatland drainage is generally expected to halt peat growth and enhance the emission of carbon from peat to the atmosphere. Recovery of original wet conditions after restoration is expected to enhance peat formation and enhance sequestration of C to the long-term sink in peat. While the carbon fluxes were not monitored in the project, we got indirect proof of restoring the ability of our project sites to act as carbon sinks through monitoring of hydrology and vegetation on many of the project sites. The restored sites are now once again forming new peat and thereby sequestering carbon, perhaps even more effectively than pristine mires.

Pristine peatlands are also known to be important for flood control and as ‘living filters’ removing nutrients, DOC and other substances moving with water from catchments to recipient watercourses. In the light of most climate scenarios the importance of peatlands for flood prevention and prevention of negative water quality changes in rivers, lakes and seas is expected to increase with climate change as an increasing proportion of annual precipitation in Finland is supposed to fall down during winter time when the mineral soils are frozen and there is no vegetation cover in mineral soils. Restored peatlands can be expected to act like pristine peatlands in flood control and as ‘living filters’. Probably not immediately after restoration but within a few years after the disturbance caused by the restoration actions settles and the original mire vegetation recovers. Our results on monitoring of hydrology support this assumption as the chemical quality of pore water in the mires is significantly improved by restoration already in couple of years and the natural groundwater level and dynamics is recovered by restoration in an even shorter time.

During the next decades the restored mires will increase in their natural value and become both structurally (habitats and species) and functionally (e.g. sequestration of carbon, flood control, nutrient uptake and circulation) closer to their natural state. Especially the hydrological recovery is important also from the perspective of water framework directive as peatland restoration may also enhance the hydrological condition of downstream water courses in long-term.

‘Placing love for mires in the hearts of everybody’

The nature education and dissemination work carried out during the project is also highly important in trying to reach the EU Biodiversity Strategy to 2020 of halting the loss of biodiversity by 2020. Understanding why and how the conservation actions taken in the EU are important for not only conservation of nature itself but also for securing the ecosystem services and human well-being is the key in getting laymen and politicians interested and involved in the conservation actions.

The project received a lot of media attention and public discussion (e.g. related to articles in the internet) has been vivid. In Finland many people find the restoration as valuable nature conservation work but naturally many people consider mire restoration as waste of time and resources. Especially in the late phases of the project we emphasized in media work and project communication that the restoration actions carried out in the project had a significant

impact on local economies and employment. 100 contractors – excavator drivers, logging truck drivers, forest workers etc. – were employed in the project, amounting to a total of about 90 person-years. This opportunity for work was highly appreciated especially as in many of the areas where restoration sites were situated job opportunities are not very abundant. This is a very important message so disseminate to politicians who quite often tend to think that nature conservation work is expensive and decreases work opportunities and local economy.

The project put a lot of time and energy to producing different kinds of innovative educational materials especially for children but also for laymen and even high-ranking politicians as part of our mission to increase awareness and appreciation of the many values of mires. The “Teacher’s material for mire educations” has been taken into use as part of school teaching by many teachers and will be undoubtedly be used long after the project has ended. The audiovisual mire exhibition that has already been visited by tens of thousands of people of all ages will be circulating Finland for many years after the project thereby adding value to the efforts put to the project. The mire quizzes and DVD on mires have been made available for everybody on the internet so that accessing them is possible whenever and wherever. Also worth mention are the guided mire tours for children and disabled people that were highly appreciated by the attending people.

The media work and other dissemination work, such as the mire exhibition and the guided mire tours, done during the project has for its part helped spread information about the importance of mires for securing many vital ecosystem services that peatlands provide. We also believe that the discussion and the success of the project in part affected the important governmental decision to launch the preparation of a new national mire protection program, which will also include restoration. Overall, the atmosphere in Finland is currently favourable for (mire) conservation and delivering information on the values and restoration of mires is likely to aid in preserving this favourable atmosphere.

All the actions above will for sure have a positive effect on people’s attitudes towards mires and nature conservation in general on a time-span that goes far beyond the duration of Boreal Peatland LIFE.

Summary of the progress

The project achieved or exceeded all of the objectives. Metsähallitus Natural Heritage Services coordinated the project and the actions were implemented together with Keski-Suomi ELY Centre and the University of Jyväskylä.

The project reached the following outcomes:

- 35 restoration plans (Action A1) were completed (29 foreseen).
- Three management plans (A2) were completed (3 foreseen).
- Communication and monitoring plans (A3) were completed and updated when necessary as foreseen.
- 9 training events on mire restoration (A4) with nearly 380 participants were organised. The objective (2 trainings, 80 participants) was considerably exceeded.
- Land purchase (B1) completed with 596 ha of land from 6 N2000 areas have been acquired permanently for nature conservation. The original objective (min. 371 ha at 6 N2000 areas) considerably exceeded.
- Hydrology restored (C1) on 4 790 ha by filling in and damming 1 183 527 m of ditches at 51 project sites. The objective (4 279 ha / 1 078 696 m) was considerably exceeded.

- Removal of trees (C2) done at 46 sites on an area of 3 313 ha of which 1 295 ha was tree cutting and 2018 ha was clearing of ditch lines. The objective was 3 143 ha.
- Dead wood was created (C3) at six project sites in an area of 103,2 ha. The original objective (61 ha) was considerably exceeded.
- 3 590 m of forest roads were demolished (C4) with excavators at three sites (foreseen 2 100 m / 2 sites).
- Duckboards and bird watching tower renewed and information boards installed at Kilpisuo (C5) as foreseen.
- Media work (D1) very active with 24 press releases and 11 media excursions (foreseen 20 press releases / 10 media excursions). The project has been noted in media at least 251 times (foreseen 110 media hits)
- 21 mire tours for disabled (D2) organized for 405 people (foreseen 10 tours each year since 2012 for 150-200 people in total).
- The mire exhibition (D3) opened in early 10/2012 as foreseen. The exhibition will continue touring in Nature Centres around Finland until at least 2016.
- 102 mire tours for children (D4) organized for 3 558 children (foreseen 50-60 groups each year since 2012 with a total of 1 000 students) and the duckboards along the mire trail at Kauhaneva renewed as foreseen.
- The project DVD published in Finnish and English and on display in Nature Centres as foreseen (D5). The stories of the DVD was also made available in Youtube.com where it has been watched 2 923 times by the end of the project.
- Project website in three languages available since 6/2010, mire restoration guidebook published and disseminated in Finnish and English. Picture database produced, mire related quizzes published and Layman's report produced and disseminated as foreseen (D6).
- 12 permanent notice boards (D7) placed on 12 project sites. In addition temporary notice boards erected in the sites where restoration has started (75 placed) and where the effects of restoration are being monitored (46 placed). Originally foreseen 85 A1 boards and 100 A5 boards in relevant locations.
- The project coordination was smooth through the project as foreseen (E1).
- Advising and project groups were formed and meetings for each group has been organised as foreseen (E2).
- The project has networked (E3) actively with other (LIFE) projects e.g. LIFE to ad(d)mire and FOR-REST LIFE. The project has attended to and been presented in several national and international events including the GreenWeek and LIFE Platform meetings.
- The coordination of monitoring (E4) was smooth through the project as foreseen.
- The monitoring of restoration success, vegetation, hydrology, butterflies, dragonflies, golden plover and rich fens ((E6-E12) were implemented during the project efficiently and largely as foreseen.
- The data on monitoring of hydrology (E7), vegetation (E8), Lepidoptera (E9) and birds (E11) were analyzed in detail and monitoring reports were prepared as foreseen.

3. Administrative part

3.1. Description of project management

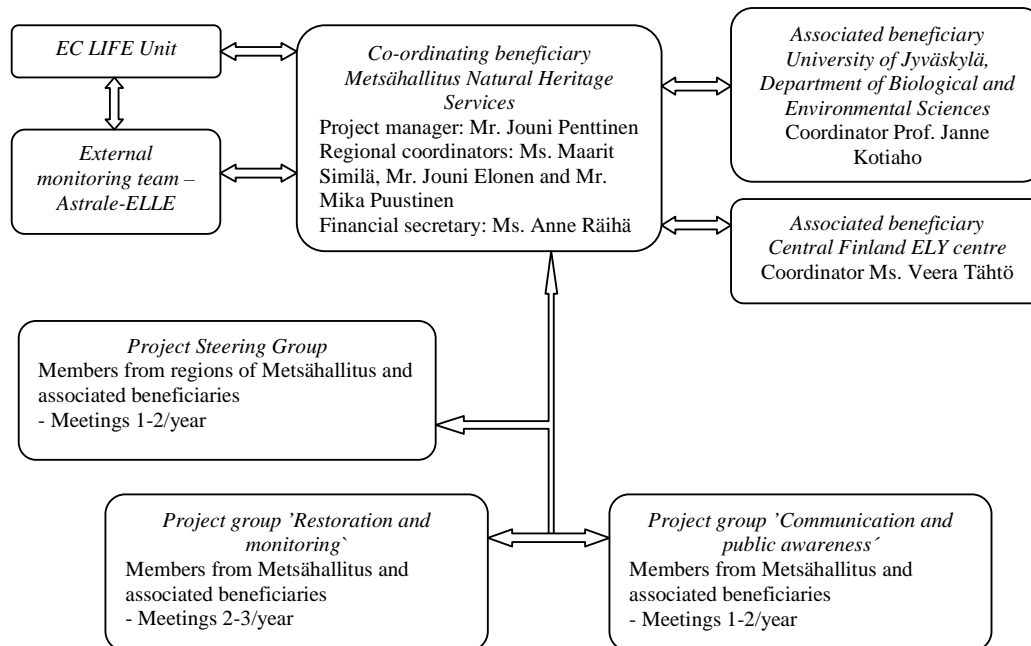
The core of project management was set up during the first two months of the project and the regional coordinators of the project were nominated by 6/2010. Since then there have been

very few changes, the most important being the change of project manager that took place during 5-8/2012. Since then there have been no significant changes to the project management and project management has been very smooth and effective throughout the project. All the changes have been described in more detail in earlier reports.

3.2. Project management structure and organigramme of the project team

Metsähallitus Natural Heritage Services has been responsible for the project coordination and majority of planning and monitoring actions and all restoration actions, dissemination and public awareness actions. MH employed a full-time project manager. As the project includes 54 N2000 sites across Finland Metsähallitus nominated 3 regional coordinators (REC). The RECs are responsible for coordinating restoration actions in the project areas and providing information to the PM. MH also nominated a person to coordinate monitoring actions (Mr. Jouni Penttinen) who was since 5/2012 also the PM. The regional coordinators and planners of MH formed the project group 'Restoration and monitoring' and the personnel from the National Park of Seitsemien, communication team of MH and PM formed the project group 'Communication and public awareness. The financial secretary assisted the PM in financial management of the project.

Associated beneficiaries also nominated coordinators and persons responsible for accounting and financial report for the project. KS ELY was responsible for preparing a few restoration plans and recreational actions, all management plans, land acquisition, and monitoring of butterflies and golden plover. JyU was responsible for supervising the monitoring actions and their analysis and reporting and took part in the field work for vegetation monitoring. The associated beneficiaries had members in steering and project groups.



3.3. Reports submitted and amendments to the Grant Agreement

Four reports on the project have been submitted prior to the Final report (see table below).

Table on reports submitted.

Report	Reporting date
Inception report	27.8.2010
Progress report no. 1	29.11.2011
Mid-term report	31.10.2012
Progress report no. 2	30.1.2014

Four amendments to the GA were done and approved by the EC during the project (see table below). The first two amendments were minor, containing only changes in names.

As reported already in Inception report, some costs were misclassified in the original GA and there were also mistakes in the allocation of the costs of the associated beneficiaries. These mistakes were corrected in the same amendment (i.e. amendment no. 3) with the first modification of project budget, the Supplementary agreement no.2 approved by the EC in the CL of 8 August 2012 (ARES 954174).

During the course of the project it also became evident that the cost structure of the project deviated considerably from the allowed flexibility margins in all cost categories. To correct this, the project requested a budget modification based on the incurred cost structure in June 2014 and was granted an amendment no. 4 i.e. the Supplementary agreement no.3 to the GA in the CL of 20 October 2014 (ARES 3469350).

Table on amendments to the GA

Modification	Date	Content
<i>Amendment no 1</i>	<i>7.12.2009</i>	<i>Change of the name “European Community” to “European Union”.</i>
<i>Amendment no 2, Supplementary agreement no. 2*</i>	<i>5.5.2010</i>	<i>Change in the name of associated partner.</i>
<i>Amendment no 3, Supplementary agreement no. 2</i>	<i>8.8.2012</i>	<i>1) Amendment of content of the actions B1, C1 C2 and C3, 2) modification of budget breakdown, 3) modification of reporting schedule, 4) revised forms A3, A4, C1b, C2, FA, FB, FC, F1, F2, F3, F4b, F5, F6 and F7.</i>
<i>Amendment no 4, Supplementary agreement no. 3</i>	<i>20.10.2014</i>	<i>1) Amendment of the action C2 (Tree removal), 2) modification of budget breakdown, 3) revised forms A3, A4/1, A4/2, C1c, FA, FB, FC, F1, F2, F3, F4a and F6</i>

** This first Supplementary agreement to the GA was incorrectly numbered as no. 2 by the EC. Following the mistake there are two Supplementary agreements no. 2 of the project.*

Preparation of the last two amendments caused considerable administrative burden but were necessary for successful implementation of the project.

3.4. Evaluation of the management system

Project management was very smooth throughout the project and no major problems were met. There are many factors that made this possible, including:

- Two of the project beneficiaries have earlier experience of managing LIFE projects and all three beneficiaries are experienced at managing large projects.
- The project had been planned very well so that the objectives and budget of the project were realistic and supported the functions and objectives of the beneficiary organizations, thereby ensuring that motivation for reaching the targets of the project was high.
- Regular project steering group and working group meetings and other contacts between beneficiaries and inside each beneficiary organization.
- The roles and obligations of each beneficiary had been set clearly in the partnership agreements.
- Highly motivated and talented project staff in each beneficiary organization. More than 100 people worked in the project, from planning officers to professor.

Without the partnerships of the beneficiaries implementation of the project would have been impossible. For example the level of scientific expertise necessary for making the analyses of monitoring data and writing reports based on the results can only be found in research organizations such as the University of Jyväskylä. The land purchase activities and preparation of management plans to the three privately owned conservation areas in the project could only be achieved by the KS ELY. The restoration planning, concrete conservation measures and dissemination work in the project, on the other hand, are something that only MH NHS can accomplish.

