



MONITORING THE VEGETATION RECOVERY IN ØSTERILD PLANTAGE 2013

Part 1

Technical Report from DCE – Danish Centre for Environment and Energy

No. 30

2013



AARHUS
UNIVERSITY

DCE – DANISH CENTRE FOR ENVIRONMENT AND ENERGY

[Blank page]

MONITORING THE VEGETATION RECOVERY IN ØSTERILD PLANTAGE 2013

Part 1

Technical Report from DCE – Danish Centre for Environment and Energy

No. 30

2013

Peter Wind

Aarhus University, Department of Bioscience



AARHUS
UNIVERSITY

DCE – DANISH CENTRE FOR ENVIRONMENT AND ENERGY

Data sheet

Series title and no.:	Technical Report from DCE – Danish Centre for Environment and Energy No. 30
Title:	Monitoring the vegetation recovery in Østerild Plantage 2013
Subtitle:	Part 1
Authors:	Peter Wind
Institution:	Aarhus University, Department of Bioscience
Publisher:	Aarhus University, DCE – Danish Centre for Environment and Energy ©
URL:	http://dce.au.dk/en
Year of publication:	November 2013
Editing completed:	November 2013
Referees:	Bettina Nygaard & Jesper Fredshavn
Financial support:	Ministry of Environment, Nature Agency Thy
Please cite as:	Wind, P. 2013. Monitoring the vegetation recovery in Østerild Plantage 2013. Part 1. Aarhus University, DCE – Danish Centre for Environment and Energy, 40 pp. Technical Report from DCE – Danish Centre for Environment and Energy No. 30 http://dce2.au.dk/pub/TR30.pdf
	Reproduction permitted provided the source is explicitly acknowledged
Abstract:	The trees in a part of Østerild Plantage have been cut down to give room for a national test center. Before the afforestation DCE has performed a baseline monitoring in the summer of 2011. DCE has in late summer 2013 re-monitored the recovery of the vegetation cover in the northernmost part of the afforested area that was covered by plantation of <i>Pinus mugo</i> . The results from the re-monitoring are presented in the report.
Keywords:	Østerild Plantage, monitoring, vegetation cover, vegetation composition, shifting dune vegetation, <i>Pinus mugo</i> plantation, pin point analysis, documentary circle, litter layer thickness, light penetration.
Layout:	Graphic Group, AU Silkeborg
Front page photo:	Peter Wind, afforested dunes at Østerild, 6. September 2013.
ISBN:	978-87-7156-042-8
ISSN (electronic):	2245-019X
Number of pages:	40
Internet version:	The report is available in electronic format (pdf) at http://dce2.au.dk/pub/TR30.pdf

Contents

Summary	5
Resumé	6
1 Objectives	7
2 Methodology	8
3 Results	9
4 References	11
Appendix	12

[Blank page]

Summary

The overall objective of the monitoring programme in Østerild is to document the outcome of the restoration project targeting open dune habitats following clear-cutting of parts of the dune plantations in the National Test Center facility. The first phase of the monitoring programme performed in July 2011 has included a recording of plant species composition and soil conditions prior to the clearing of the dune plantations (the baseline monitoring).

Sample areas and plots for the baseline monitoring were laid out in 2011 in a stratified random way in order to cover the variation in starting points of the vegetation development and the restoration measures. Stratification was applied according to baseline condition (forest type), planned post-cutting treatments of litter layer and hydrology, the expected management regimes, the distance to appropriate seed sources, and topography.

During the first 10 years after the clear-cutting a systematic recording of the vegetation development in the succession towards open dune habitats (post-construction monitoring) has been planned. The results of the monitoring programme will as far as possible contribute to the recommendations for future restoration projects, which aim to convert plantations into open habitats.

Thus, in 2013 the second monitoring phase was initiated. The report presents the results of the second phase which was performed by re-monitoring the vegetation cover in the dune area formerly dominated by *Pinus mugo*. The 2011 monitoring methodology was repeated (Nygaard et al. 2011). The method is based on the variables in the Danish NOVANA programme for terrestrial habitats (Fredshavn et al. 2011). The plant species composition and vegetation structure were recorded in a pin point frame (0.5 * 0.5 m). Additional species were recorded in a documentation circle with a radius of 5 m for each of the twenty sample areas.

In the twenty sample areas monitored in 2013 61 taxa of vascular plant species, bryophytes and lichens were recorded ranging between six and 24 taxa. The most frequent species was *Deschampsia flexuosa* recorded in all twenty sample areas. Other abundant species recorded were *Carex arenaria*, *Pleurozium schreberi*, *Hypnum jutlandicum* and *Empetrum nigrum*. One species, *Rumex acetosella*, only recorded as an additional species in one sample area in 2011, was recorded in nine sample areas in 2013. The rest of the 61 taxa were recorded once or twice either in the pin point frame or as additional species in the documentary circle, only.

The disturbance of the soil layer caused by cutting of trees and removing the trunks and stumps may lead to release of nutrient that can favour problematic vascular plant species that prefer a higher nutrient level in the soil than originally present in the *P. mugo* plantation or to a flourishing of invasive species. In 2013 no problematic species were recorded in the sample areas except for a few scattered plants of *Epilobium angustifolium*.

Resumé

Det overordnede formål med overvågningsprogrammet i Østerild Klitplantage er at dokumentere successionen mod åbne klitnaturtyper efter rydningen af nåletræsbevoksninger i det nationale testcenter for vindmøller, der er blevet opført i en del af plantagen. Overvågningsprogrammets første fase i 2011 omfattede en registrering af jordbundsforhold, vegetationens struktur og artssammensætning før træerne blev fældet (basis overvågning).

Overvågningsstationer og prøvefelter blev i 2011 udlagt stratificeret tilfældigt med henblik på at dække variationen i udgangspunkter for vegetationsudviklingen og de behandlinger, der er skitseret i implementeringsplanen. Stratificeringen omfatter udgangspunkter (skovtyper), de planlagte behandlinger af førne og hydrologi, forventet pleje og drift af den lysåbne klitnatur, afstand til egnede spredningskilder og topografi.