Communication with the Monitoring team has been very smooth and fruitful throughout the project. The MoT Ms. Milka Parviainen has been very quick to reply to any contacts by the project regarding a multitude of matters, from general issues such as how to calculate working hours in the project to very specific details related to budget modification requests and reporting. Moreover, the MoT has been an essential link between the project and the Commission. Implementing the project would have been very difficult without the support and help of the MoT.

Direct communication with the Commission has been sparse as most of the communication has been through the MoT. But, when there has been direct communication, it has been fruitful and helpful. And most importantly, all matters that have needed solving, for example several requests to the Commission in the earlier reports, have been solved in due time.

4. Technical part

The project dealt with the restoration of drained peatlands and increasing of awareness of the natural values of peatlands. The actions of the project included preparation of restoration plans and management plans. The key action of the project was the restoration of the hydrology of various kinds of drained mires and recreating the open mire landscapes by clearing and thinning tree stands. Various materials on mires were produced and excursions for several target groups organised to promote the protection of unique natural values of Finnish mires.

4.1. Action A1 Restoration plans

Foreseen in the GA: Preparation of 29 restoration plans covering a total of 2 478 ha by 3/2012. MH will draft 27 plans and KS ELY 2 plans (Saarisuo-Valleussuo and Suojärviensuot). The restoration planning areas will become more accurate during the planning process and may therefore change for the areas foreseen in the proposal.

Outcome: **Action successful and target exceeded.**

35 restoration plans covering a total of 3 715 ha were completed. 6 of the plans were not foreseen in the GA but had to be done to ensure successful restoration of the project sites. The additional restoration plans have been accepted by the EC e.g. in the CL of 30 October 2013 (ARES 3376163). In addition, the restoration objectives set in the plans were slightly modified for many sites from those in the GA as reported in Annex 7 of the Progress report 2. All restoration plans have been sent to the Commission with the earlier reports.

4.2. Action A2 Management plans

Foreseen in the GA: KS ELY will prepare 3 management plans (Aittosuo, Laihistenneva-Härkäneva and Kilpisuo) covering a total of 2 261 ha by 31/12/2013. The MPs will be approved according to national standards by the end of the project.

Outcome: **Action successful.**

3 managements were completed, covering a total area of 1624 ha. The MP for Kilpisuo (project site 23) covering 247 ha was completed in 11/2011 and annexed to the Progress report 1. The MPs for Aittosuo-Leppäsuo-Uitusharju (project site 19) covering 884 ha and Laihistenneva-Härkäneva (project site 20) covering 493 ha were completed in 11/2014. The area covered by the MP of Aittosuo-Leppäsuo-Uitusharju is smaller than foreseen in the GA as it was noticed during the preparation that only the part of the Natura2000 area that has been implemented by the Forest Act, i.e. Leppäsuo, owned by the UPM-Kymmene Ltd at (884 ha) was in need of a MP. The part Aittosuo is a national mire conservation area and the part Uitusharju is an esker area and both are with no such land use pressure that management planning would be needed. The decrease in surface area of the MP of Aittosuo-Leppäsuo-Uitusharju has no effect whatsoever on the success of the action A2 or other parts of the project.

The MPs and the related approval documents of Aittosuo-Leppäsuo-Uitusharju and Laihistenneva-Härkäneva are enclosed as annexes 2 and 3.

4.3. Action A3 Monitoring and communication plans

Foreseen in the GA: An electronic monitoring plan covering all monitoring actions, sites and methods will be made by 1.6.2010. A project communication plan for efficient and coherent internal and external communication will be compiled by 30.6.2010.

Outcome: **Action successful.**

The monitoring and communication plans were completed in 8/2010 and were submitted with the Inception Report. The plans were followed during to project to ensure the success of monitoring and communication actions.

4.4. Action A4 Preparatory training

Foreseen in the GA: Organising of two workshops on restoration methods, experiences, ecology of boreal peatlands and the LIFE project for staff involved with restoration works (planners, supervisors and forest workers). In total 40-80 participants. To be completed by 11/2010.

Outcome: **Action successful and target exceeded.**

As reported with more details in the previous reports, altogether 9 face to face trainings were organised for 378 people. Two of the trainings were nation-wide workshops on restoration methods, experiences, ecology of boreal peatlands and the LIFE project and targeted altogether 60 planners and biologists of MH. Seven trainings targeted mostly the forestry workers of Metsähallitus Forestry.

In addition, in 11/2011 MH NHS organized an internal video conference training session on the basis of the Forest Restoration Guidebook and project staff was actively involved in the preparation of the session. In 4/2014 MH NHS organized a similar internal video conference training session on the basis of the Mire Restoration Guidebook that was prepared in the project. The participants of these sessions are enclosed as annex 4 and 5.

As reported in the earlier reports, MH NHS and the project have also been active in co-organising seminars on restoration of peatlands and forests for key stakeholders and experts such as Ministry of the Environment, Finnish and regional Environment Institutes, Forestry Centres in 2011 and 2013.

4.5. Action B1 Land purchase

Foreseen in the GA:* In total 596 ha of land with mires and restoration areas in 6 Natura2000 areas to be acquired permanently for nature conservation by 15.3.2014. All areas owned by UPM-Kymmene Ltd.

* After Supplementary Agreement number 2 to Grant Agreement approved by the EC in the CL of 8 August 2012 (ARES 954174).

Outcome: **Action successful.**

Land purchase in the project was highly successful as 596 of land with mires and restoration areas were acquired permanently for nature conservation in 6 Natura2000 areas (see table below).

The payment proofs for Karstula and Sotkamo requested in CL of 19 December 2012 (ARES 1522234) are enclosed as annex 6.

Table on the areas and total costs of land purchase (table removed from the public version of the report).

4.6. Action C1 Restoration of hydrology

*Foreseen in the GA**: Restoration of hydrology by filling in ditches and building dams in 51 project sites covering 4 249 ha and 1 078 696 m of ditches by 30/11/2014.

* After the modifications approved by the EC in the CLs on 30 October 2013 (ARES 3376163) and 14 April 2014 (ARES 1172163).

Outcome: Action successful and target exceeded.

Hydrology restored by filling in ditches and building dams in 51 project sites, covering 4 790 ha and 1 183 527 m of ditches.

Restoration of hydrology was highly successful as the objectives set in the GA were achieved or exceeded in most sites. In a minority of sites the final restoration area or the length of ditches filled restored was lower than the objective for specific reasons and all of these decreases were compensated for in other project sites. More detailed information on the restoration of hydrology on each site can be found in annex 7.

The updated maps of sites where hydrology restoration actions have taken place since the PR2 are enclosed as annex 8. For the rest of the sites the maps have been delivered with the earlier reports.

4.7. Action C2 Tree removal

*Foreseen in the GA**: Tree removal is done at 45 project sites covering a total area of 3 152 ha (app. 20 000 m³). In several project areas trees are cleared from the ditch lines only and the trees are left on site (see table in the GA for sites with 0 indicated in the volume for trees). Clearing of ditch lines is needed for enabling the filling of the ditches with excavator. Income from timber and energy wood are estimated to app. 1 772 121 €. To be completed by 30.11.2014.

** After Supplementary Agreement number 2 to Grant Agreement approved by the EC in the CL of 8 August 2012 (ARES 954174), Supplementary Agreement number 3 to Grant Agreement approved by the EC in the CL of 20 October 2014 (ARES 3469350) and the CL on 30 October 2013 (ARES 3376163).*

Outcome: Action successful and target exceeded.

In total, tree removal was completed on 46 project sites in a total area of 3 313 ha. Cutting was done on 1 295 ha, resulting in app. 47 433 m³ of timber and energy wood (mainly pine) being removed and sold. Clearing of ditch lines was done on 2 018 ha. See annex 9 and annex 10 for more information on outcome of action C2 in each project site.

The updated maps of sites where tree removal has taken place since the PR2 are enclosed as annex 11. For the rest of the sites the maps have been delivered with the earlier reports.

Tree removal resulted in timber income of 1 894 594 €. Tree removal (cutting and clearing of ditch lines) costs were in total 2 367 172 € of which 1 876 465 € were External Assistance costs, 372 693 € were personnel costs, 74 589 € were travel costs, 4017 € were Consumable costs and 39 408 € were Other costs.

4.8. Action C3 Creation of dead wood

Foreseen in the GA: Creation of dead wood by felling trees and ring barking in 4 project areas covering 83 ha. To be completed by 30.9.2012.

Outcome: Action successful and target exceeded.

Dead wood was increased at six project sites in a total area of 103,2 ha. On the two extra sites the action was ecologically important and economically very cost-effective as the excavator and forest workers did the work while they were on the sites for restoration of hydrology. More detailed information of the action outcome on each site is enclosed as annex 12.

Maps of the areas of where dead wood has been created have been delivered with the earlier reports.

4.9. Action C4 Demolishing of unnecessary forest roads

Foreseen in the GA:* Demolishing of 2 890 m of forests roads with excavators in three project sites by 31.12.2014.

** After the CL on 4 April 2014 (ARES 1172163).*

Outcome: Action successful and target exceeded.

3 590 m of unnecessary and harmful forest roads were demolished with excavators at three sites, Pohjoisneva (Site 24) Hukkasuo (Site 29) and Saarisuo-Kurkisuo (Site 37). Saarisuo-Lurkisuo was not foreseen in the original GA but demolishing was necessary for restoration of hydrology at the site as the road was acting as a barrier blocking the flow of water in the

restoration area. The cost of demolishing the road at the extra site was negligible as the excavator demolished the road while it was filling the ditches at the site.

See annex 13 for more information on the demolishing of roads at each site. The demolished road at Pohjoisneva is shown on the map in annex 14. For the rest of the sites the maps have been delivered with the earlier reports.

4.10. Action C5 Improvement of sustainable recreational areas

Foreseen in the GA: Improving the recreational facilities at Kilpisuo. The action includes tearing down part of the existing duck boards and a bird watching tower, rebuilding the remaining duck boards and lower bird watching platform. Also new information boards will be placed. Detailed planning will be included in the management plan of the area. To be completed by 30.6.2012.

Outcome: **Action successful.**

Renewing of duckboards was completed in 10/2013. Replacing the old bird watching tower with a new one and installing new information boards was completed in 9/2014. See annex 15 for photos of the new bird watching tower and information boards. Photos of the new duckboards have been delivered with the earlier reports.

4.11. Action D1 Media cooperation

Foreseen in the GA: The project informs media on progress and actions of the project nationally and locally. The project prepares press releases (20) and invites press to the project sites. The aim is to have at least 110 articles/media hits on the project (including TV, Radio, internet, national and regional newspapers and special magazines).

Outcome: **Action successful and target exceeded.**

Overall objective (110 articles/media hits) was reached and exceeded by far with at least 251 articles/media hits by the end of the project (see annex 16).

Media coverage

The article/media hits have been screened by the media monitoring system of MH (M-Brain media observation for Metsähallitus during 1.1.2010-31.12.2012 and Merilkon Oy/Meedius International Oy media observation for Metsähallitus since 1.1.2013) and other search engines such as Google. It is very likely that many articles in local newspapers were missed in the media monitoring and the real number of media appearances is likely to be even higher than 251. The summary of articles captured from the media monitoring systems is enclosed as annex 17, list of media coverage as annex 18 and samples of press cuts and appearances in other media since the PR2 as annex 19.

The great majority of the articles on the project were either neutral or positive in nature and dealt very broadly with many different aspects of the project. The very few negative articles

mainly dealt with the philosophy of restoration in general i.e. that is restoration worth the money.

Press releases

24 press releases were prepared. The press releases were quite well picked up by the media and only a couple of press releases did not lead to article(s). See annex 20 for a summary of press releases and annex 21 for samples of press releases.

Media excursions

11 media excursions were organised. The media excursions were successful and resulted in good articles. See annex 22 for more information on the media excursions.

Websites

The websites were updated many times each year with new information on project progress as well as with the publications produced as part of the project. The project website was highlighted in press releases and other contacts with media. The average number of website visitors (app. 245 per month and 14 869 in total) was considerably lower than was foreseen in the GA. The number of visitors can nevertheless be regarded fairly good as the importance of traditional web sites in general has decreased during the project because of increase in use of social media (such as Facebook) as source of information. We also want to emphasize that the project has been very well presented in other types of media so we think that the visibility of the project has been very good overall.

4.12. Action D2 Mire tours for disabled people

*Foreseen in the GA**: Mire tour packages will be arranged to suitable areas (e.g. Haapakeidas and Torronsuo) for approximately 450-600 people during 2012-2014.

** After the CL on 4 April 2014 (ARES 1172163).*

Outcome: Action successful.

21 mire tours were organised for 585 people. Most of the tours were organized in collaboration with different associations. For more information on progress, see the summary of mire tours for disabled in annex 23, tour reports from the tours annex 24 and photographs from the tours in 2014 in annex 15. Please note that the photos from the tours have been taken by the attending people and we have the right to use them only in project reporting, not in other media work. The travel reports and photos from tours in 2013 have been delivered with the PR2.

Feedback from the mire tours was very positive and the attending people were very happy for the opportunity to visit mires safely and with a guide. For many of them the scents and sounds of the mire brought back memories of childhood and inspired them to plan future mire tours with their friends.

4.13. Action D3 Building of a mire exhibition

Foreseen in the GA: A mobile mire exhibition with light stands and a computer game will be produced for circulation in Nature Centres around Finland. To be completed by 31.12.2012.

Outcome: **Action successful.**

The mire exhibition was officially opened on 8.10.2012 in Nature Museum of Central Finland. Since then it has been on display in Nature Centres in different parts of Finland and also in the Zoo of Ranua (see the display schedule in annex 25).

The exhibition has been very popular and had more than 25 000 visitors already during the project. And moreover, the exhibition is already fully booked in different Nature Centres and a museum until July 2016 so many more people will be able to enjoy it long after the project has ended.

4.14. Action D4 Mire education for children

Foreseen in the GA:* Preparation of tour packages for mire excursions in Kauhaneva, Pyhä-Häkki and Salamajärvi (and other mire areas in Southern Finland) for kindergarten kids and pupils of 5. and 6. grades. Tour packages ready and tested by 31.12.2012. Tours arranged for 1000-3000 children during 2012-2014. The duckboards along the mire trail will be renewed and information boards will be set in along the trail.

** After the CL on 4 April 2014 (ARES 1172163).*

Outcome: **Action successful and target exceeded.**

The education package for the tours was completed in autumn 2012 and has been delivered with the earlier reports. The duckboards along the mire trail in Kauhaneva were renewed in autumn 2013. Photos of the new duckboards were delivered with PR2. 7 new information boards were installed in Kauhaneva in 2014 (see photos in annex 15).