I de første 10 år efter fældning er der planlagt en systematisk registrering af ændringerne af vegetationsdækket for at følge successionen mod lysåbne klitnaturtyper ("post-construction overvågning"). Resultaterne af overvågningsprogrammet vil så vidt muligt indgå i anbefalinger til fremtidige genopretningsprojekter, hvor formålet er at konvertere plantage til lysåbne naturtyper.

Anden fase af overvågningsprogrammet blev derfor iværksat i 2013. Denne rapport præsenterer resultaterne af genovervågningen af vegetationsdækket på klitarealer, der førhen var dækket af bjerg-fyr (*Pinus mugo*) plantage. Ved genovervågningen, hvor tyve prøvefelter blev genundersøgt, blev metodikken, som blev anvendt ved basis monitoreringen i 2011, genanvendt (Nygaard m.fl. 2011).

I de tyve prøvefelter blev der i 2013 registreret 61 taxa af karplanter, mosser og laver. Antallet af registrerede taxa varierede med seks som det laveste og 24 som det højeste i de undersøgte prøvefelter. Den hyppigste art, som blev registreret i alle prøvefelter, var bølget bunket (*Deschampsia flexuosa*). De andre mere hyppige arter var sand-star (*Carex arenaria*), trind fyrremos (*Pleurozium schreberi*), hede-cypresmos (*Hypnum jutlandicum*) og revling (*Empetrum nigrum*). Rødknæ (*Rumex acetosella*), der kun blev registreret som supplerende art i ét prøvefelt i 2011, blev registreret i ni prøvefelter i 2013. Resten af de 61 taxa blev kun registreret én eller to gange i pin point rammerne eller som supplerende arter i dokumentationscirklen.

Forstyrrelserne som følge af fældningen af nåletræerne og fjernelsen af stammer og stubbe kan medføre en frigivelse af næringsstoffer i jordbunden. Dette kan favorisere problematiske plantearter, der foretrækker et højere indhold af tilgængelige næringsstoffer i jordbunden end det, der oprindeligt var givet i bjerg-fyr plantagen, eller fremme en opblomstring af invasive arter. Bortset fra nogle spredte skud af gederams (*Epilobium angustifolium*) blev der ikke registreret problemarter i 2013.

1 Objectives

DCE – Danish Centre of Environment and Energy at Aarhus University has performed the first monitoring of the recovery of the vegetation cover in the Østerild plantation complex in the county of Thy in Northern Jutland. The southern part of the plantation complex was afforested in late 1800 with *Picea abies*, *Picea sitchensis* and *Pinus sylvestris* as dominant conifer tree species. The northern part of the complex, the plantation of Hjardemål, was established on a drifting sand area dominated by dunes that have been reforested mostly with the sand drift and draught resistant *Pinus mugo*. In summer 2011 a part of the conifer trees in the Østerild plantation complex were cut to give room for the National Test Center facility. The cutting was formed as an ellipsoidal opening reaching from Hjardemål in the north to the southern part of Østerild.

2 Methodology

In spring 2011 DCE selected 12 monitoring sites where a reference net with grid cells on 10 x 10 m was established. The monitoring sites were established in plantations with *Picea sitchensis*, *Pinus sylvestris* and *Pinus mugo*. On each monitoring site 5 sample plots were randomly placed among grid cells. On the two sites in Hjärdemål additional 5 sample plots were placed in order to cover the topographical variation of the plantation that should be affected by the establishment of the test centre. At two other monitoring sites where a litter treatment experiment was planned, 20 sample plots were placed randomly. All the sample plots were marked as way points in a GPS prior to the baseline monitoring.

The baseline monitoring was performed by DCE in 2011 before the clear-cutting of the conifer trees. The baseline monitoring of each sample area was performed by using pin point analysis and a documentation circle of 5 m radius to record the species composition and frequency. Besides, a number of vegetative and ecological parameters were recorded including measurement of the depth of the accumulated organic matter in the forest floor (the litter layer) and the penetration of light, vegetation structure and the inclination and direction of the slope where the pin point frame was located. Finally soil samples for measurements of pH, of organic matter and of nitrogen in the laboratory were collected at the four corners of the pin point frame.

In the pin point analysis a frame on 0.5 * 0.5 m with 16 pin points was used where every vascular plant, bryophyte and lichen species touched by a pin was recorded. Species that was rooted inside the pin point frame untouched by the pin were recorded as supplementary species. The documentation circle had a radius on 5 m covering 78.5 m² where additional species not found inside the pin point frame were recorded.

DCE re-monitored on September 5th and 6th in 2013 the vegetation cover in the Hjärdemål plantation. A part of the *Pinus mugo* plantation has been clear-cut during autumn 2011 except for one sample area where the pine trees were still present. The re-monitoring was performed by using pin point analysis and documentation circle as well as measurement of the depth of the litter layer, the vegetation structure, the penetration of light measured in the four corners of the world, and the inclination and direction of the slope where the pin point frame was located. The height of the vegetation cover and depth of the litter layer was measured at the four corners of the pin point frame starting clock-wise from the southeastern leg.

The sample areas were approximately recovered by the use of the waypoint of GPS. The pin point frame was placed in the field, and a digital image was taken of each sample area with information on bearing for future recovery. On three occasions the sample areas were moved up to 15 m from bare sand or road constructions into more natural coherent vegetation cover or on one occasion to a nearly naked area covered by sand under the cables of a telecommunication mast. Twenty sample areas were re-monitored.

3 Results

The results of the twenty samples of the vegetation cover are compiled in the appendix. In the presentation there is a picture of the position of the pin point frame defining the center of the documentary circle in the southeastern leg of the frame. The vegetation and ecological parameters and the floristic data have been put into two tables separately.

The floristic data are sorted with first the data from the pin point frame in descending frequency, i.e. the number of pin touches, then species recorded inside the frame untouched by the pin, and finally the additional species recorded in the documentary circle. The species records from the documentary circles are sorted with first the lichens, then the bryophytes, the ferns and gymnosperms and finally the angiosperms that are ordered by the trees and shrubs, the dwarf shrubs and then the herbs. All lichen and plant species are mentioned with their international name while the vernacular (English) name has been added on the vascular plants, too. The English nomenclature is based on Stace 2010 'New Flora of the British Isles – Cambridge University Press'.

On many occasions only the litter layer, the sand cover, branches, or other fragments of abandoned wood was pinned without touching any vegetative parts of the subterranean vegetation cover. Such touches are registered separately in the species table.

Species richness

In the twenty sample areas in the Hjärdemål plantation 61 taxa were recorded with the species numbers ranging from 24 taxa in the sample area at site 85 to six species at site 90. The species number in the pin point frames were lower ranging from nil in site 93 where only naked sand was touched by the pin to five at site 0 and 91.

In the sample areas nineteen broad-leaved species, six grasses, two rushes and sedges, four dwarf shrubs, eight deciduous bushes and trees, five coniferous trees, three ferns, nine bryophytes and liverworts and five lichens were recorded. The most frequent species was the grass *Deschampsia flexuosa* that was recorded in all twenty sample areas. The second most frequent species was the sedge *Carex arenaria* that together with the bryophytes *Pleurozium schreberi* and *Hypnum jutlandicum* and *Empetrum nigrum* was recorded in eighteen, nineteen, thirteen and twelve documentary circles respectively (Table 1). The rest of the 61 taxa were pinned once or twice in the frame plots, else as supplementary or additional species, only.

Table 1. The five most frequent plant species in the sample areas in Hjärdemål.

Species name	Vernacular name	Recorded no. of pin point frames	Recorded no. of pins	Recorded as supplementary species	Recorded in documentary circle
<i>Deschampsia flexuosa</i>	Wavy hairy-grass	13	120	3	4
<i>Carex arenaria</i>	Sand sedge	9	46	1	8
<i>Pleurozium schreberi</i>	Red-stemmed feather-moss	9	25	-	10
<i>Hypnum jutlandicum</i>	Heath plait-moss	5	17	1	8
<i>Empetrum nigrum</i>	Crowberry	3	11	-	9

Cutting the trees, removing the trunks, branches, and stumps has led to a lot of disturbance to the soil. One consequence may be the release of nutrients accumulated in the soil that can change the composition of the vegetation cover. The area could have been invaded by species that prefer a higher nutrient level in the soil than originally present in the *Pinus mugo* plantation e.g. species like *Epilobium angustifolium*, *Galeopsis bifida*, *Rubus ideaus* and *Urtica dioica*. Such a development has not been recorded in the deforested area probably because the amount of nutrients released after the cuttings of the pine trees is too low. Of the quoted species only *E. angustifolium* has been recorded and only as single plants or seedlings.

Another consequence could be the possible spread of invasive species like *Amelanchier spicata*, *Prunus serotina* and *Rosa rugosa* that together with pine and spruce trees are recorded in the Østerild plantation complex, too. None of the species have yet been recorded. The number of annual species can also indicate great changes of the growth conditions. But it is only at the sample sides where road construction and establishment of the telecommunications masts that a high number of annual species like *Senecio sylvaticus*, *S. viscosus* and *Spergula arvensis* has been recorded e.g. at sample area 85 and 87.

Cutting the pine trees has changed the protected woodland climate of the *Pinus mugo* plantation causing especially lichens and bryophytes to be faced with more open land conditions. This might be the reason for the amounts of withered or dead tussock of especially moss tussocks. An expected line of development can be into a vegetation cover dominated by grasses especially *Deschampsia flexuosa* and by dry resistant dwarf shrubs like *Calluna vulgaris* and *Empetrum nigrum* – all species that have been recorded.

Rumex acetosella was only recorded as an additional species in sample area 92 in 2011. This time the species was recorded as an additional species in eight sample namely no. 2, 84, 86, 87, 88, 91, 94 and 97 and at one of the pins in the pin point frame in no. 89.

4 References

Nygaard, B., Wind, P. & Ejrnæs, R. 2011. Restoration of dune habitats in Østerild Klitplantage - baseline monitoring 2011. Aarhus University, DCE – Danish Centre for Environment and Energy, 36 pp. - Scientific Report from DCE – Danish Centre for Environment and Energy No. 13 <http://www.dmu.dk/Pub/SR13.pdf>

Fredshavn, J.R., Nielsen, K.E., Ejrnæs, R. & Nygaard, B. (2011). Overvågning af terrestriske naturtyper, v.1.07. – Teknisk anvisning fra Fagdatacenter for Biodiversitet og Terrestrisk Natur, TA-N01. 17 s.

Appendix



Sample area 0, the pin point frame is situated to the right of the yellow plastic bag, photo direction south. 05-09-2013.

Vegetation and ecological parameters in sample area 0.

Height of vegetation in cm	10	20	5	40
Thickness of litter in cm	4	7	4	5
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	5	1	> 1	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	2°	SW	10	0

Species recorded in sample area 0. A species is only registered in the table the first time it has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	16	-	-
<i>Carex arenaria</i>	Sand Sedge	3	-	-
<i>Hypnum jutlandicum</i>	Heath Plait-moss	3	-	-
<i>Cladonia chlorophaea</i> agg.		1	-	-
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	1	-	-
<i>Dicranum scoparium</i>	Broom Moss	-	-	+
<i>Dryopteris carthusiana</i>	Narrow Buckler-fern	-	-	+
<i>Dryopteris dilatata</i>	Broad Buckler-fern	-	-	+
<i>Pinus mugo</i>	Dwarf Mountain-pine	-	-	+
<i>Calluna vulgaris</i>	Heather	-	-	+
<i>Empetrum nigrum</i>	Crowberry	-	-	+
<i>Vaccinium uliginosum</i>	Bog Bilberry	-	-	+
<i>Epilobium angustifolium</i>	Fireweed	-	-	+
<i>Molinia caerulea</i>	Purple Moor-grass	-	-	+



Sample area 1, the pin point frame is situated in the middle below, photo direction south. 05-09-2013.

Vegetation and ecological parameters in sample area 1.