Altogether 102 tours were organised for 3 558 children (and their teachers), mainly in the National Parks of Seitsemien, Torronsuo and Leivonmäki, in the Nature Centres of Seitsemien and Häme and in the Nature Museum of Central Finland. Feedback from the tours was mostly very positive and children as well as teachers have found the tours both educational and fun. For more information on progress of the tours, see the summary of mire tours for children in annex 26, travel reports from the tours organized in 2014 in annex 27 and photographs from the tours in 2014 in annex 15. Travel reports have been requested only from those school groups that have received monetary help from the project for covering the transportation costs from attending the mire tours. The travel reports and photos from 2013 have been delivered with the PR2.

Please note that the photos from the tours have been taken by the attending people and we have the right to use them only in project reporting, not in other media work.

4.15. Action D5 AV program on mires

*Foreseen in the GA**: The production of an AV presentation on mires and their significance and natural values to be presented in Nature Centres and at the Museum of Natural Sciences at Jyväskylä has been combined with the project DVD (action D6) to increase cost efficiency. To be completed by 31.12.2013.

** After the CL on 6 January 2012 (ARES 16837).*

Outcome: Action successful.

The planning of the DVD was started in 3/2012. The DVD was ready in 6/2014, including both Finnish and English versions. The English name of the DVD is “Boreal Peatlands Today”. It is made with a combination of drawing, storytelling and live pictures and it consists of 10 app. 3 minute long stories. A copy of the DVD was sent to all Nature Centres and the Museum of Natural Sciences at Jyväskylä for display in their AV devices. In addition, the stories have been uploaded to Youtube.com where they can be watched free of charge. Direct links to the stories in Youtube.com are provided in the project homepage. The stories have been advertised in several press releases.

By the end of the project the stories have been watched in Youtube.com 2 923 times.

A copy of the DVD is enclosed in the parcel with the Final report.

4.16. Action D6 Project communication

*Foreseen in the GA**: Preparation and maintenance of project website in Finnish, Swedish and English by 31.12.2010. Production of an updated peatland restoration booklet on mire restoration in Finnish (25 pages, 1000 copies) by 31.3.2014. Production and maintenance of an on-line picture database for communication purposes to be operational by 31.12.2010. Production of Layman’s report for the final report.

** After the CL on 6 January 2012 (ARES 16837).*

Outcome: Action successful.

Website

The project website in three languages (Finnish, Swedish and English) was opened in 6/2010 for the press event of 17.6.2010. Information on the project progress and the most important project deliverables (such as a video on the return of butterflies after restoration, the education package on mires, the mire restoration guidebook and the Layman’s report) were updated on the website. Links to important sources of information (such as the online picture database and descriptions of the project sites in the new joint websites of Finland’s environmental administration (<http://www.ymparisto.fi/en-US>)) were embedded.

Peatland restoration booklet

Roll-ups on the peatland restoration and forest restoration guidebooks were prepared in autumn 2012 to (pre-)market the guidebooks in SER Europe meeting in 9/2012 and other important events.

The Finnish version of the mire restoration guidebook was published in 8/2013 and can be downloaded in pdf format for free from <http://julkaisut.metsa.fi/julkaisut/show/1601> or via the project website. A paper copy was delivered with the PR2. The English version of the guidebook was published in 9/2014 and can be downloaded in pdf format for free from <http://julkaisut.metsa.fi/julkaisut/show/1733>. The pdf version is enclosed in two parts as annex 28. A paper copy is enclosed in the parcel with the Final report. The Guidebooks have been marketed and distributed in congresses, such as the SER Europe meeting in Oulu in August 2014, LIFE Platform meetings and other networking events and as part of the Boreal Biogeographical Natura2000 process. The feedback from the guidebooks has been very positive and the best practises of peatland restoration developed and used in the project will most likely be adopted in other countries and LIFE projects as well.

Online picture database

Picture database of the project was activated at social service (<http://yhteisoluonto.fi/gallery/>) during 2012. The picture database is only available in Finnish but the tips for using the database are presented also in English at the project website. Three mire related quizzes – Suo siellä (~What Makes a Mire), Soiden asukkaat (~Inhabitants of Mires) and Ihmisen jäljet (~Traces Made by Man) were published in 5/2014 at the social service <http://yhteisoluonto.fi/visat/>. The quizzes have been advertised in several press releases. See annex 29 for screen shots of the quizzes.

Layman's report

Layman's report was published in 12/2014 in Finnish, Swedish and English. All versions can be downloaded as pdf versions from the front page of the project website and are enclosed as annex 30. The Finnish and English versions were also published in paper format and are disseminated to the public mainly via Nature Centres in different parts of Finland. Paper copies of the Finnish and English versions are enclosed in the parcel with the Final report.

4.17. Action D7 Building of notice boards

*Foreseen in the GA**: Placing in total app. 140 notice boards (10-15 permanent size A1 boards and app. 130 temporary size A4/A3 boards) to strategic places in project sites. All boards placed by the end of the project.

* After the CL on 19 December 2012 (ARES 1522234).

Outcome: Action successful.

12 permanent size A2/A1/A0 notice boards have been placed on sites with significant recreational use (see table below). Photos of the boards in place at project sites are enclosed in annex 15. 75 A4/A3 size temporary notice boards informing about the restoration measures have been placed to such restoration sites where people can be expected to be moving (photos of boards on some of the sites were delivered with the PR2). In addition, 46 similar A4 size temporary boards have been placed on monitoring sites of hydrology, vegetation and

eutrophic fens to inform about how the effects of restoration are being monitored in the project (photos of boards on some of the sites were delivered with the PR2).

Table on permanent information boards.

Site
3. Petkelsuo
4. Kytäjä-Usmi
13. Lauhanvuori
14. Kauhaneva
18. Pässilänvuori
21. Pyhä-Häkki
26. Salamajärvi
31. Kotkanneva ja Pikku-Koppelon metsät
39. Kansanneva-Kurkineva-Muurainsuo
42. Rumala-Kuvaja-Oudonrimmet
49. Syöte
54. Pomokaira
12 permanent information boards in total

4.18. Action E1 Project coordination

Foreseen in the GA: Coordination of the project by a full-time project manager (PM), two regional co-ordinators from the permanent staff of MH NHS and a regional coordinator at KS ELY (for 23 months for actions under responsibility of KS ELY), MH NHS's Park chef from Pirkanmaa (actions D2-5) and a sales person to carry out and assist in the selling of timber. Resources needed in project coordination: 5 GPS devices, 3 mobile phones and digital cameras, 1 microscope, aerial and bird-eye photos, project logo, translation services, 150 T-shirts, Service Centre for Metsähallitus for administration.

Outcome: **Action successful.**

Project coordination has been fluent and cost-effective throughout the project. See below for more details.

Project personnel

Mr Mikko Tiira was employed as the full-time PM during 1.1.2010-28.2.2012 and as a part-time PM during 1.3.-31.8.2012. During 1.5.-31.8.2012 Mr Jouni Penttinen worked as part-time PM together with Mr Mikko Tiira. From 1.9.2012 onwards Mr Jouni Penttinen was the full-time PM. The PM was assisted by three regional co-ordinators from the permanent staff of MH NHS; Ms Maarit Similä for Southern Finland, Ms Päivi Virnes (during 1-4/2010) and Mr Jouni Elonen (during 5/2010-12/2014) for Ostrobothnia and Mr Mika Puustinen for Lapland. Park chef Ms Tuula Peltonen was responsible for the actions D2-5 and Ms Anne Rähä was the financial secretary of the project.

Ms Veera Tähtö worked as the regional co-ordinator for KS ELY. Prof. Janne Kotiaho coordinated the actions of JyU, assisted by Dr. Satu Huhtala as the financial administrator of JyU.

Financial monitoring

The PM made a detailed guide for financial reporting and accounting in the project, which was delivered to the project personnel in spring 2010. The guidelines were updated when needed e.g. when travel cost software was changed at MH NHS. The guidelines were also delivered to the associated beneficiaries.

At the start of the project, new financial monitoring instruments were developed in MH NHS for project cost accounting to meet the LIFE+ financial reporting requirements and to assist monitoring of the project expenses and balance online. The end result of the development work is called the "LIFE tool" which enables automatic and up-to-date monitoring of costs in each budget category, project action and site. The information can also be easily exported to excel in the form compatible with LIFE financial forms. An external consultant (KJK-tieto ltd.) was used in the production of the tool (see also Financial notes below).

The financial reporting system for timber sales in MH was also improved. Due to this new system there was no need to hire a sales person or acquire Access tool. The budget reserved for the sales person (40 000 €) was used for developing the LIFE tool (see also Financial notes below).

Also the working time recording system of MH NHS was developed so that LIFE timesheets could be easily made with the standard working time monitoring system of MH NHS.

4.19. Action E2 Advising and project group

Foreseen in the GA: Advising group involving 5 members from Metsähallitus and one member from each associated beneficiary will be established. The group will meet once a year. Project group for coordinating planning and restoration measures will be formed. The group will have two meetings a year. Also project groups for monitoring and communication actions will be formed.

Outcome: **Action successful.**

Project steering group

The PSG was formed in early 2010. The original members were reported in the Inception Report and since then there has been only three changes in the PSG: Ms. Sanna-Kaisa Juvonen was replaced as the PSG chairperson by Mrs. Pirkko Siikamäki who became the area manager of conservation for MH Ostrobothnia in 2012 and due to retirement of Mr. Yrjö Norokorpi's successor in the PSG was Mrs. Päivi Paalamo who is the new area manager of conservation for MH in Lapland and the original PM Mikko Tiira has been a member since 5/2012.

8 PSG meetings were held during the project. The topics of the first six meetings have been explained in earlier reports. Since the PR2 there have been two PSG meetings. The meeting of 6 May 2014 concentrated on preparation of the budget modification request that was sent to the EC in June 2014. The last PSG meeting was held on 3 November 2014 to discuss the EC response to the budget modification request and to plan the preparation of the Final report.

Project groups

Project group 'Restoration and monitoring' for coordinating planning, restoration and monitoring actions including 13 key persons (personnel involved with the restoration planning, monitoring and supervising restoration works on site) from Metsähallitus NHS and associated beneficiaries was formed in early 2010. The group had five bigger meetings during the project and the topics of these meetings have been explained in earlier reports.

Project group 'communication and public awareness' for coordinating and planning of communication and recreational actions formed of 6 key persons (personnel recreational services of Seitsemien NP and communication team) from Metsähallitus NHS and associated beneficiaries was formed in early 2010. The group had five bigger meetings during the project in which the upcoming media work was planned and the communication plan was updated.

In addition to the meetings mentioned above, there have been many smaller group meetings and one-to-one meetings and discussions on many topics related to the project actions.

4.20. Action E3 Networking

Foreseen in the GA: Active networking with mire specialists and other LIFE projects, organising of one national LIFE coordinator's meeting and inviting other projects to visit the project sites. Participation to GreenWeek in 2011 or 2012.

Outcome: **Action successful.**

The networking during the project was very active and the project attended many noteworthy networking events each year. Details of the most noteworthy events are given in annex 31 and photos of some of the events in 2014 can be found as annex 15.

4.21. Action E4. Coordination of monitoring

Foreseen in the GA: All monitoring actions will be planned in 2010 and the data analysis in detail to be made during 2013-14. This requires coordination between monitoring and planning specialists.

Outcome: **Action successful.**

Coordination of monitoring was fluent and in line with the monitoring plan prepared in action A3.

Meeting on the monitoring actions was held in Jyväskylä on 24.2.2010. During the meeting the goals, timetable and methods for the monitoring actions were discussed. The detailed planning of the implementation of the monitoring actions for year 2010 was made before the start of the field work season in 5/2010. The planning included defining of the monitoring sites, fine tuning of the monitoring setups and hiring of personnel for the field work. The planning of the monitoring actions was made in close co-operation with MH, JyU and KS ELY. The monitoring plan was completed in 8/2010 (see action A3). The plan included

detailed explanation on the methods for each monitoring action. See: also section 'Problems encountered' related to the clarification on the objectives of the monitoring actions.

MH nominated a person for coordinating monitoring actions. Ms. Similä coordinated the monitoring until 5/2010. Since 6/2010 The PM Mr. Jouni Penttinen was responsible for coordinating all mire monitoring actions of Metsähallitus. The PM was active in networking and communicating with researchers in different research institutes to make sure that the monitoring data collected in the project could be analyzed with best available methods. The PM also passed information on the monitoring actions and results in the project to LIFE colleagues, especially the Swedish LIFE to ad(d) mire project, the Latvian FOR-REST LIFE and the Finnish LIFE PeatLandUse project .

4.22. Action E5 Auditing

Foreseen in the GA: Audit of the project. Audit report to be attached to the FR.

Outcome: **Action successful.**

The project was audited by the KPMG Public Sector Services Ltd during 9.3.-20.3.2015. The audit report is enclosed in electronic form as annex 32 and is also included as paper version in the parcel with the Final report.

4.23. Action E6 General monitoring

Foreseen in the GA:* The technical success of the restoration actions (filling of ditches) will be observed during two years after the restoration measures in each site. The sites restored in 2014 will not be monitored during the project. There can be several monitoring sites in the project area.

** After the CL on 20 October 2014 (ARES 3469350).*

Outcome: **Action successful.**

General monitoring was done in total at 48 sites in years 2011, 2012, 2013 and 2014. In two sites that were restored in 2014 the general monitoring will be done after the project during 2015. The total sum of monitoring visits was 120 which is slightly higher than was foreseen. The reason is that many of the sites in fact consisted of several sub-sites that were restored in different years and therefore the site had to be visited many times over the years to cover all sub-sites 1 and 2 years after restoration. More information on number and dates of monitoring visits in each site is given in annex 33.

4.24. Action E7 Monitoring of hydrology

Foreseen in the GA:* Hydrology will be monitored in 23+2 sites once or twice before restoration and each year after restoration. Monitored elements are the level of the water table

and chemical characters such as nutrient balance and oxidation-reduction balance. The analysis of the water samples will be outsourced. Data loggers will be acquired.

** After the CL on 20 October 2014 (ARES 3469350).*

Outcome: Action successful.

Each year 3-4 water samples were collected and sent to contracting laboratory for analysing. The following attributes were analysed from the water samples: pH, conductivity, total N, total P, DOC and absorbance 254. In addition, automatic data loggers were placed to each site for receiving data on the water table height every 15 or 30 minutes. The logger data was been extracted from the loggers to a computer by Mr Jouni Penttinen for further treatment and analysing of the data. One control site (Poukamoinmäki) that is not an original project area was included in hydrological monitoring as a control for Usmi due to lack of a suitable control site in the original project areas. Poukamoinmäki and Usmi are both included in the N2000 network. The complete sampling system and co-operation was explained in the detail in the PR1. The hydrological monitoring at two extra sites, Pääoja and Vujenselänoja, in Syöte was approved by the EC in CL of 6 January 2012 (ARES 16837).

The monitoring was done each year as follows:

2014: 4 water samples were taken from 25 sites between May 12th and September 8th 2014 (see annex 34). The samples were collected by the field workers of MH NHS. The water chemistry analyses were conducted at Ahma Ympäristö Oy. The analyses of hydrological samples (water chemistry) were tendered in 3-4/2014 and Ahma Ympäristö Oy was selected as the contract laboratory. The logger data was extracted from the loggers to a computer by the PM during September 2014.

2013: 4 water samples were taken from 25 sites between May 13th and November 20th 2013 (see annex 34). The samples were collected by the field workers of MH NHS. The water chemistry analyses were conducted at Kokemäenjoen vesistön vesiensuojeluyhdistys ry as the option year of the contract was accepted by both the MH and the laboratory. The logger data was extracted from the loggers to a computer by the PM during late 2013.

2012: 4 water samples were taken from 25 sites between May 2nd and November 7th 2012 (see annex 34). The samples were collected by the field workers of MH NHS. The water chemistry analyses were conducted at Kokemäenjoen vesistön vesiensuojeluyhdistys ry. The logger data was extracted from the loggers to a computer by the PM during early 2013.

2011: 3 water samples were taken from 25 sites between May 9th and November 1st 2011 (see annex 34). The samples were collected by the field workers of MH NHS. The water chemistry analyses were conducted at Kokemäenjoen vesistön vesiensuojeluyhdistys ry. The logger data was extracted from the loggers to a computer by Mr Jouni Penttinen by the end of 2011.

2010: Water samples were taken from 23 sites between April 7th and November 3rd 2010 (see annex 34). Four samples for each site were collected except at four of six sites at Syöte were monitoring started in late August only two samples per site was collected. The field workers of MH NHS and JyU collected the samples. The water chemistry analyses were conducted at Kokemäenjoen vesistön vesiensuojeluyhdistys ry. The tendering for the analysis of hydrological samples (water chemistry) was conducted in 3-4/2010. The Ecological Research Institute (ETI), University of Eastern Finland was selected as the contract laboratory for

analysing the water samples. However, unexpectedly the laboratory of ETI was shut down in the beginning of June and all employees of the laboratory were laid off. Therefore it was necessary to select another laboratory for analysing the samples. As a result, the laboratory that was ranked as second best in the tendering, Kokemäenjoen vesistövesiensuojeluyhdistys ry was chosen as the contract laboratory for analysing the water samples during 2010-2012 with the option of continuing the contract.

Maps on the monitoring sites were included in the annex 32 of the PR1.

4.25. Action E8 Monitoring of vegetation

*Foreseen in the GA**: Permanent vegetation monitoring plots will be established at 37 (restored) sites (two sites/project area; treatment and control). 23 of the sites are the same as in the hydrological monitoring. Ground layer, trees and saplings will be assessed in each site before the restoration and after the restoration as defined in the monitoring plan.

** After the CL on 20 October 2014 (ARES 3469350).*

Outcome: Action successful.

The monitoring was done altogether at 39 sites on 25 areas. The monitoring visits were done each year as follows:

2014: Vegetation monitoring was done at 4 sites on 7 areas between July 4th and August 13th (see annex 34). The monitoring was done by field workers of JyU in southern Finland and by field workers of MH in Ostrobothnia.

2013: Vegetation monitoring was done at 12 sites on 7 areas between June 26th and September 27th (see annex 34). The monitoring was done by field workers of JyU in southern Finland and by field workers of MH in Ostrobothnia. In addition, field workers of JyU revisited 12 monitoring sites on 7 project areas to check the data from the previous year and to repair the monitoring plots where the plots had been found to be damaged in some way (e.g. the poles of the 1x1m monitoring plots disappeared). These sites are indicated in annex 34.

2012: Vegetation monitoring was done at 20 sites on 9 areas between 30th June and 16th August (see annex 34). The monitoring was mainly done by field workers of JyU in southern Finland. The remaining sites were inventoried by field workers of MH. Master's thesis of Ms. Hilja Vuori on the effect of drainage on vegetation was completed in 2/2012. The thesis is based on monitoring of vegetation in the project.

2011: Vegetation monitoring was done at 5 sites on 4 areas between June 30th and August 16th (see annex 34) by field workers of JyU. All vegetation monitoring project sites and areas (39 sites) were at this point sampled before the restoration measures. During 2011 analysis on the vegetation data before the restoration measures was conducted for the Master's thesis of Ms. Hilja Vuori.

2010: Vegetation monitoring was done at 25 sites on 13 areas between June 28th and August 8th (see annex 34). Establishment and inventorying of the vegetation plots were mainly done by field workers of JyU. The remaining sites were inventoried by field workers of MH. At

four sites (Syöte 2 and Liejusuo-Kaakkurisuo 2) vegetation plots were monitoring already prior to the project in summer 2009.

One control site (Kulhanvuori) that is not an original project area was included in vegetation monitoring as a control for Helvetinjärvi due to lack of a suitable control site in the original project areas as approved by the EC in the CL on 20 October 2014 (ARES 3469350). Kulhanvuori and Helvetinjärvi are both included in the N2000 network.

Maps on the monitoring sites (all foreseen) were included in annex 33 of the PR1.

4.26. Action E9 Monitoring of Lepidoptera

*Foreseen in the GA**: Line transects will be established on 12 project areas, each including 3 monitoring sites (pristine / restored / not restored). Weekly line transect censuses will be conducted once before and each year after the restoration in June and July.

** After the CL on 20 October 2014 (ARES 3469350).*

Outcome: Action successful.

The original to-be-restored monitoring sites at project areas 11 Haapakeidas and 30 Pilvineva were restored only in autumn 2014. This means that post-restoration monitoring data from these sampling sites was not acquired during the project. This did not jeopardize the analyses on effect of restoration on Lepidoptera under Action E13 (see Action E13 for more information).

The monitoring was done each year as follows:

2014: Line transect censuses were made at 10 areas, 30 sites that were restored in 2010, 2011, 2012 or 2013, i.e. all areas except Haapakeidas and Pilvineva that were restored in autumn 2014. The butterfly experts from KS ELY counted the butterflies and recorded indicator dragon fly species 7-11 times between May 19th and August 9th (see annex 35).

2013: Line transect censuses were made only at sites, which were restored (i.e. the ditches were filled in) in 2010, 2011 or 2012. Consequently the monitoring was made at 15 sites on five areas between May 14th and August 6th (see annex 35). The butterfly expert from KS ELY counted the butterflies and recorded indicator dragon fly species 9-11 times at Kukilankeidas, Pohjoisneva, Pyhä-Häkki, Pirjantanneva and Lauhanvuori.

2012: Line transect censuses were made only at sites, which were restored in autumn 2010 and autumn 2011 (i.e. the ditch filled in). Consequently the monitoring was made at four areas between May 15th and August 2nd (see annex 35). The butterfly expert from KS ELY counted the butterflies and recorded indicator dragon fly species 7-10 times at Kukilankeidas, Pohjoisneva, Pyhä-Häkki and Pirjantanneva.

2011: Line transect censuses were made only at sites, which were restored in autumn 2010 (i.e. the ditch filled in). Consequently the monitoring was made at two areas between May 31st

and August 3rd (see annex 35). The butterfly expert from KS ELY counted the butterflies and recorded indicator dragon fly species 8 times at Pohjoisneva and Pirjatanneva.

2010: Line transect censuses on 36 sites in 12 project areas were completed, between May 18th and August 6th (see annex 35). Each project areas included three monitoring sites (pristine, to be restored and drained), which were visited on average 8 times. The indicator dragonfly species were also monitored on the same occasions. The censuses were conducted by the field workers of KS ELY. All pre-restoration censuses were completed in 2010.

Maps on the monitoring sites (all foreseen) were included in annex 34 of the PR1.

4.27. Action E10 Monitoring of Odonata

*Foreseen in the GA**: Monitoring plots will be established to 11 project areas, each including 3 monitoring sites (pristine / restored / not restored) at which dragonfly larvae samples are collected from water puddles once before restoration, 1 year after restoration and 3 (or in two cases 2) years after restoration. In addition, adult indicator species are monitored during butterfly transect censuses.

** After the CL on 20 October 2014 (ARES 3469350).*

Outcome: Action successful.

The original to-be-restored sampling sites at project areas 14 Kauhanneva and 28 Seläntaus (sub-site II) were restored only in autumn 2014. This means that post-restoration monitoring data from these exactly same sampling sites was not acquired during the project. Instead the post-restoration samples were taken from slightly different places of the same project areas that were restored earlier during the project to make sure that the best possible data was available for analyzing the effect of restoration on Odonata under Action E13.

The monitoring was done each year as follows:

2014: Indicator adult dragonflies (5 target species) were checked along the butterfly line transects at 10 areas, 30 sites between May 19th and August 9th (see annex 35) and were also recorded if seen outside the transects. Larvae samples were collected with sweeping nets from water puddles or ditches at 33 sites in 10 project areas in the beginning of June (see annex 35). The censuses of adult dragonflies were conducted by field workers of KS ELY. The larvae samples were collected by field workers of MH NHS.

2013: Indicator adult dragonflies (5 target species) were checked along the butterfly line transects at 15 sites on five areas between May 14th and August 6th (see annex 35) and were also recorded if seen outside the transects. Larvae samples were collected with sweeping nets from water puddles or ditches at 9 sites in 3 project areas in the end of May and beginning of June (see annex 35). The censuses of adult dragonflies were conducted by field workers of KS ELY. The larvae samples were collected by field workers of MH NHS.

2012: Indicator adult dragonflies (5 target species) were checked along the butterfly line transects at 12 sites 7-10 times per site between May 15th and August 2nd and were also recorded if seen outside the transects. Larvae samples were collected with sweeping nets from

water puddles or ditches at 12 sites in 4 project areas in the end of May and beginning of June (see annex 35). The censuses of adult dragonflies were conducted by field workers of KS ELY. The larvae samples were collected by field workers of Metsähallitus NHS.

2011: Indicator adult dragonflies (5 target species) were checked along the butterfly line transects at 6 sites on average 8 times per site between May 31st and August 3rd and also recorded if seen outside the transects. Larvae samples were collected with sweeping nets from water puddles or ditches at 9 sites in 3 project areas in June (see annex 35). The censuses of adult dragonflies were conducted by field workers of KS ELY. The larvae samples were collected by field workers of Metsähallitus NHS.

2010: Indicator adult dragonflies (5 target species) were checked along the butterfly line transects at 36 sites on average 8 times per site between May 18th and August 6th and also recorded if seen outside the transects. Larvae samples were collected with sweeping nets from water puddles or ditches at 36 sites in 11 project areas between late May and Mid-Summer (see annex 35). The censuses of adult dragonflies were conducted by field workers of KS ELY. The larvae samples were collected by field workers of Metsähallitus NHS and identified by the expert at JyU during winter 2011.

Map on the monitoring sites during the project are included in annex 36.

4.28. Action E11 Monitoring of birds

Foreseen in the GA:* The breeding pair counts of golden plover (*Pluvialis apricaria*) will be made at c. 10 sites once before and each year after the restoration.

** After the CL on 20 October 2014 (ARES 3469350).*

Outcome: Action successful.

The monitoring site at project area 24 Pohjoisneva (sub-site I) was restored in only autumn 2014. This means that post-restoration monitoring data from this site was not acquired during the project. This did not threaten the analyses of the effect of restoration on birds under Action E13.

The monitoring was done each year as follows:

2014: The pair counts were conducted at sites restored in 2010, 2011, 2012 or 2013, i.e. at 10 sites in 7 project areas between June 2nd and June 19th by field workers of KS ELY (see annex 35).

2013: The pair counts were conducted at sites restored in 2010, 2011 or 2012, i.e. at 9 sites in 7 project areas between May 30th and June 10th by field workers of KS ELY (see annex 35).

2012: The pair counts were conducted at sites restored in 2010 or 2011, i.e. at 5 sites in 4 project areas (Pirjatanneva, Pyhä-Häkki, Salamajärvi and Seläntaus) between May 31st and June 11th by field workers of KS ELY (see annex 35).

2011: The pair counts were conducted at sites restored in autumn 2010. Breeding pair counts were conducted at 4 sites in 2 project areas (Pirjatanneva and Salamajärvi) between June 2nd and June 10th by field workers of KS ELY (see annex 35).

2010: Breeding pair counts were conducted at 11 sites in 7 project areas between May 31st and June 17th by field workers of KS ELY (see annex 35). All pre-restoration counts were completed in year 2010.

4.29. Action E12 Monitoring of eutrophic fens in northern Finland

*Foreseen in the GA**: Hydrology and vegetation of eutrophic fens (7230*) will be monitored at 3 project areas and 6 sites (3 treatment and 3 control). Similar methods are used as in actions E7 and E8. However, more chemical characters from the water samples will be analysed e.g. alkalinity.

* After the CL on 20 October 2014 (ARES 3469350).

Outcome: Action successful.

In addition to physical and chemical characters monitored and analysed in actions E7 and E8, also alkalinity and certain cations (Ca, Mg, K, Na, Fe) are analysed from water samples of eutrophic fens. Due to datalogger thefts from the original monitoring site (Site 43. Pitkäsneva) during the field season 2012, the hydrological monitoring was shifted from Pitkäsneva to Suuripää (FI1301811) during 2013, as approved by the EC in the CL of 19 December 2012 (ARES 1522234). Pitkäsneva was restored in autumn 2013 so the post-restoration vegetation monitoring will be done after the end of the project in 2015.

The monitoring was done each year as follows:

2014: Vegetation was inventoried on two sites at project area Tormuan Pohjavaara by field workers of MH NHS. Water samples were taken four times from 6 sites at Syöte, Tormuan Pohjavaara and Suuripää between May 13th and September 8th (see annex 37).

2013: Vegetation was inventoried on two sites at Syöte by field workers of MH NHS. Water samples were taken four times from 6 sites at Syöte, Tormuan Pohjavaara and Suuripää between May 27th and October 23rd (see annex 37).

2012: No vegetation monitoring was conducted in 2012 as the pre-restoration inventories were already completed in 2011 and the first after-restoration inventories were due in 2013 (see annex 37). Water samples were taken four times from 6 sites (Syöte, Pitkäsneva and Tormuan Pohjavaara) between May 14th and August 14th.