Height of vegetation in cm	40	30	15	50
Thickness of litter in cm	4	3	3	3
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	1	0	0	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	0	-	> 1	0

Species recorded in sample area 1. A species is only registered in the table the first time it has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	16	-	-
<i>Carex arenaria</i>	Sand Sedge	9	-	-
<i>Galium saxatile</i>	Heath Bedstraw	1	-	-
<i>Dicranum scoparium</i>	Broom Moss	-	-	+
<i>Hypnum jutlandicum</i>	Heath Plait-moss	-	-	+
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	-	-	+
<i>Scleropodium purum</i>	Neat Feather-moss	-	-	+
<i>Dryopteris carthusiana</i>	Narrow Buckler-fern	-	-	+
<i>Dryopteris dilatata</i>	Broad Buckler-fern	-	-	+
<i>Polypodium vulgare</i>	Polypody	-	-	+
<i>Calluna vulgaris</i>	Heather	-	-	+
<i>Vaccinium uliginosum</i>	Bog Bilberry	-	-	+
<i>Molinia caerulea</i>	Purple Moor-grass	-	-	+
<i>Stellaria media</i>	Common Chickweed	-	-	+
<i>Trientalis europaea</i>	Chickweed-wintergreen	-	-	+



Sample area 2, the pin point frame is situated in the middle at the yellow plastic bag, photo direction south. 06-09-2013.

Vegetation and ecological parameters in sample area 2.

Height of vegetation in cm	40	10	0	25
Thickness of litter in cm	6	7	5	6
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	> 1	> 1	0	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	12°	S	1	0
Remarks	Some disturbance in the documentary circle, where there are several stumps, some with stems and many abandoned branches and twigs.			

Species recorded in sample area 2. A species is only registered in the table the first time it is has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	10	-	-
<i>Carex arenaria</i>	Sand Sedge	3	-	-
	Litter	3	-	-
<i>Hypnum jutlandicum</i>	Heath Plait-moss	-	-	+
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	-	-	+
<i>Dicranum scoparium</i>	Broom Moss	-	-	+
<i>Dryopteris carthusiana</i>	Narrow Buckler-fern	-	-	+
<i>Dryopteris dilatata</i>	Broad Buckler-fern	-	-	+
<i>Polypodium vulgare</i>	Polypody	-	-	+
<i>Picea sitchensis</i>	Sitka Spruce	-	-	+
<i>Quercus robur</i>	Pedunculate Oak	-	-	+
<i>Sorbus aucuparia</i>	Rowan	-	-	+
<i>Calluna vulgaris</i>	Heather	-	-	+
<i>Agrostis capillaris</i>	Common Bent	-	-	+
<i>Epilobium angustifolium</i>	Fireweed	-	-	+
<i>Molinia caerulea</i>	Purple Moor-grass	-	-	+
<i>Rumex acetosella</i>	Sheep's Sorrel	-	-	+
<i>Senecio sylvaticus</i>	Heath Groundsel	-	-	+
<i>Senecio viscosus</i>	Sticky Groundsel	-	-	+



Sample area 3, the pin point frame is situated to the right of the yellow plastic bag, photo direction southwest. 06-09-2013.

Vegetation and ecological parameters in sample area 3.

Height of vegetation in cm	30	1	0	30
Thickness of litter in cm	4	4	2	3
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	> 1	> 1	> 1	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	10°	SW	> 1	> 1
Remarks	The sampling area was moved 15 m to the south into natural vegetation cover. In the northern part of the sampling area there is an area covered by sand.			

Species recorded in sample area 3. A species is only registered in the table the first time it has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
	Litter	7	-	-
<i>Carex arenaria</i>	Sand Sedge	6	-	-
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	4	-	-
<i>Dicranum scoparium</i>	Broom Moss	-	-	+
<i>Cladonia portentosa</i>		-	-	+
<i>Hypogymnia physodes</i>		-	-	+
<i>Pinus mugo</i>	Dwarf Mountain-pine	-	-	+
<i>Quercus robur</i>	Pedunculate Oak	-	-	+
<i>Empetrum nigrum</i>	Crowberry	-	-	+
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	-	-	+



Sample area 84, the pin point frame is situated at the yellow plastic bag, photo direction south. 05-09-2013.

Vegetation and ecological parameters in sample area 84.

Height of vegetation in cm	2	5	0	0
Thickness of litter in cm	6	4	7	4
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	> 1	0	> 1	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	10°	S	> 1	0

Species recorded in sample area 84. A species is only registered in the table the first time it is has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
<i>Carex arenaria</i>	Sand Sedge	8	-	-
	Litter	7	-	-
<i>Hypnum jutlandicum</i>	Heath Plait-moss	3	-	-
<i>Galium saxatile</i>	Heath Bedstraw	1	-	-
<i>Trientalis europaea</i>	Chickweed-wintergreen	1	-	-
<i>Dryopteris carthusiana</i>	Narrow Buckler-fern	-	+	-
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	-	+	-
<i>Dicranum scoparium</i>	Broom Moss	-	-	+
<i>Hypnum cupressiforme</i>	Cypress-leaved Plait-moss	-	-	+
<i>Dryopteris dilatata</i>	Broad Buckler-fern	-	-	+
<i>Polypodium vulgare</i>	Polypody	-	-	+
<i>Picea sitchensis</i>	Sitka Spruce	-	-	+
<i>Cytisus scoparius</i>	Broom	-	-	+
<i>Quercus robur</i>	Pedunculate Oak	-	-	+
<i>Empetrum nigrum</i>	Crowberry	-	-	+
<i>Cerastium fontanum</i>	Common Mouse-ear	-	-	+
<i>Chenopodium album</i>	Fat-hen	-	-	+
<i>Epilobium angustifolium</i>	Fireweed	-	-	+
<i>Rumex acetosella</i>	Sheep's Sorrel	-	-	+
<i>Senecio sylvaticus</i>	Heath Groundsel	-	-	+
<i>Solanum nigrum</i>	Black Nightshade	-	-	+
<i>Spergula arvensis</i>	Corn Spurrey	-	-	+



Sample area 85, the pin point frame is situated to the right of the yellow plastic bag, photo direction south. 05-09-2013.

Vegetation and ecological parameters in sample area 85.

Height of vegetation in cm	40	5	0	40
Thickness of litter in cm	5	6	4	3
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	> 1	> 1	0	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	0	-	1	0
Remarks	The sample area was moved 12 m to the south into natural vegetation cover to avoid border effect from the road and the area of the telecommunication mast.			