2011: Permanent vegetation monitoring plots were established and their vegetation inventoried on 2 sites at Tormuan Pohjavaara in August by field workers of MH NHS (see annex 37). All pre-restoration vegetation monitoring at rich fens was completed. Water samples were taken three times from 6 sites (Syöte, Pitkäsneva and Tormuan Pohjavaara) between May 30th and October 1st.

2010: Permanent vegetation monitoring plots were established and their vegetation inventoried on 4 sites (Syöte and Pitkäsneva between July 14th and August 8th (see annex 37) by field workers of MH NHS (Pitkäsneva) and by researchers of JyU (Syöte). Water samples were taken two times from 6 sites (Syöte, Pitkäsneva and Tormuan Pohjavaara) as the hydrological monitoring was established in late august/early September (see annex 37).

Map on the monitoring sites during the project are included in annex 38.

4.30. Action E13 Analysis and reports

*Foreseen in the GA**: The monitoring data will be analysed in detail using novel statistical methods. The results will be reported in the final report. The analysing of the results will be, however conducted throughout the project period. Special software will be acquired for the data analysis and also posters and other presentations will be prepared. The results and experiences of the project will be widely disseminated nationally and internationally. 6 reports completed by 31.12.2014.

* After the CL on 14 April 2014 (ARES 1172163).

Outcome: Action successful.

All monitoring data was analyzed and 6 monitoring reports were produced. The reports were prepared as follows:

General monitoring (E6):

The final report on general monitoring is enclosed as annex 39. The report was prepared by the PM on the basis of information collected during monitoring visits by the field workers of MH NHS.

Monitoring of Hydrology (E7 and E12):

The final report on monitoring of hydrology is enclosed as annex 40. The analyses therein were done and the report was prepared by the University of Oulu in collaboration with the PM during autumn 2014. To maximize the quality of the report the data collected in the project in actions E7 and E12 was pooled with all hydrology monitoring data collected by MH NHS using exactly the same methods during and before the project. This way we were able to use monitoring data from not only the 31 sites monitored in the project during 2010-2014 but data from altogether 52 sites monitored during 2008-2014. This enabled the use of sophisticated statistical and visual analyses and the analysing of effects of restoration several years after restoration actions which would not have been possible with data from only the projects 31 monitoring sites. The inclusion of the extra sites in the report lead to no extra costs to the project but gave very high added value to the project as we gained much more reliable results on the effect of peatland restoration on hydrology than would have been possible otherwise.

A preliminary report (in Finnish) on hydrological monitoring results till 2011 was prepared by Ms. Hilja Vuori and Prof. Janne Kotiaho from JyU during 2012 and 2013. The report was delivered with the PR2.

The novel and impressive results will be published presented for the first time in the European Geosciences Union General Assembly 2015¹. They will also be presented in scientific journals and other conferences within the next couple of years, highlighting the contribution the Boreal Peatland LIFE and also the LIFE programme in facilitating the successful restoration of peatland hydrology.

Monitoring of Vegetation (E8 and E12):

The final report on monitoring of vegetation is enclosed as annex 41. The analyses therein were done and the report was prepared by the JyU during autumn 2014. To maximize the quality of the report the data collected in the project in actions E8 and E12 was pooled with all vegetation monitoring data collected by MH NHS using exactly the same methods during and before the project. This way we were able to use monitoring data from not only the 43 sites monitored in the project during 2010-2014 but data from altogether app. 130 sites monitored during 2007-2014. This enabled the use of sophisticated statistical analyses and the analysing of effects of restoration several years after restoration actions which would not have been possible with data from only the projects 43 monitoring sites. The inclusion of the extra sites in the report lead to no extra costs to the project but gave very high added value to the project as we gained much more reliable results on the effect of peatland restoration on vegetation than would have been possible otherwise.

The Master's thesis of Hilja Vuori (in Finnish) on the effect of drainage on vegetation of mires, in part based on the vegetation monitoring done in the project during 2010 and 2011, was delivered with the PR2. The data was also used in preparation of a scientific article that will be published in a respected scientific journal², thereby effectively disseminating the work done in the project and with LIFE funding.

The impressive results acquired during preparation of the monitoring report will be published in other scientific journals and conferences within the next couple of years, highlighting the contribution the Boreal Peatland LIFE and also the LIFE programme in facilitating the successful restoration of peatland vegetation.

Monitoring of Lepidoptera (E9):

The final report on monitoring of Lepidoptera is enclosed as annex 42. The analyses therein were done and the report was prepared by the JyU in collaboration with the KS ELY during autumn 2014. In the analyses of Lepidoptera we have included data that had been collected already in 2003 and in 2007 from the 9 mires described in the *Request to the Commission* under action E9 of the PR2 to increase reliability in statistical testing. In this older data experimental setups were identical with the setups in the project and all pristine sites were included in the Natura 2000 network. In these areas restoration actions were performed between 2003 and 2005. By using this old data, we also got a geographically more extensive dataset and thus the results can be better generalised: in older data four study areas were located in Central Finland province and five areas in North Carelia province. The inclusion of the extra sites in the report lead to no extra costs to the project but gave added value to the project as we gained much more reliable results on the effect of peatland restoration on Lepidoptera than would have been possible otherwise.

The results will most likely be published in scientific journals and conferences within the next couple of years, highlighting the contribution the Boreal Peatland LIFE and also the LIFE programme in facilitating the successful restoration of peatland fauna.

Monitoring of Odonata (E10):

The final report on monitoring of Odonata is enclosed as annex 43. The analyses therein were done and the report was prepared by the JyU.

A scientific article on the results of monitoring of Odonata prepared by Merja Elo (JyU), Prof. Kotiaho and the PM has been prepared and will be published in the scientific journal BMC Ecology³ during 2015, highlighting the contribution the Boreal Peatland LIFE and also the LIFE programme in facilitating the successful restoration of peatland fauna.

Monitoring of Birds (E11):

The final report on monitoring of Birds is enclosed as annex 44. The analyses therein were done and the report was prepared by the JyU in collaboration with the KS ELY during autumn 2014.

The results will be most likely published in scientific journals and conferences within the next couple of years, highlighting the contribution the Boreal Peatland LIFE and also the LIFE programme in facilitating the successful restoration of peatland fauna.

Monitoring of Eutrophic Fens in Northern Finland (E12):

The hydrology data collected in action E12 was analyzed and reported together with the data collected in action E7 (see above) and the vegetation monitoring data collected in action E12 was analyzed and reported together with the data collected in action E8 (see above).

¹ Meseret Menberu et al. 2015. Peatland Restoration and effects on groundwater, water quality and runoff. EGU General Assembly 2015 (<http://egu2015.eu>) [abstract accepted].

² Elo, M., Kareksela, S., Haapalehto, T., Vuori, H. & Kotiaho, J.S. 2015. The mechanistic basis of changes in community assembly in relation to anthropogenic disturbance and productivity. Ecosphere [in press].

³ Elo, M., Kotiaho, J., Penttinen, J. 2015. The effect of peatland drainage and restoration on Odonata species richness and abundance. BMC Ecology [in press].

4.31. Action E14 After-LIFE conservation plan (ALCP)

Foreseen in the GA: ALCP describing the future actions and responsibilities as well as the resources will be attached to the final report.

Outcome: **Action successful.**

The ALCP is enclosed as annex 45.

5. Evaluation of Project Implementation

The project met or exceeded all of the set objectives as can be noted from the table below. .

Task	Foreseen in the revised proposal	Achieved	Evaluation
Restoration plans (A1)	29 plans	35 plans	Objectives met. Restoration plans enabled cost-efficient and ecologically effective restoration of hydrological regimes in all project sites during the project.
Management plans (A2)	3 plans	3 plans	Objectives met. Management plans were prepared during the project and will be followed/taken into action in the years after the project.
Monitoring and communication plans (A3)	2 plans	2 plans	Objectives met. Monitoring and communication plans were followed during the project.
Preparatory training (A4)	2 workshops / 40-80 participants	2 workshops, 7 other face-to-face trainings and 2 video conference trainings	Objectives exceeded. The trainings guaranteed that best practises were used during the project and will also be used in the future restoration activities.
Land purchase (B1)	596 ha in six N2000 areas	596 ha in six N2000 areas	Objectives met. With the amendment no 2 to the original GA, the bigger than foreseen land purchase activities ensured that the quality and coherence of 6 N2000 sites of high conservational value is secured for years to come.
Restoration of hydrology (C1)	4 249 ha / 1 078 696 m	4 790 ha / 1 183 527 m	Objectives exceeded. The efficient and economical use of best practises enabled the restoration of a considerably larger area than was anticipated, thereby significantly increasing the conservational value of the N2000 network in years to come.
Tree removal (C2)	3 152 ha / 45 sites	3 282 ha / 46 sites	Objectives exceeded. Considerably bigger effort to tree removal than was foreseen in the original GA was needed for the restoration of hydrology and the amendment no 3 enabled this. Large scale tree removal was needed especially because: 1) filling in of ditches by excavators is often only possible after the

			trees have been cleared and 2) without tree removal the transpiration by trees would in many cases lead to incomplete recovery of hydrology.
Creation of dead wood (C3)	83 ha / 4 project sites	103,2 ha / 6 project sites	Objectives exceeded. Dead wood will be available for saproxylic organisms for at least the next couple of decades on more sites than was foreseen in the GA.
Demolishing of unnecessary forest roads (C4)	2 890 m / 3 sites	3 590 m / 3 sites	Objectives met. Demolition of roads prevents unwanted traffic on the sites and also ensures the recovery of natural hydrology on the sites in the years to come.
Improvement of sustainable recreational areas (C5)	Replacing duckboards and bird watching tower, placing information boards	Duckboards and bird watching tower replaced, information boards placed.	Objectives met. Sustainable recreational use of Kilpisuo secured for many years to come.
Media cooperation (D1)	20 press releases, 110 articles/media hits, 10 media excursions	24 press releases, 251 articles/media hits, 11 media excursions	Objectives exceeded. The project, LIFE and the values of mires and the N2000 network were very well visible in media throughout the project period.
Mire tours for disabled people (D2)	Tours for 450-600 people	585 people / 21 tours	Objectives met. The tours brought joy and happiness for many people and at the same time highlighted the project and LIFE, the values of mires and the N2000 network.
Building of a mire exhibition (D3)	Mobile mire exhibition with light stands and a computer game circulating in Nature Centres	Mobile audiovisual exhibition with computer games circulating in Nature Centres	Objectives exceeded. The exhibition was visited by more than 25 000 visitors during the project and will be visited by many more in years to come.
Mire education for children (D4)	Mire excursions for 1000-3000 children, duckboards at Kauhaneva renewed.	102 mire excursions for 3 558 children.	Objectives exceeded. The tours brought joy and happiness for very many children and at the same time highlighted the project and LIFE, the values of mires and the N2000 network.
AV program on mires /project DVD (D5)	AV presentation on mires and their significance to be presented in Nature Centres and Museum of Natural Sciences in Jyväskylä (MNS).	DVD consisting of 10 stories on mire, their significance and the project presented in Nature Centres and Museum of	Objectives met. The DVD was presented in Nature Centres and the Museum of Natural Sciences at Jyväskylä during the project and will be presented in the years to come also, thereby telling people about the importance of mires, LIFE and the N2000

		Natural Sciences in Jyväskylä and available on Youtube.com.	network.
Project communication (D6)	Website, peatland restoration booklet, on-line picture database, Layman's report.	Website operational and updated regularly, restoration guidebook in Finnish and English, on-line picture database operational, Layman's report published.	Objectives met. Produced material/services effectively disseminated information on the projects progress and results during the project. The restoration guidebooks will be highly valuable many years after the project as the best practises will be utilised in many countries besides Finland.
Building of notice boards (D7)	10-15 permanent and 130 temporary boards	12 permanent and 121 temporary boards	Objectives met. The temporary boards highlighted the project, LIFE and N2000 network during the project and the permanent boards will continue to do so for many years to come.
Project coordination (E1)	Fluent coordination of the project	Fluent coordination of the project	Objectives met. Frequent contact between the PM and project staff ensured the timely progress of the project.
Advising and project group (E2)	Advising group and two project groups formed, meetings annually	Project steering group and two project groups formed, meetings at least annually.	Objectives met. Steering and project group meeting were needed for planning the project actions and for timely progress of the project in general.
Networking (E3)	Active networking with mire specialists and other LIFE projects, organizing a national LIFE coordinator's meeting and inviting other projects to project sites.	National LIFE Platform meeting organized, International LIFE Platform meeting co-organized, many scientific congresses attended, many LIFE project visits hosted.	Objectives exceeded. The project, LIFE and N2000 network were highlighted and the lessons learned during the project disseminated on very many occasions throughout the project. The dissemination work will continue in the future also without doubt.
Coordination of monitoring (E4)	Coordination between monitoring and planning specialists	Fluent coordination between monitoring and planning specialists	Objectives met. Having a nominated coordinator of monitoring actions was the key to success. The amount of people involved in the monitoring actions and the amount of data

			collected during monitoring were so great that somebody had to look after it quite closely.
Auditing (E5)	Audit report of the project to be attached to the FR.	Audit report of the project attached to the FR.	Objectives met.
General monitoring (E6)	Technical success of restoration actions will be observed two years after the restoration measures in each site.	Technical success of restoration actions observed two years after the restoration measures in each site.	Objectives met. The information collected during the monitoring visits will be used as background information in case problems in the recovery of hydrology or vegetation is noticed in years after the project.
Monitoring of hydrology (E7)	Hydrology will be monitored in app. 20 sites and 6 eutrophic fens with dataloggers and chemical analyses.	Hydrology was monitored in 25 sites and 6 eutrophic fens with dataloggers and chemical analyses.	Objectives met. The results of monitoring were analysed in the project under action E13 for short-term effects of restoration. The monitoring will be continued after the project and the results analysed again after several years to resolve also the long-term effects of restoration.
Monitoring of vegetation (E8)	Permanent vegetation monitoring plots established at 40 sites and 6 eutrophic fens.	Permanent monitoring plots established and monitoring done at 39 sites and 6 eutrophic fens.	Objectives met. The results of monitoring were analysed in the project under action E13 for short-term effects of restoration. The monitoring will be continued after the project and the results analysed again after several years to resolve also the long-term effects of restoration.
Monitoring of Lepidoptera (E9)	Line transects to be established at 12 project areas and censuses done once before and each year after restoration	Line transects established at 12 project areas and censuses done once before and each year after restoration	Objectives met. Post-restoration data from two project sites was not received during the project but this was minor set-back was overcome by including monitoring data from 2003 and 2007 in the analyses under action E13.
Monitoring of Odonata (E10)	Monitoring plots will be established to 11 project areas, larvae sampling before restoration, 1 year after restoration and 3 (or in two cases 2) years after restoration. In addition, adult	Monitoring plots established to 11 project areas, larvae sampled before restoration, 1 year after restoration and 3 (or in two cases 2) years after	Objectives met. The modifications to the original monitoring scheme in the original GA ensured good quality monitoring data. The results of monitoring were analysed in the project under action E13 for short-term effects of restoration.

	indicator species are monitored during butterfly transect censuses.	restoration. In addition, adult indicator species monitored during butterfly transect censuses.	
Monitoring of birds (E11)	Breeding pair counts of golden plover (<i>Pluvialis apricaria</i>) will be done at c. 10 sites once before and each year after the restoration.	Breeding pair counts done at 11 sites before restoration each year after restoration.	Objectives met. Post-restoration data from one project site was not received during the project but this was only a minor set-back and did not seriously weaken the quality of the data. The results of monitoring were analysed in the project under action E13 for short-term effects of restoration.
Monitoring of eutrophic fens in northern Finland (E13)	Hydrology and vegetation will be monitored in 6 eutrophic fens with dataloggers, chemical analyses and permanent vegetation monitoring plots.	Hydrology and vegetation was monitored in 6 eutrophic fens with dataloggers, chemical analyses and permanent vegetation monitoring plots.	Objectives met. The datalogger theft in one of the sites and the consequent shifting of monitoring of hydrology to a different site lead to slightly weaker data. This was compensated in the analyses under action E13 by analysing the data together with data of action E7. The monitoring will be continued after the project and the results analysed again after several years to resolve also the long-term effects of restoration.
After-LIFE conservation plan (E14)	The ALCP to be attached to the FR	The ALCP attached to the FR.	Objectives met.

The key to the great results achieved in the project is that the project beneficiaries have a long history of working with the topics of the project and the cost-efficient ways, i.e. best practises, for implementing the project actions were already in place when the project started. In the actions regarding restoration planning (Action A1) and concrete restoration actions (C1-C4) the expertise gained by MH NHS during the more than 25 years that it has been restoring different peatland and forest habitats made it possible to work very cost-efficiently and still ecologically effectively. In the land purchase action (B1) and preparation of management plans (A2), KS ELY's long experience in acquiring land for conservation purposes and existing good contacts with the key landowner UPM Kymmene Corp. were very important for the great results on these actions. In the analysing and reporting of monitoring results (E13) the scientific know-how and experience and good contact network of JyU was elemental in producing the high-quality monitoring reports on short-term effects of restoration on many hydrology, flora and fauna of mires.

There were also situations when developing new tools and/or practises was needed or found to be worthwhile. For example, developing new financial tools in an early phase of the project greatly helped the financial management of the project and also other LIFE projects where

MH NHS is the coordinating beneficiary. In the nature education actions (D1- D5) new ideas and ways of thinking and acting – such as active marketing of the mire tours – were likewise of great importance for reaching the rather demanding objectives set for the actions.

The dissemination work in the project was highly successful and effective and there were no major drawbacks. The project, LIFE and N2000 network were present in all major/relevant medias – TV, radio, national, regional and local newspapers and internet – at least 251 times during the project. After the initial problems - which were mainly due to lack of travelling funds at the schools and organisations working with disabled people - the mire tour actions (D2 and D4) were also highly successful and appreciated by the attending people. This will ensure that good words of the project, LIFE and N2000 network will be spread widely not only during the project but also long after the project has ended. The information in the AV program on mires and the permanent information boards set to the project sites with high recreational use will also spread of information for many years to come.

6. Analysis of long-term benefits and impact

6.1. Environmental benefits

6.1.1 Direct / quantitative environmental benefits

The greatest threats for the Natura 2000 peatlands of Finland are related to the ecological degradation, habitat destruction and lack of social appreciation. At the global scale degradation of peatlands is recognised as a major and growing source of anthropogenic greenhouse gas emissions. In Finland drainage is the major cause of ecological degradation of peatland habitats and drainage for forestry has affected almost two thirds of the original peatland area. Habitat degradation has been most intensive in Southern and Central Finland where only 25% of peatlands remain intact.

Peatland drainage has decreased the representativeness and species diversity of the Natura 2000 habitat types. Moreover, according to a national assessment, drainage is the most common cause for the peatland habitat types being threatened in Finland. Drainage and habitat degradation are also major threats for many HD Annex II, IV and V, and Birds Directive Annex I species.

At the beginning of the project Metsähallitus Natural Heritage Services and Finnish Environment Institute estimated that approximately 15 000 ha of peatlands which are nationally and internationally valuable as an essential part of Natura 2000 network were in need of restoration. During the project restoration of hydrology was completed at 51 N2000 sites on an area of 4 790 ha. As a result the hydrology and eventually also the natural succession of mires of the N2000 sites is regained on almost 1/3 of the area that was estimated to be in need of restoration.

The restoration actions in the project were undertaken on 4 673 ha of habitats that have been classified as HD Annex I habitats: 1 278 ha of Aapa mire (7310), 827 ha of Active raised bogs (7110), 2 183 ha of Bog Woodland (91D0), 221 ha of Degraded raised bogs (7120), 65 ha of Alkaline fens (7230), 78 ha of Transition mires (7140), 0,3 ha of Mineral-rich springs and springfens (7160) and 21 ha of Western Taiga (9110) (see annex 1). The area of the HD Annex I habitat types that has been directly positively affected by the restoration actions is even larger, 5 759 ha and includes Natural dystrophic lakes and ponds (3160) where natural water level was restored as a result of restoration of mires in the catchment (annex 1). The

area of direct impact is larger than the area where the actual restoration actions have been undertaken as ditch-filling may rewet hydrologically disturbed areas hundreds of meters away from the in-filled ditches. On the other hand the impacted area may also be smaller than the restoration area in cases where some large ditch at the margin of the N2000 area cannot be filled due to very high risk of flooding the neighbouring landowner's lands.

During the next decades the restored mires will increase in their natural value and become both structurally (habitats and species) and functionally (e.g. sequestration of carbon, flood control, nutrient uptake and circulation) closer to their natural state. Especially the hydrological recovery is important also from the perspective of water framework directive as peatland restoration may also enhance the hydrological condition of downstream water courses in long-term.

6.1.2 Relevance for environmentally significant issues or policy areas

According to international assessments on peatlands, biodiversity and climate change, peatlands are critical for biodiversity conservation; they support many specialised species and unique habitat types, and may provide a refuge for species that are suffering from climate change. Within the European Union, great majority of the boreal peatlands occur in Finland and therefore, Finland has a significant international responsibility for their conservation.

The project concentrated on implementing the Habitat Directive. The project areas were situated across Finland and formed a representative sample of unique Finnish peatland ecosystems. The project areas covered the sites chosen from entire Finnish N2000 network that most urgently needed active restoration and other project actions to prevent the impacts of degradation. On these N2000 sites restoration actions were undertaken on 4 673 ha of HD Annex I habitats (see above). On longer time perspective this will increase the representativeness of the habitats significantly and on their part helping to reach the favourable conservation status of the habitats and increasing the coherence and quality of the N2000 network significantly. HD Annex II, IV and V and Birds Directive Annex I species were also positively affected as the breeding and living conditions of the species are improved when the original hydrology and mire landscape return to the restored sites, thereby helping to reach the favourable conservation status of the species. Many of the habitats and species are also evaluated to be endangered in the national assessments of threat status and the restoration actions are necessary for lowering their national threat status as well.

The project actions are also highly important as part of the work towards reaching the biodiversity targets of the EU Biodiversity Strategy to 2020, especially the target of restoring at least 15% of degraded ecosystems. The nature education and dissemination work carried out during the project is also highly important in this work as understanding why and how the conservation actions taken in the EU are important for not only conservation of nature itself but also for securing the ecosystem services and human well-being. The contacts made with laymen and local stakeholders during the project also help reinforce cooperation and even building partnerships that are valuable for future work on reaching the biodiversity targets of the EU Biodiversity Strategy to 2020. The substantial monitoring effort by the project enhances our understanding on the expected effects restoration measures when aiming at the 15% target in EU countries and globally.

Pristine peatlands are the most efficient terrestrial ecosystems as carbon sinks. Peatland drainage is generally expected to halt peat growth and enhance the emission of carbon from peat to the atmosphere. This is especially due to increased aerobic decomposition in the

uppermost peat layer after water level drawdown, loss of peat forming vegetation and anoxic conditions that are essential for formation of new peat and through decay of peat under aerated conditions. On the other hand, recovery of original wet conditions after restoration is expected to enhance peat formation and enhance sequestration of C to the long-term sink in peat. While the carbon fluxes were not monitored in the project, we got indirect proof of restoring the ability of our project sites to act as carbon sinks through monitoring of hydrology and vegetation on many of the project sites. The monitoring results of water table levels clearly show that our restoration actions were in most cases successful i.e. we were able to raise the average water table level to the natural level or slightly above it. On the other hand, our monitoring of vegetation showed that after our restoration actions the peat-forming mire species (especially the *Sphagnum* mosses) are growing very rapidly and are replacing the forest species that had invaded the sites after drainage. This is very strong indirect proof that we have been able to stop the release of carbon from the decaying peat layer. On many restored sites the growth of *Sphagnum* is extremely strong which suggests that peat formation may even be much faster in restored sites than in pristine (un-drained) mires. The restored sites are now once again forming new peat and thereby sequestering carbon, perhaps even more effectively than pristine mires.

Pristine peatlands are also known to be important for flood control and as 'living filters' removing nutrients, DOC and other substances moving with water from catchments to recipient watercourses. In the light of most climate scenarios the importance of peatlands for flood prevention and prevention of negative water quality changes in rivers, lakes and seas is expected to increase with climate change as an increasing proportion of annual precipitation in Finland is supposed to fall down during winter time when the mineral soils are frozen and there is no vegetation cover in mineral soils. Restored peatlands can be expected act like pristine peatlands in flood control and as 'living filters'. Probably not immediately after restoration but within a few years after the disturbance caused by the restoration actions settles and the original mire vegetation recovers. Our results on monitoring of hydrology support this assumption as the chemical quality of pore water in the mires is significantly improved by restoration already in couple of years and the natural groundwater level and dynamics is recovered by restoration in an even shorter time.

The Boreal Peatland LIFE has played a part in the preparation of the new Peatland Protection Programme in Finland in many ways, by e.g. providing data on costs and cost-effectiveness of restoration actions, expert opinion on setting conservation priorities etc. In addition, the project played an important role in the Boreal Natura 2000 Biogeographical Process lead by Finland – and will continue to do so as the outcomes of the project will be introduced to restoration experts of Boreal region member states in several future events.

6.2. Long-term benefits and sustainability

6.3.1 Long-term / quantitative environmental benefits

We were able to restore 4 790 ha of peatlands, 4 673 ha of which have been classified as HD Annex I habitats. Moreover, the area of the HD Annex I habitat types that has been directly positively affected by the restoration actions is even larger, 5 759 ha. The outlook for these habitats is very good. Restoration was almost exclusively technically successful in the project sites and we were able to overcome the many challenges that are inevitable in restoration of mires, such as bad weather conditions preventing restoration actions, difficult hydrological conditions and sinking of excavators. According to our monitoring results the variables that can fairly be expected to show clear short-term response to restoration actions, i.e. monitoring

of hydrology and monitoring of Odonata, clearly show that the restoration actions have triggered the recovery of the natural habitats and species communities. In the other monitoring actions, i.e. monitoring of vegetation, butterflies and birds, the project period was found to be a bit too short to reveal clear response but it is safe to assume that the fauna and flora will benefit from the actions on longer term.

On most of the N2000 areas targeted by the project, all peatlands that were in need of restoration when the project started were restored during the project. In some of the biggest N2000 areas, especially Site 11 Haapakeidas, Site 12 Helvetinjärvi, Site 13 Lauhavuori and Site 14 Kauhaneva, tens to hundreds of hectares of drained peatlands still remain after the project. These areas will be restored in future as part of new LIFE projects and/or with other funding. There are, on the other hand, several project sites and other N2000 sites in Finland, where the N2000 habitat types and species are negatively affected by forestry drainage and other hydrological disturbances outside N2000 areas. Restoring and protecting such sites disturbing N2000 network should be highest priority in the future.

The media work and other dissemination work, such as the mire exhibition and the guided mire tours, done during the project has for its part helped spread information about the importance of mires for securing many vital ecosystem services that peatlands provide. We also believe that the discussion and the success of the project in part affected the important governmental decision to launch the preparation of a new national mire protection program, which will also include restoration. Overall, the atmosphere in Finland is currently favourable for (mire) conservation and delivering information on the values and restoration of mires is likely to aid in preserving this favourable atmosphere.

6.3.2 Long-term / qualitative economic benefits

The new financial reporting tools that were developed in the project have also been utilized in other LIFE projects where the MH NHS is a beneficiary such as Saimaa Seal LIFE (LIFE12 NAT/FI/000367) and Light & Fire LIFE (LIFE13/NAT/FI/000099) and will be utilized in LIFE projects to come. This leads to effective financial management of the LIFE projects, leading to considerable cost savings on long term.

The English and Finnish versions of the peatland restoration guidebook produced in the project helps disseminate the lessons learnt during the 25 years that MH has been restoring peatlands. By adopting the best practices explained in the guidebook and learning from the case studies of both successful and unsuccessful restoration actions described in detail in the guidebook, other restoration projects in Finland, other parts of Europe and indeed the World can avoid the many pitfalls that are related to peatland restoration. This may lead to use of cost-efficient restoration methods and thereby to considerable monetary savings.

About 100 contractors were needed in the execution of the restoration actions in the project. The experience that the contractors gained during the project will assure ecologically high-quality and cost-efficient execution of restoration actions in future restoration projects.

6.3.3 Long-term / qualitative social benefits

The project received a lot of media attention and public discussion (e.g. related to articles in the internet) has been vivid. In Finland many people find the restoration as valuable nature conservation work but many people consider mire restoration as waste of time and resources. Especially in the late phases of the project we emphasized in media work and project communication that the restoration actions carried out in the project had a significant impact

on local economies and employment. 100 contractors – excavator drivers, logging truck drivers, forest workers etc. – were employed in the project, amounting to a total of about 90 person-years. This opportunity for work was highly appreciated especially as in many of the areas where restoration sites were situated job opportunities are not very abundant. This is a very important message so disseminate to politicians who quite often tend to think that nature conservation work is expensive and decreases work opportunities and local economy.