Species recorded in sample area 85. A species is only registered in the table the first time it has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	12	-	-
	Litter	2	-	-
	Sand	2	-	-
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	1	-	-
<i>Empetrum nigrum</i>	Crowberry	1	-	-
<i>Dicranum scoparium</i>	Broom Moss	-	-	+
<i>Hypnum jutlandicum</i>	Heath Plait-moss	-	-	+
<i>Scleropodium purum</i>	Neat Feather-moss	-	-	+
<i>Picea sitchensis</i>	Sitka Spruce	-	-	+
<i>Pinus contorta</i>	Lodgepole Pine	-	-	+
<i>Pinus mugo</i>	Dwarf Mountain-pine			+
<i>Pinus sylvestris</i>	Scots Pine	-	-	+
<i>Salix repens</i> var. <i>argentea</i>		-	-	+
<i>Ammophila arenaria</i>	Marram	-	-	+
<i>Carex arenaria</i>	Sand Sedge	-	-	+
<i>Chenopodium album</i>	Fat-hen	-	-	+
<i>Cirsium arvense</i>	Creeping Thistle	-	-	+
<i>Corynephorus canescens</i>	Grey Hair-grass	-	-	+
<i>Galium saxatile</i>	Heath Bedstraw	-	-	+
<i>Holcus lanatus</i>	Yorkshire-fog	-	-	+
<i>Persicaria laphathifolia</i> ssp. <i>pallida</i>	Pale Persicaria	-	-	+
	Seedling, dicot	-	-	+
	Seedling, monocot (grass)	-	-	+
<i>Senecio viscosus</i>	Sticky Groundsel	-	-	+
<i>Spergula arvensis</i>	Corn Spurrey	-	-	+
<i>Triantalis europaea</i>	Chickweed-wintergreen	-	-	+



Sample area 86, the pin point frame is situated to the right of the yellow plastic bag, photo direction south. 06-09-2013.

Vegetation and ecological parameters in sample area 86.

Height of vegetation in cm	70	20	15	0
Thickness of litter in cm	7	4	10	12
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	2	> 1	0	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	15°	S	1	0

Species recorded in sample area 86. A species is only registered in the table the first time it has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
<i>Molinia caerulea</i>	Purple Moor-grass	7	-	-
<i>Calluna vulgaris</i>	Heather	4	-	-
	Branch	3	-	-
	Litter	2	-	-
<i>Carex arenaria</i>	Sand Sedge	1	-	-
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	-	+	-
<i>Cladonia chlorophaea</i> agg.		-	-	+
<i>Cladonia macilenta</i> ssp. <i>floerkeana</i>		-	-	+
	Bryophyte protonema	-	-	+
<i>Dicranum scoparium</i>	Broom Moss	-	-	+
<i>Hypnum jutlandicum</i>	Heath Plait-moss	-	-	+
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	-	-	+
<i>Rhytidiadelphus triquetrus</i>	Shaggy Moss	-	-	+
<i>Picea sitchensis</i>	Sitka Spruce	-	-	+
<i>Pinus mugo</i>	Dwarf Mountain-pine			+
<i>Betula pubescens</i>	Downy Birch	-	-	+
<i>Crataegus</i> sp.	Hawthorn	-	-	+
<i>Empetrum nigrum</i>	Crowberry	-	-	+
<i>Vaccinium uliginosum</i>	Bog Bilberry	-	-	+
<i>Juncus bulbosus</i>	Bulbous Rush	-	-	+
<i>Rumex acetosella</i>	Sheep's Sorrel	-	-	+
<i>Senecio viscosus</i>	Sticky Groundsel	-	-	+



Sample area 87, the pin point frame is situated in the middle of the picture, photo direction south. 06-09-2013.

Vegetation and ecological parameters in sample area 87.

Height of vegetation in cm	10	8	10	8
Thickness of litter in cm	4	7	4	5
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	5	> 1	0	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	20°	NE	1	> 1

Species recorded in sample area 87. A species is only registered in the table the first time it is has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	14	-	-
	Litter	2	-	-
<i>Hypogymnia physodes</i>		-	-	+
<i>Dicranum scoparium</i>	Broom Moss	-	+	-
<i>Hypnum jutlandicum</i>	Heath Plait-moss	-	-	+
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	-	-	+
<i>Dryopteris carthusiana</i>	Narrow Buckler-fern	-	-	+
<i>Polypodium vulgare</i>	Polypody	-	-	+
<i>Picea abies</i>	Norway Spruce	-	-	+
<i>Picea sitchensis</i>	Sitka Spruce	-	-	+
<i>Pinus contorta</i>	Lodgepole Pine	-	-	+
	Seedling, gymnosperm	-	-	+
<i>Betula pubescens</i>	Downy Birch	-	-	+
<i>Calluna vulgaris</i>	Heather	-	-	+
<i>Empetrum nigrum</i>	Crowberry	-	-	+
<i>Rubus fruticosus</i>	Bramble	-	-	+
<i>Vaccinium uliginosum</i>	Bog Bilberry	-	-	+
<i>Carex arenaria</i>	Sand Sedge	-	-	+
<i>Holcus lanatus</i>	Yorkshire-fog	-	-	+
<i>Rumex acetosella</i>	Sheep's Sorrel	-	-	+
<i>Senecio viscosus</i>	Sticky Groundsel	-	-	+



Sample area 88, the pin point frame is situated to the right of the yellow plastic bag, photo direction southwest. 06-09-2013.

Vegetation and ecological parameters in sample area 88.

Height of vegetation in cm	0	1	0	0
Thickness of litter in cm	3	5	2	3
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	1	> 1	0	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	5°	NW	1	0

Species recorded in sample area 88. A species is only registered in the table the first time it has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
	Litter	8	-	-
	Branch	4	-	-
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	2	-	-
<i>Hypnum jutlandicum</i>	Heath Plait-moss	1	-	-
<i>Carex arenaria</i>	Sand Sedge	1	-	-
<i>Hypogymnia physodes</i>		-	-	+
<i>Dicranum scoparium</i>	Broom Moss	-	-	+
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	-	-	+
<i>Dryopteris carthusiana</i>	Narrow Buckler-fern	-	-	+
<i>Polypodium vulgare</i>	Polypody	-	-	+
<i>Picea sitchensis</i>	Sitka Spruce	-	-	+
<i>Pinus mugo</i>	Dwarf Mountain-pine	-	-	+
<i>Empetrum nigrum</i>	Crowberry	-	-	+
<i>Rumex acetosella</i>	Sheep's Sorrel	-	-	+



Sample area 89, the pin point frame is situated to the right of the yellow plastic bag, photo direction southeast. 06-09-2013.

Vegetation and ecological parameters in sample area 89.