The project put a lot of time and energy to producing different kinds of innovative educational materials especially for children but also for laymen and even high-ranking politicians as part of our mission ‘Placing love for mires in the hearts of everybody’. The “Teacher’s material for mire educations” has been taken into use as part of school teaching by many teachers and will be undoubtedly be used long after the project has ended. The audiovisual mire exhibition that has already been visited by tens of thousands of people of all ages will be circulating Finland for many years after the project thereby adding value to the efforts put to the project. The mire quizzes and DVD on mires have been made available for everybody on the internet so that accessing them is possible whenever and wherever. Also worth mention are the guided mire tours for children and disabled people that were highly appreciated by the attending people.

All the actions above will for sure have a positive effect on people’s attitudes towards mires and nature conservation in general on a time-span that goes far beyond the duration of Boreal Peatland LIFE.

6.3.4 Continuation of the project actions by the beneficiary or by other stakeholders

The MH NHS will continue carrying out peatland restoration in N2000 areas as a part of the new Peatland Protection Programme and the Forest Biodiversity Programme METSO 2008-2025 but on much smaller annual surface areas than was possible with the funding from Boreal Peatland LIFE. A plan is to combine the two above mentioned programmes to an extensive Life+ proposal that will be submitted in 2017 to return the area of annual restoration actions to the same level as it was during the Boreal Peatland LIFE.

The monitoring measures for monitoring hydrology and vegetation in the project will be continued by MH NHS as long as funding for it is available. Funding for 2015 is already secured. The monitoring measures developed and started in the Boreal Peatland LIFE have inspired the University of Jyväskylä to prepare a project proposal connected to restoration prioritization to the Horizon 2020 launch. If the project will be realized, monitoring measures of the Boreal Peatland LIFE will help the EU member states to fulfill the EU Biodiversity Strategy 2020 Target 2, Action 6a by developing a strategic framework to set priorities for ecosystem restoration.

The KS ELY will continue to purchase land for conservation as part of the Forest Biodiversity Programme METSO 2008-2025 and also as part of the new Peatland Protection Programme. KS ELY will also continue the management planning of Natura 2000 sites by updating the general plan concerning the management of the whole Natura 2000 network in Central Finland. Through this process the sites in need of more precise planning are recognized and prioritized.

6.3. *Replicability, demonstration, transferability, cooperation*

The restoration guidebook produced in the project was also published as an English version to disseminate the best practises used and lessons learned in Finland during the more than 25 years that peatland restoration has been done in Finland. The guidebook has been distributed to other LIFE projects and other restoration practitioners throughout Europe and even other parts of the world so that the same methods can be applied where possible and developed further where necessary. For example the guidebook has been disseminated to Boreal countries of the Natura 2000 Biogeographical Process and they have appreciated the input of the Boreal Peatland LIFE for producing such a useful restoration guidebook.

The Layman's report has been produced and disseminated in Finnish and Swedish versions to ensure that it is really accessible to laymen also in those parts of Finland where Swedish language is used by many people. The English version of the Layman's report is very useful in disseminating the results of the project to tourists and other foreigners that are visiting the Nature Centres in different parts of Finland and also serves as an example to other LIFE projects.

6.4. *Best practise lessons*

The best practise of peatland restoration at MH NHS is a four-step process. The adjustments to the steps and other lessons learned during the project are discussed below step by step:

1) Target setting. In most cases the aim is to restore the drained peatland to as close as possible to what the site was like before drainage. Old aerial photographs from time before drainage are used whenever available to estimate what the site was like before drainage.

- The importance of target setting was confirmed during the project. When we are working on N2000 areas, the target for restoration should always be to recover the original hydrology and peatland habitats. When working outside N2000, the target may be different, i.e. in some cases the target may be to enhance the quality of the habitat for game birds or for recreational use.

2) Restoration planning. All existing data on habitats, hydrology, species etc. of the intended restoration area in the GIS systems of MH NHS and other information sources is utilized and supplementary field inventories are done to get a clear vision of the characteristics of the site to be restored. With this information it is possible to evaluate which specific actions need to be taken in different parts of the site to ensure that the restoration will comply with the targets set for the restoration, that threatened and other noteworthy species and/or habitats will not be destroyed in the process and that the neighbouring lands are not flooded. Costs of the restoration actions are also evaluated.

- At the start of the project it was thought that restoration plans should always be similar and include rather high levels of detail. The experiences during the project lead to slight adjustments to the restoration planning process as the situations vary considerably from site to site. Now the restoration planning is considered to be a more dynamic process, i.e. the precise content and level of detail is adjusted to match the needs of the site in question. In many cases the plans need to be very precise and have high levels of detail whereas in other cases the restoration plan itself can be more robust and the more detailed planning should be done in restoration working plan given to the contractors and during the restoration action. This way the planning is more cost-effective without decrease in quality.

3) Restoration. As we are restoring peatlands that have been drained for forestry, the first step is to remove trees that have grown because of drainage. Old aerial photographs are used to estimate whether the site was originally open or semi-open. Tree removal is done by motorized harvesters during winter when the peatland is frozen and covered by snow to minimize the effect on peatland surface. In the autumn following tree removal, ditches are filled in by excavators. Different types of dams and surface barriers are built when necessary to direct the flow of water as desired.

- The restoration techniques used in the project have already been in use for many years before the project and no need for modifying the proven techniques was found during the project. Many small adaptations to local situations, such as re-directing of water to desired places by digging a new short ditch that feeds an Aapa mire water from the catchment or leaving birch trees on the site instead of felling them to decrease the risk of uncontrollable root sprouting of birches that leads to high transpiration of water by the trees.

4) Monitoring of the effects of restoration. During preparation of the project proposal a scientifically valid monitoring network for monitoring the effects of restoration on hydrology, flora and fauna was planned in collaboration with scientists and restoration practitioners. The first five years of the monitoring network executed as part of the project's E actions.

- The need for comprehensive and long-term monitoring of the effects of restoration was greatly emphasized during the project. With help of the monitoring data it is possible to detect sites where restoration has not been technically successful and techniques that may need to be modified. Even more importantly, high-quality monitoring data from many years is essential to be able to prove that restoration actions really lead to improvement of the habitat quality and help prevent loss of biodiversity. This is a task that cannot be left solely to research organisations as they have no means to execute restoration actions at the scales necessary for detecting changes and they have limited or no access to long-term funding sources necessary for implementing comprehensive long-term monitoring. The monitoring data – provided that the monitoring is well planned and conducted – can be of utmost importance in many uses besides and beyond the LIFE project. For example the monitoring results will most likely be used in the implementation and monitoring phase of the pan-European ELITE work. In the ELITE work a strategic framework for setting priorities for ecosystems is developed to reach the EU Biodiversity Strategy 2020 Target 2 “By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15% of degraded ecosystems”.

The project also faced many challenges – both financial and technical – that were not foreseen but to which solutions were found and adaptations were taken. The biggest challenges were:

1) High costs of tree removal (Action C2)

The extent of tree removal necessary for restoration of hydrology (C1) was found during the project to be much bigger than was anticipated in the GA. The area where tree removal was necessary was not significantly larger than foreseen (app. 140 ha) but the amount of trees that had to be removed was more than twice as high as foreseen.

The cost of tree removal is directly dependent on the amount of time that the harvesters and forest workers spend doing the work and on the total volume of trees that are removed, not on the area of tree removal. This led to much higher external assistance costs of tree removal (1 876 465 €) than was foreseen in the original GA (1 375 250 €) or in the Supplementary agreement no. 3 (1 542 383 €) approved by the EC in the CL of 20 October 2014 (ARES 3469350). Of this 1 894 594 € was covered by timbersales resulting from the tree removal.

The lesson learned here is that no matter how sophisticated GIS systems or other data sources are used in the preparation of project proposal, more detailed information will be acquired during the project. It is important not to stick deterministically to the original information but instead utilize the new information and modify the actions to be taken to assure that the important objectives of the project can be reached.

2) Restoration at project site 3. Petkelsuo

As reported in earlier reports, part of the dams at Petkelsuo (site 3) were burst and repaired several times during the project. The first vandalism act happened during summer 2011, the second sometime during winter 2011/2012 and the third sometime during autumn 2012 and February 2013. Sometime during winter 2013/2014 part of the dams were burst for the fourth time. In June 2014 we then once again repaired the broken dams. This time the dams were reinforced with wood and trees were felled on the dams to make it very difficult to break them again. In addition, we installed two game cameras for surveillance of the dams in the end of June. The cameras were secured in place by sturdy chain locks. They had built-in modems and they were programmed to send photos directly to an e-mail address that was opened for this purpose. In 6th of July, the cameras sent photos that made our planning officer suspect something was not right. She went to check the site on 10th of July and noticed that the cameras had been stolen. The police was contacted and the offense was reported. The dams were however not broken. After that we have been checking the site app. once a month and the dams have been left intact. So, it looks like the situation has stabilized and the dams will be left intact in future. The site will, however, be monitored in the future also in case of vandalism.

The vandalism cases at Petkelsuo caused a lot of work for the PM and planning officers responsible for the site. They also caused 1633 € of direct extra external assistance and consumable costs as the dams had to be repaired several times and surveillance (game) cameras had to be bought to monitor the site. The bright side of things is that the importance of mires and restoration of peatland and the project was highlighted in the local newspaper more than was expected at the start of the project. Also, the vandalism led to more contact and collaboration with the local landowners than is common for a restoration process.

3) Restoration at Haarasuo ja Kansikkopuro

As approved by the EC in CL of 30th October 2013 (ARES 3376163), due to objection by neighboring landowners the restoration of northern parts of Haarasuo could not be achieved and all restoration actions in Kansikkopuro are cancelled. This did not compromise the objectives of the project as the reduction in restoration area was compensated in other project sites.

The lesson learned from points 2) and 3) is that sometimes the attitude of local landowners can't be changed no matter how hard you try. Often the people involved are elderly and there are old traumas of some sort behind these cases. While it is very important to communicate with such landowners and try to find ways to reach an agreement with them, at some point one has to step back, let the dust settle and perhaps try negotiating again after a couple of years. Too much pushing may lead to negative counter-reactions and may lead to much bigger problems.

4) Monitoring actions

The objectives of the monitoring actions were somewhat unclear in the original GA and they had to be clarified and updated in previous reports and other CLs. The last update to the

objectives of monitoring was approved by the EC in the CL of 20 October 2014 (ARES 3469350).

As reported in the Progress report no 2, deviations from the original schedule of restoration of monitoring sites lead to the situation that the number of sites visited after restoration was lower than anticipated. For Odonata we corrected this by shifting the sampling sites for the two areas restored in year 2014 (Site 28 Seläntaus and Site 14. Kauhaneva) to slightly different parts of the same areas; these parts were restored earlier during the project. For butterflies and birds we were able to compensate for the lower number of sites monitored after restoration in the statistical analyses. Thereby the quality of the monitoring reports is as good as was anticipated in the original GA.

The most important lesson learned here is that changes in nature are slow. Project time span of a few years is very short for detecting changes in many variables, such as species numbers or community structure. Therefore it is wise to plan the monitoring in the project to be part of a monitoring network or similar that will be continued after the project. The monitoring done as part of the project may be able to reveal short-term responses if the monitoring is planned and conducted well. The long-term responses, which are the most important ones, can be revealed only many years later so there needs to be a mechanism to continue the monitoring actions after the project. The possibility to include the same monitoring sites in follow-up projects - LIFE or something else – is crucial to accomplish this. It is inefficient use of time and money to start new monitoring in every project as they will only be able to reveal short-term responses, if even that.

Another valuable lesson is that monitoring actions in a project should always be planned very carefully with scientists so that the monitoring set-up is good and feasible and that there are enough replicates to ensure that the results obtained can be analyzed properly and thereby generalized to beyond the sites that were monitored. Especially because there are many factors lurking, some of which are beyond the power of the project staff, for which the original project schedule and monitoring plan may need to be modified even several times during the project. Such deviations from the original schedule can easily lead to the situation that the objectives of the monitoring actions can't be reached.

6.5. Innovation and demonstration value

Due to extremely high degradation of peatlands at the Suomenselkä ridge area in Central Finland, a wide variety of measures were planned to improve the state of peatlands in this demonstration area. This was a very successful strategy as hundreds of hectares of peatlands both inside and outside N2000 were restored, 485 ha of peatlands were purchased for permanent conservation, 3 management plans were prepared and comprehensive monitoring of hydrology, flora and fauna was conducted during the project. The management planning focused on the management of sites protected under the Forest Act and resulted in better understanding on how the economical use of forest can continue in conformity with the Natura 2000 requirements. Overall, the project enabled a much bigger effort to conservation of peatlands than would have been possible without the project.

The “Teacher’s material for mire educations”, the mire exhibition and the DVD on mires are innovative and demonstrative approaches to providing high information input in materials that people can use by themselves long after the project has ended. As such they can really be said to add value to the project.

6.6. Long term indicators of the project success

- a) Recovery of natural hydrology. To be assessed by continuation of the monitoring conducted in the project.
- b) Recovery of natural vegetation. To be assessed by continuation of the monitoring conducted in the project

7. Comments on the financial report

7.1. Summary of Costs incurred

Costs incurred

Budget breakdown categories	Total cost in GA* in €	Costs incurred in €	%
1. Personnel	2 111 741	2 010 694	95,2
2. Travel and subsistence	315 423	302 558	95,9
3. External assistance	2 930 547	3 215 472	109,7
4. Durable goods			
Infrastructure	8 000	734	9,2
Equipment	0	0	N/A
Prototype	0	0	N/A
5. Land purchase / long-term lease	850 014	1 217 518	143,2
6. Consumables	81 209	65 851	81,1
7. Other Costs	45 688	55 457	121,4
8. Overheads	383 992	392 809	102,3
TOTAL	6 726 614	7 261 093	107,9

* After Supplementary Agreement number 3 to Grant Agreement approved by the EC in the CL of 20 October 2014 (ARES 3469350).

7.2. Accounting systems

7.2.1 MH NHS

The accounting system used at MH NHS is Web-Meritt 3.13. accounting system. The Meritt financial management system comprises the following modules: commercial accounting/accounting, purchase ledger, sales ledger, invoicing, business partner register and reporting (VAT reports, profit and loss account and balance sheet). The accounting of 6 organisations and 4 subsidiaries of the enterprise are maintained in Meritt. In addition, the highest 999 level comprises all organisations. The system is used for maintaining and producing all Metsähallitus accounting material from the current record of accounting to financial statements.

Interfaces to Meritt:

- IP – purchase invoices and account assignment in the purchase ledger, memos to main accounting
- M2 – account assignment from the travel expense account application to accounting
- Fixed assets – depreciations to accounting
- Analyste – account assignment of account transactions, payments and exchange rates to accounting and sales ledger
- Fenix – account assignment from payroll administration to accounting
- Winres – collective sales account assignment to accounting
- Sampo – purchase invoices, account assignment and supplier information to purchase ledger
- Cone invoicing – purchase invoicing and account assignment to purchase ledger
- Timber sales – sales invoices and account assignment to sales ledger
- VuokraGis – sales invoices, account assignment and customer information to invoicing
- Sapling invoicing – sales invoices, account assignment and customer information to sales ledger
- Seed invoicing – sales invoices and account assignment to sales ledger
- SAP – sales invoices, account assignment and customer information to sales ledger
- Excel accounting memo – account assignment to accounting

The electronic Basware Invoice Processing system IP 5.1.5 is used for the electronic processing of purchase invoices. The system, suitable for receiving electronic invoices and invoices on paper scanned into the system, includes the electronic processing, verification, allocation and approval of invoices and their transfer into the accounting system.

The Basware Invoice Processing system comprises several applications used for performing various tasks at the various stages of invoice processing:

Application	User	Purpose
Thin Client	Factual verifier/acceptor	Factual verification and approval of invoice
Property management	Main user of the Tori procurement system	Automatic balancing of orders made via the Tori procurement system and purchase invoices sent by the supplier
Admin	IP main user	main user's tasks
Master	Financial Secretary	management of the purchase invoice flow
Monitor	Financial Secretary other person responsible	browsing of purchase invoices

The **Master** application enables supervision of invoice processing in the system. It is used for entering the basic information of invoices and account assignment data, defining the settings for processing and sending the invoices into the process. Once the process is complete, the Master application is used for the final verification of invoices, making amendments, if any, and transferring the approved invoices into the accounting system. The Master application also facilitates one-by-one scanning of paper invoices.

ThinClient is an application for the posting, verification and approval of invoices. All incoming invoices (except for the ones treated in the M2) are transferred to the IP ThinClient. In the IP ThinClient the invoices first go to the project secretary for filling in the basic information such as the project reference code. Then the invoice is forwarded to the employee

who is responsible for the invoice for checking the invoice and filling in all remaining necessary information such as cost centre ('Kustp'), Amäärä and Bmäärä. When the invoice is found to be correct and all necessary information is filled in, the person forwards the invoice to the person who is in charge of the cost centre in question for approving. Only after the approval is the invoice payment transferred to bookkeeping.

Monitor is an application that can be used for analysing and reporting. It includes a wide range of search terms to enable searches of invoices and reports.

Property management (OM-hallinta) is an application related to the automatic reconciliation of orders made via the Tori procurement system and purchase invoices sent by suppliers. The reconciliation settings created in the application (Tori suppliers, reconciliation tolerance, requirement for acknowledging receipt of orders) define the automatic reconciliation of an order and the corresponding purchase invoice. Reconciled purchase invoices are transferred in IP to invoices ready for transfer to await transfer to accounting, in other words purchase invoices do not go to factual verification or approval. Property management is only used by the main user of the Tori procurement system.

Admin is the system main user's tool. Service centre financial services are responsible for the maintenance of IP applications, user support and instructions and user management. Invoice image, account assignment and process log data are archived in accordance with a centralised archiving process by saving on DVD.

The system for treatment of travel expense claims, driver's logs and expense claims is Logium M2. A travel expense claim is saved in the system as a travel log by the traveler. Costs are allocated to specific projects by use of project codes and with posting rules the use of cost dimension items and bookkeeping accounts are limited. In many cases travel expense claims include different documents received when costs have been paid e.g. in cash. The documents are scanned/photographed and attached to a travel expense claim. Travel expense claims are rotated and approved electronically. All travel expenses and expense claims are approved by a two-level route: the traveller first sends the claim to a financial secretary for verification and only after that the claim is forwarded to the person who is in charge of the cost centre in question for approving. Furthermore, certain travel expense claims (eg. those related to a project) are guided to a different approval path from the one defined for a traveller as a default (e.g. to a project secretary. Travel expense claims are paid after the final approval. Information on paid transactions is transferred to bookkeeping with a bookkeeping interface. M2 is connected to other financial administration systems, i.e. bookkeeping system Meritt, salary and personnel system Fenix and Nordea First Card system, with interfaces.

MH NHS's standard time registry system (AKS) is used in the project. The AKS has been equipped during the project with mechanisms that enable the same references to be inserted as are used in the accounting systems and also a standard reporting template that enables easy printing of time sheet that includes all the necessary information. The printed time sheets are signed by the employee and his/her superior.

In the beginning of the project financial guidelines were prepared and disseminated to the project crew of MH NHS. The guidelines included clear instructions that a clear project reference should be asked to every invoice and that in cases of missing reference a new invoice should be asked. The most commonly used reference in invoices was Suoverkosto-LIFE (LIFE08/NAT/FIN/000596) or simply Suoverkosto-LIFE. 'Suoverkosto-LIFE' is the Finnish name of the project.

In all systems of the MH NHS the costs of the project are identified by the reference code '7001'. For all costs bearing the reference '7001' in IP, M2 or AKS also other data cells are obligatory for identifying the cost category ('KomKoh'), project action ('Amäära') and project site ('Bmäära') to which the cost item relates to.

7.2.2 JyU

University of Jyväskylä has implemented SAP system in financial administration functions 1st of January 2010. Before that university was part of Finland state legal personality and accounting was conducted within state central accounting. System used then was AdeEco. The new University Act in Finland came into operation 1st of January 2010.

SAP financial administration system includes following modules:

Budgeting

Cash management

Accounting (Before 1.1.2010 AdeEco)

Fixed assets (Before 1.1.2010 AdeInv)

Sales invoicing and ledger (Before 1.1.2010 AdeEco)

Purchase ledger (Before 1.1.2010 AdeEco)

Project management (Before 1.1.2010 AdeEco)

Internal accounting (Before 1.1.2010 AdeEco)

Also, SAP HR is being implemented starting 2011, including as of now following modules

Organisation management

Employment management

Electronic services for employees and supervisors

Travel management (SAP Travel) (Before 1.1.2011 Personec Travel)

Boreal Peatland Life project codes at JyU are

A3: Monitoring plans (T)	210000081711
E1: Project coordination (T)	210000081712
E2: Advising and project group (T)	210000081713
E3: Networking (T)	210000081714
E4: Coordination of monitoring (T)	210000081715
E6: General monitoring (T)	210000081716
E7: Monitoring hydrology (T)	210000081717
E8: Monitoring vegetation (T)	210000081718
E9: Monitoring lepidoptera (T)	210000081719
E11: Monitoring birds (T)	210000081720
E12: Monitoring eutrophic fens in No (T)	210000081721
E13: Analyses and reports (T)	210000081722

Preposting and approving of purchase invoices is done using Rondo system, which allows electronic archiving and documenting. Preposting and approving of Travel claims is done using SAP Travel system.

Time recording system SoleTM is linked to SAP system. Based on paid salary and allocated and approved working hours, personnel cost is allocated to each project.

Project management is included in SAP system. Each project is a cost object within University accounting, and is therefore possible to report separate. A cost, like purchase invoice can be charged to only one cost object.

The University rules and regulations – document (Johtosääntö in Finnish) approved at the University Board, regulates the authorizations of deans and department managers. Department manager is responsible of approving the costs of the department, including the projects the department is carrying out. Department manager may give authorization to project manager or vice manager to approve of the costs.

The operating unit carrying out the project is responsible for preposting and approving of invoices and in-coming funding according to project agreement and funding regulations and rules. The guidelines at JYU included clear instructions that a project reference should be asked to every invoice. The most commonly used reference in invoices was Suoverkosto-LIFE (LIFE08/NAT/FIN/000596), Suoverkosto-LIFE or JYU project number for this project. ‘Suoverkosto-LIFE’ is the Finnish name of the project.”

Purchase invoices are always first checked, preposted and charged to the individual project, by a person working in the faculty, then approved by an authorized person, (project manager or department manager) before payment.

The financial administration office in the university controls the roles and functions each employee is given access to in the systems with which financial administration is conducted.

University of Jyväskylä is a client of Certia Oy in regard of certain financial and personnel services. Certia Oy does the actual paying the invoices according to the agreement between University of Jyväskylä and Certia.

According to the university law, rector of the university has the authority to recruit personnel. Rector has given 8th of February 2011 a decision describing rights and responsibilities unit managers and other employees have regarding personnel process. Salary process is handled in Certia, according to university decisions.

The personnel on University of Jyväskylä allocates working hours for projects and other cost objects using application SoleTM. The employees allocate working hours and approve them. The allocated working hours are then checked and approved by an authorized person in the department or faculty of Jyväskylä University in the first week of each month. Each employee’s monthly salary and the amount of hours are used to calculate actual cost for each cost object, i.e project. This cost is then brought to project accounting. The annual working time of teaching and research staff shall be 1 600 hours. Other staff (not teaching or research staff): working hours shall average no more than 7 hours and 15 minutes per day, and 36 hours and 15 minutes per week.

7.23 KS ELY

Preposting and approving of purchase invoices is done using Rondo system to which invoices are received (electronic invoices) or scanned via Opus Capita. The basic information (such as bank account, sum of the invoice etc.) is filled in Rondo by The Central Government Service Centre for Financial Administration and HR (CGSCFA). The CGSCFA then forwards the invoices for further treatment to the appropriate ELY Centre.

All invoices of the project bear the project name or other project code (see below), based on which the CGSCFA forwards the invoice to Ms. Veera Tähtö (the internal coordinator at KS

ELY) for posting and verification. Ms. Tähtö then forwards the invoice to the manager of the cost centre in question, i.e. to Mrs. Päivi Halinen (KS ELY's representative in the project steering group) for approval. Approved invoices are transferred by the CGSCFA to Raindance bookkeeping system from which the payment is transferred to the biller. The invoices are archived in the Rondo system and bookkeeping information are kept in the Raindance bookkeeping system.

The system for treatment of travel expense claims, driver's logs and expense claims is Logium M2 (see general description under MH NHS). Travel claims of the project are approved by Mrs. Päivi Halinen. The paid claims are archived in the Rondo system and bookkeeping information is transferred to Raindance bookkeeping system.

Recording of working time is done in Taika time recording system. The daily working hours are 7,25 hours. Each employee is responsible for recording his/her working time in the Taika regularly. Superiors monitor the use of working time by their employees. Working time used in implementing projects is specifically allocated to projects. In Boreal Peatland LIFE, working time reports of the project personnel are printed out from the Taika and signed by the employee and their superiors each month. The Taika system is closed every three months and after closing of a period, no changes to it can be done.

Salaries and fees are treated in Personec system. To each person working in a project a appointment/secondment document is prepared, including the project reference, salary information and duration of the appointment/secondment. The CGSCFA transfers the information in the secondment document to the Personec system. The information is used by the Personec in formation of a payroll for each person for each month. The payroll is verified and approved in the ELY Centre in question. Bookkeeping information is transferred to the Raindance bookkeeping system

Ledger books and other bookkeeping reports are printed from the Raindance bookkeeping system.

Boreal Peatland Life project codes at KS ELY are:

- 20T0020 (A1 Restoration plans)
- 20T0021 (A2 Management plans)
- 20T0022 (B1 Land purchase)
- 20T0023 (C5 Improvement of sustainable recreation areas)
- 20T0024 (D1 Media cooperation)
- 20T0025 (E1 Project coordination)
- 20T0026 (E2 Advising and project group)
- 20T0027 (E9 Monitoring of Lepidoptera)
- 20T0028 (E11 Monitoring of Birds)
- 20T0029 (E13 Analysis and reports)
- 20T0057 (E9 Monitoring of Lepidoptera)
- 20T0062 (all salary costs of the project 2011-2014)

7.3. Auditor's report/declaration

The project was audited during 9.3.-20.3.2015 by:

KPMG Public Sector Services Ltd
PO Box 1037
FI-00101 Helsinki
Finland

The auditor's report is enclosed in electronic form as annex 32 and is also included in paper form in the parcel with the Final Report.

7.4. Summary of costs per action

Action no.	1. Personnel	2. Travel and subsistence	3. External assistance	4.a Infrastructure	4.b Equipment	4.c Prototype	5. Purchase or lease of land	6. Consumables	7. Other costs	TOTAL
A1	244190	14022	448	0	0	0	0	7299	18	265977
A2	70315	3516	0	0	0	0	0	0	0	73831
A3	3766	95	0	0	0	0	0	0	0	3861
A4	14963	2103	0	0	0	0	0	0	60	17126
B1	7374	1108	0	0	0	0	1217518	0	0	1226000
C1	201954	73212	1066767	0	0	0	0	9242	3536	1354711
C2	372693	74589	1876465	0	0	0	0	4017	39408	2367172
C3	2453	0	0	0	0	0	0	0	1451	3904
C4	0	2242	0	0	0	0	0	0	0	2242
C5	16147	11001	12113	0	0	0	0	11210	0	50471
D1	15340	1877	0	0	0	0	0	0	40	17257
D2	5573	3937	273	0	0	0	0	0	325	10108
D3	12911	633	11875	0	0	0	0	5541	298	31258
D4	22670	8185	32219	0	0	0	0	502	0	63576
D5	4330	16	41875	0	0	0	0	0	0	46221
D6	60456	1626	76051	0	0	0	0	3077	69	141279
D7	3177	0	1730	734	0	0	0	126	163	5930
E1	379253	9051	20392	0	0	0	0	1312	3106	413114
E2	27509	1378	0	0	0	0	0	0	1049	29936
E3	26675	15988	1386	0	0	0	0	0	2699	46748
E4	34223	410	0	0	0	0	0	129	0	34762
E5	189	0	11779	0	0	0	0	0	0	11968
E6	21843	10512	0	0	0	0	0	120	0	32475
E7	56523	11768	45803	0	0	0	0	15529	2245	131868
E8	62886	12479	0	0	0	0	0	6029	0	81394
E9	92747	35218	0	0	0	0	0	949	0	128914
E10	7687	2602	0	0	0	0	0	419	129	10837
E11	13511	4989	0	0	0	0	0	350	0	18850

E12	354	0	6296	0	0	0	0	0	38	6688
E13	226106	0	10000	0	0	0	0	0	824	236930
E14	2876	0	0	0	0	0	0	0	0	2876
Over-heads										392809
TOTAL	2010694	302558	3215472	734	0	0	1217518	65851	55457	7261093