Height of vegetation in cm	30	0	10	0
Thickness of litter in cm	3	1	5	0
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	> 1	0	0	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	30°	NW	25	1

Species recorded in sample area 89. A species is only registered in the table the first time it has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	12	-	-
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	4	-	-
	Litter	2	-	-
<i>Chiloscyphus latifolius</i>		1	-	-
<i>Rumex acetosella</i>	Sheep's Sorrel	1	-	-
<i>Cladonia portentosa</i>		-	-	+
<i>Dicranum scoparium</i>	Broom Moss	-	-	+
<i>Rhytidiadelphus triquetrus</i>	Shaggy Moss	-	-	+
	Seedling, gymnosperm	-	-	+
<i>Empetrum nigrum</i>	Crowberry	-	-	+
<i>Quercus robur</i>	Pedunculate Oak	-	-	+
<i>Carex arenaria</i>	Sand Sedge	-	-	+
<i>Senecio sylvaticus</i>	Heath Groundsel	-	-	+
<i>Spergula arvensis</i>	Corn Spurrey	-	-	+
<i>Stellaria media</i>	Common Chickweed	-	-	+



Sample area 90, the pin point frame is situated behind the yellow plastic bag, photo direction south. 06-09-2013.

Vegetation and ecological parameters in sample area 90.

Height of vegetation in cm	0	0	0	0
Thickness of litter in cm	3	5	8	5
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	0	0	0	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	20°	N	10	> 1
Remarks	Moon-like sample area with many stumps, great amounts of withered moss – dried out or dead?			

Species recorded in sample area 90. A species is only registered in the table the first time it has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
	Litter	14	-	-
<i>Hypnum jutlandicum</i>	Heath Plait-moss	2	-	-
<i>Dicranum scoparium</i>	Broom Moss	-	+	-
<i>Cladonia portentosa</i>		-	-	+
<i>Quercus robur</i>	Pedunculate Oak	-	-	+
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	-	-	+
	Seedling, gymnosperm	-	-	+



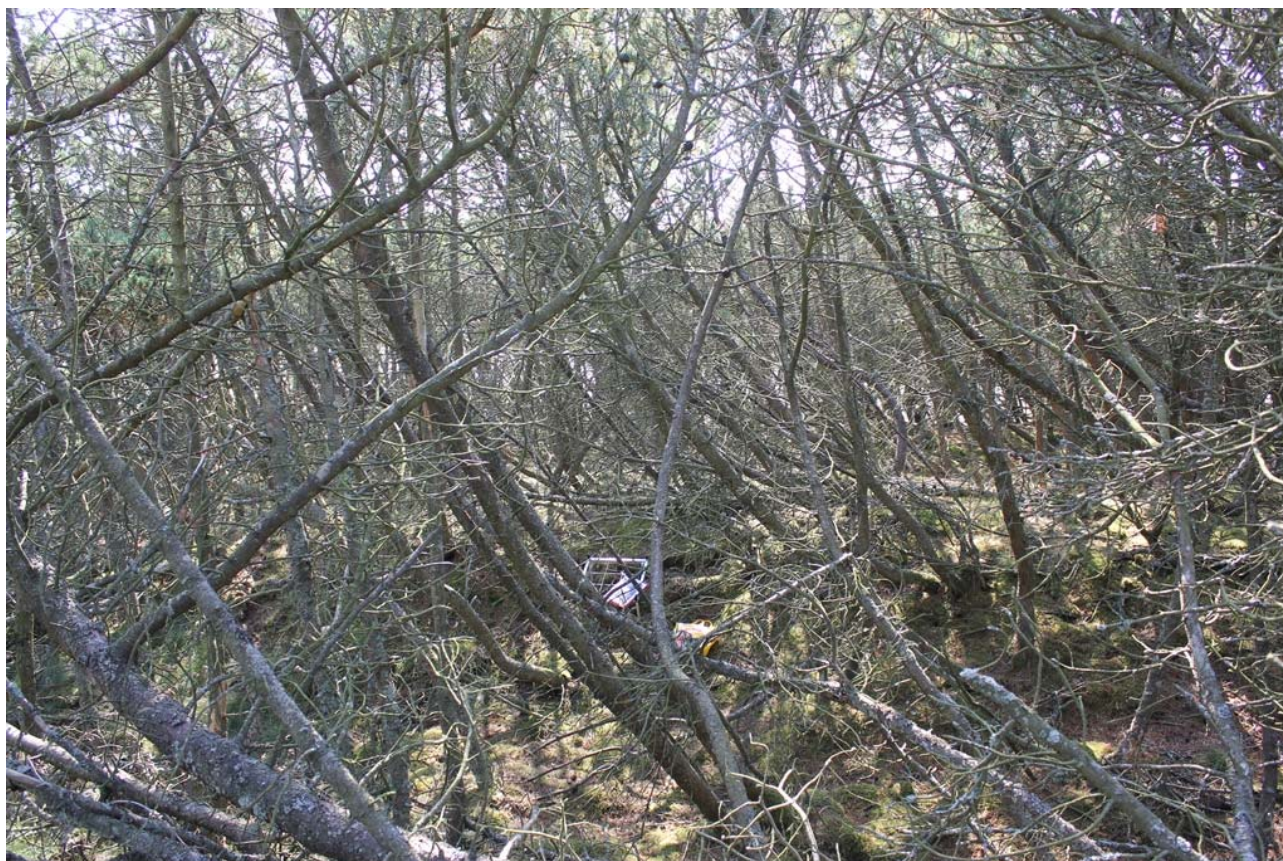
Sample area 91, the pin point frame is situated at the yellow plastic bag, photo direction south. 06-09-2013.

Vegetation and ecological parameters in sample area 91.

Height of vegetation in cm	7	5	7	10
Thickness of litter in cm	5	9	2	5
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	10	> 1	> 1	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	0	-	10	1
Remarks	There are many abandoned twigs, branches and stumps in the sample area. In the documentary circle there is an abandoned wood pile, otherwise the area has an intact vegetation cover.			

Species recorded in sample area 91. A species is only registered in the table the first time it has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	9	-	-
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	5	-	-
<i>Empetrum nigrum</i>	Crowberry	5	-	-
<i>Calluna vulgaris</i>	Heather	4	-	-
<i>Pinus contorta</i>	Lodgepole Pine	1	-	-
<i>Dicranum scoparium</i>	Broom Moss	-	+	-
<i>Hypnum jutlandicum</i>	Heath Plait-moss	-	+	-
<i>Cladonia portentosa</i>		-	-	+
<i>Hypogymnia physodes</i>		-	-	+
<i>Dryopteris carthusiana</i>	Narrow Buckler-fern	-	-	+
<i>Picea abies</i>	Norway Spruce	-	-	+
<i>Picea sitchensis</i>	Sitka Spruce	-	-	+
<i>Pinus contorta</i>	Lodgepole Pine	-	-	+
<i>Pinus mugo</i>	Dwarf Mountain-pine			+
<i>Pinus sylvestris</i>	Scots Pine	-	-	+
<i>Vaccinium uliginosum</i>	Bog Bilberry	-	-	+
<i>Carex arenaria</i>	Sand Sedge	-	-	+
<i>Rumex acetosella</i>	Sheep's Sorrel	-	-	+



Sample area 92, the pin point frame is situated in the center of the picture, photo direction southeast. 06-09-2013.

Vegetation and ecological parameters in sample area 92.

Height of vegetation in cm	1	1	0	1
Thickness of litter in cm	4	2	2	2
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	0	0	50	0
Light penetration	N: 71	E: 61	S: 62	W: 68
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	20°	N	99	0
Remarks	The sampling area is laid down in intact <i>Pinus mugo</i> plantation.			

Species recorded in sample area 92. A species is only registered in the table the first time it is has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
<i>Hypnum jutlandicum</i>	Heath Plait-moss	8	-	-
	Litter	5	-	-
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	2	-	-
	Branch	1	-	-
	Sand	1	-	-
<i>Dicranum scoparium</i>	Broom Moss	-	+	-
<i>Hypogymnia physodes</i>		-	-	+
<i>Parmelia saxatilis</i>		-	-	+
<i>Bryophyte 4</i>		-	-	+
<i>Polypodium vulgare</i>	Polypody	-	-	+
<i>Pinus mugo</i>	Dwarf Mountain-pine	-	-	+
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	-	-	+
<i>Epilobium angustifolium</i>	Fireweed	-	-	+



Sample area 93, the pin point frame is situated at the yellow plastic bag, photo direction southeast. 06-09-2013.

Vegetation and ecological parameters in sample area 93.

Height of vegetation in cm	0	0	0	0
Thickness of litter in cm	0	0	0	0
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	0	0	0	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	0	-	> 1	0
Remarks	The sample area has been moved 5 m NNW out on the almost naked sand.			

Species recorded in sample area 93. A species is only registered in the table the first time it has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
	Sand	16	-	-
<i>Carex arenaria</i>	Sand Sedge	-	+	-
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	-	-	+
<i>Senecio viscosus</i>	Sticky Groundsel	-	+	-
<i>Senecio sylvaticus</i>	Heath Groundsel	-	-	+
<i>Persicaria laphathifolia</i> ssp. <i>pallida</i>	Pale Persicaria	-	-	+
<i>Spergula arvensis</i>	Corn Spurrey	-	-	+



Sample area 94, the pin point frame is situated to the right below the center of the picture, photo direction south. 05-09-2013.

Vegetation and ecological parameters in sample area 94.

Height of vegetation in cm	0	35	0	40
Thickness of litter in cm	0	0	4	2
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	0	> 1	0	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	20°	S	5	0
Remarks	Lots of abandoned wood in the documentary circle and much withered moss – dried or dead?			

Species recorded in sample area 94. A species is only registered in the table the first time it is has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	11	-	-
	Litter	4	-	-
<i>Carex arenaria</i>	Sand Sedge	1	-	-
	Sand	1	-	-
<i>Dicranum scoparium</i>	Broom Moss	-	+	-
<i>Hypnum jutlandicum</i>	Heath Plait-moss	-	-	+
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	-	-	+
<i>Picea abies</i>	Norway Spruce	-	-	+
<i>Pinus sylvestris</i>	Scots Pine	-	-	+
	Seedling, gymnosperm	-	-	+
<i>Cytisus scoparius</i>	Broom	-	-	+
<i>Epilobium angustifolium</i>	Fireweed	-	-	+
<i>Rumex acetosella</i>	Sheep's Sorrel	-	-	+
<i>Solanum nigrum</i>	Black Nightshade	-	-	+
<i>Sonchus sp.</i>	Sowthistle	-	-	+



Sample area 95, the pin point frame is situated in the center below in the picture, photo direction south. 05-09-2013.

Vegetation and ecological parameters in sample area 95.

Height of vegetation in cm	30	35	50	0
Thickness of litter in cm	0	0	1	0
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	0	0	0	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	30°	S	10	1

Species recorded in sample area 95. A species is only registered in the table the first time it has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	9	-	-
	Litter	4	-	-
	Sand	2	-	-
<i>Cladonia cfr. crispata</i>		-	-	+
<i>Cladonia portentosa</i>		-	-	+
<i>Dicranum scoparium</i>	Broom Moss	-	-	+
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	-	-	+
<i>Pinus sylvestris</i>	Scots Pine	-	-	+
<i>Quercus robur</i>	Pedunculate Oak	-	-	+
<i>Carex arenaria</i>	Sand Sedge	-	-	+
<i>Hypochaeris radicata</i>	Cat's-ear	-	-	+



Sample area 96, the pin point frame is situated to the left of the yellow plastic bag, photo direction south. 05-09-2013.

Vegetation and ecological parameters in sample area 96.

Height of vegetation in cm	0	5	0	0
Thickness of litter in cm	3	4	2	2
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	1	0	> 1	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	0	-	1	> 1
Remarks	In the sampling area there is a lot of dead or withered <i>Empetrum nigrum</i> . If alive the cover of dwarf shrub should be improved to 10 m ² . The sampling area is disturbed by the cuttings of trees and driving.			

Species recorded in sample area 96. A species is only registered in the table the first time it has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
	Litter	9	-	-
<i>Empetrum nigrum</i>	Crowberry	5	-	-
	Sand	3	-	-
<i>Luzula multiflora</i>	Heath Wood-rush	1	-	-
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	-	+	-
<i>Cladonia portentosa</i>		-	-	+
<i>Chiloscyphus latifolius</i>		-	-	+
<i>Hypnum jutlandicum</i>	Heath Plait-moss	-	-	+
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	-	-	+
<i>Polypodium vulgare</i>	Polypody	-	-	+
<i>Picea sitchensis</i>	Sitka Spruce	-	-	+
<i>Pinus mugo</i>	Dwarf Mountain-pine			+
<i>Pinus sylvestris</i>	Scots Pine	-	-	+
<i>Quercus robur</i>	Pedunculate Oak	-	-	+
<i>Carex arenaria</i>	Sand Sedge	-	-	+
<i>Senecio sylvaticus</i>	Heath Groundsel	-	-	+



Sample area 97, the pin point frame is situated to the left of the yellow plastic bag, photo direction south. 05-09-2013.

Vegetation and ecological parameters in sample area 97.

Height of vegetation in cm	40	30	35	0
Thickness of litter in cm	3	3	3	3
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	2	0	0	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	10°	W	1	> 1
Remarks	The sampling area has been moved 10 m to the south into natural vegetation cover. Sand drift has partly covered the litter layer and covers approximately 33 % of the documentary circle.			

Species recorded in sample area 97. A species is only registered in the table the first time it has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
<i>Carex arenaria</i>	Sand Sedge	14	-	-
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	3	-	-
	Litter	2	-	-
<i>Cladonia portentosa</i>		-	-	+
<i>Dicranum scoparium</i>	Broom Moss	-	-	+
<i>Hypnum jutlandicum</i>	Heath Plait-moss	-	-	+
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	-	-	+
<i>Calluna vulgaris</i>	Heather	-	-	+
<i>Empetrum nigrum</i>	Crowberry	-	-	+
<i>Vaccinium uliginosum</i>	Bog Bilberry	-	-	+
<i>Atriplex patula</i>	Common Orache	-	-	+
<i>Epilobium angustifolium</i>	Fireweed	-	-	+
<i>Holcus lanatus</i>	Yorkshire-fog	-	-	+
<i>Polygonum aviculare</i>	Knotgrass	-	-	+
<i>Rumex acetosella</i>	Sheep's Sorrel	-	-	+
<i>Senecio sylvaticus</i>	Heath Groundsel	-	-	+
<i>Senecio viscosus</i>	Sticky Groundsel	-	-	+
<i>Sonchus asper</i>	Prickly Sowthistle	-	-	+
<i>Viola arvensis</i>	Field Pansy	-	-	+



Sample area 98, the pin point frame is situated in the center of the picture, photo direction north. 05-09-2013.

Vegetation and ecological parameters in sample area 98.

Height of vegetation in cm	0	0	40	0
Thickness of litter in cm	3	2	3	3
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	0	0	0	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	6°	E	5	> 1
Remarks	The documentary circle is affected by cuttings and abandoned wood.			

Species recorded in sample area 98. A species is only registered in the table the first time it has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
	Litter	8	-	-
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	6	-	-
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	2	-	-
<i>Cladonia portentosa</i>		-	-	+
<i>Hypogymnia physodes</i>		-	-	+
<i>Dicranum scoparium</i>	Broom Moss	-	-	+
	Seedling, gymnosperm	-	-	+
<i>Quercus robur</i>	Pedunculate Oak	-	-	+
<i>Carex arenaria</i>	Sand Sedge	-	-	+
<i>Senecio sylvaticus</i>	Heath Groundsel	-	-	+



Sample area 99, the pin point frame is situated to the right of the yellow plastic bag, photo direction southeast. 05-09-2013.

Vegetation and ecological parameters in sample area 99.

Height of vegetation in cm	5	0	3	2
Thickness of litter in cm	2	4	4	1
	Dwarf shrub	Trees and shrubs below 1 m	Trees and shrubs over 1 m	Free water surface
Cover in m²	5	1	0	0
Light penetration	0	0	0	0
	Inclination	Direction of inclination	Cover of bryophytes in m ²	Cover of lichens in m ²
	20°	E	5	2

Species recorded in sample area 99. A species is only registered in the table the first time it has been recorded in the field.

International name	Vernacular name	No. of pins	Supplementary species	Additional species
	Litter	6	-	-
<i>Deschampsia flexuosa</i>	Wavy Hair-grass	4	-	-
<i>Hypnum jutlandicum</i>	Heath Plait-moss	3	-	-
<i>Pleurozium schreberi</i>	Red-stemmed Feather-moss	2	-	-
<i>Cladonia portentosa</i>		1	-	-
<i>Ptilidium ciliare</i>		-	+	-
<i>Cladonia chlorophaea</i> agg.		-	-	+
<i>Dicranum scoparium</i>	Broom Moss	-	-	+
<i>Dryopteris carthusiana</i>	Narrow Buckler-fern	-	-	+
<i>Polypodium vulgare</i>	Polypody	-	-	+
<i>Picea abies</i>	Norway Spruce	-	-	+
<i>Picea sitchensis</i>	Sitka Spruce	-	-	+
<i>Pinus mugo</i>	Dwarf Mountain-pine	-	-	+
<i>Pinus sylvestris</i>	Scots Pine	-	-	+
<i>Quercus robur</i>	Pedunculate Oak	-	-	+
<i>Calluna vulgaris</i>	Heather	-	-	+
<i>Empetrum nigrum</i>	Crowberry	-	-	+
<i>Erica tetralix</i>	Cross-leaved Heath	-	-	+
<i>Salix repens</i> var. <i>repens</i>	Creeping Willow	-	-	+
<i>Vaccinium uliginosum</i>	Bog Bilberry	-	-	+
<i>Carex arenaria</i>	Sand Sedge	-	-	+
<i>Epilobium angustifolium</i>	Fireweed	-	-	+

[Blank page]

MONITORING THE VEGETATION RECOVERY IN ØSTERILD PLANTAGE 2013

Part 1

The trees in a part of Østerild Plantage has been cut down to give room for a national test center. Before the afforestation DCE has performed a baseline monitoring in the summer of 2011. DCE has in late summer 2013 re-monitored the recovery of the vegetation cover in the northernmost part of the afforested area that was covered by plantation of *Pinus mugo*. The results from the re-monitoring are presented in the report.

ISBN: 978-87-7156-042-8
ISSN: 2245-019X