



GREIFSWALD
MIRE
CENTRE

Species protection by paludiculture:

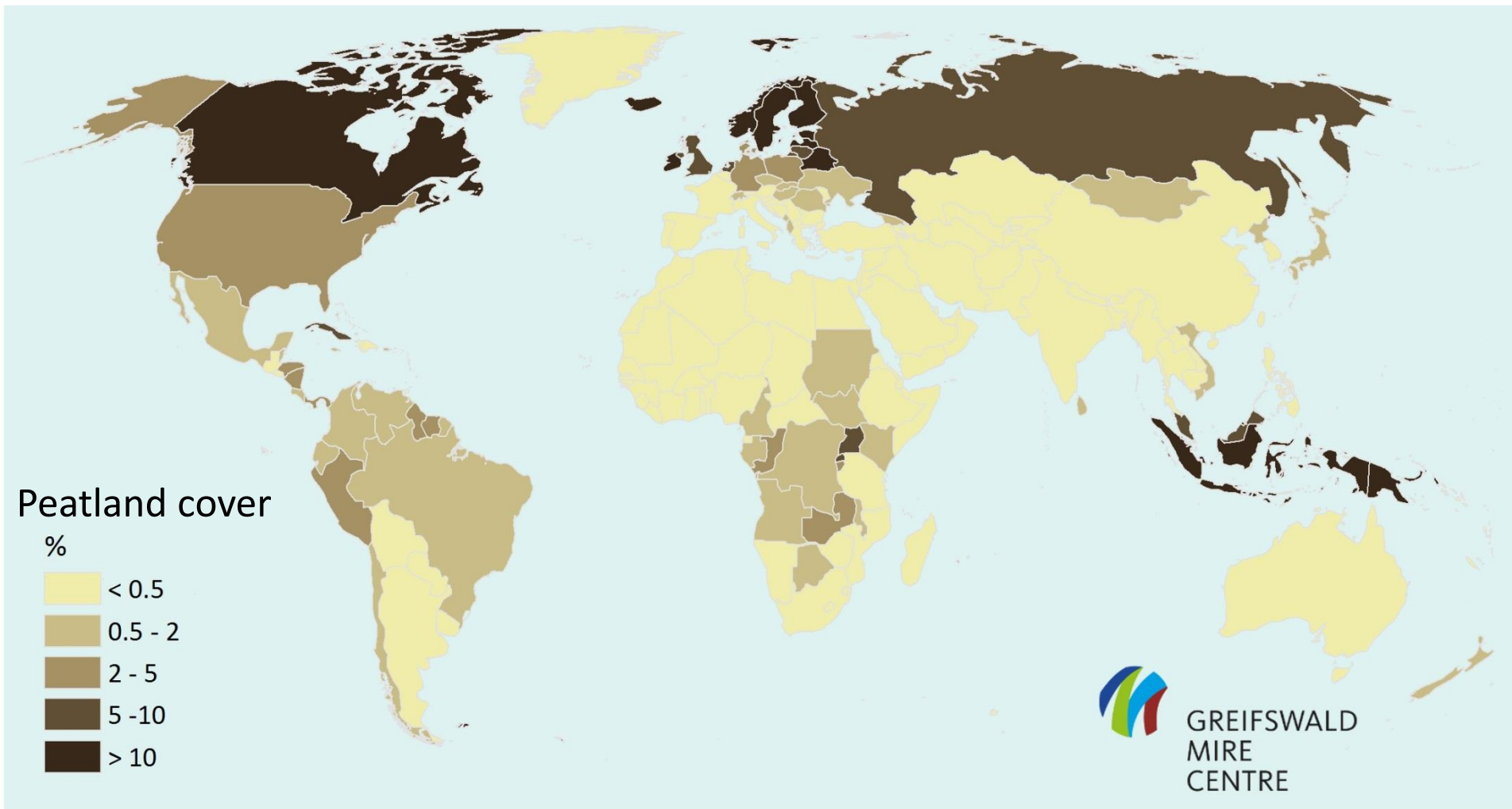
Sphagnum cultures as
surrogate habitats

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& Christoph Muster

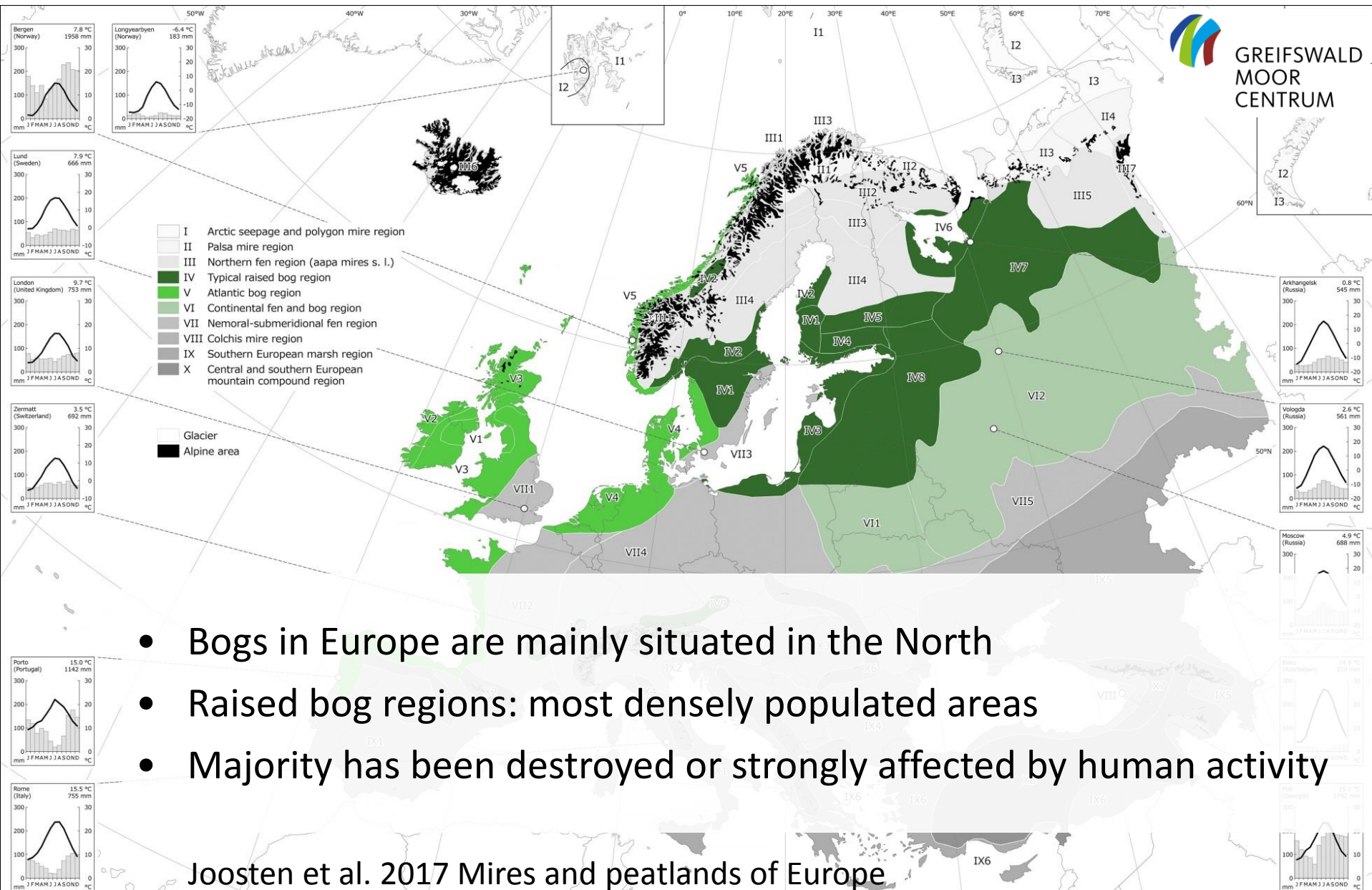


Foto: S. Wichmann

- **Europe** is the continent with world wide largest proportional **loss of mires**
- In **Germany**: **99%** of the 1.4 Mio ha of peatlands have been **drained** for land use



Distribution of mire regions in Europe



Bog grassland: drained and used for dairy farming



Bog grassland: drained and used for dairy farming

- sowing of a few graminoid fodder species

→ species poor
→ dominance of
Poa pratensis, *Holcus
lanatus*, *Alopecurus
pratensis*

- drainage and changes in hydrology

→ dry site conditions



Corn cultivation: monoculture with Mexican origin



Foto: H. Joosten

Agricultural use: partly devastation of bogs



Peat extraction: removal for growing media




Bog utilisation

- no site conditions comparable with natural bog
- habitat loss
- many bog species are currently endangered

other degraded bogs:
shrubs, heath land, in restoration process

→ only partly suitable habitats for bog species

natural bogs in Germany: only 2%

- 
- habitats necessary to maintain species diversity
 - surrogate habitats become more and more important

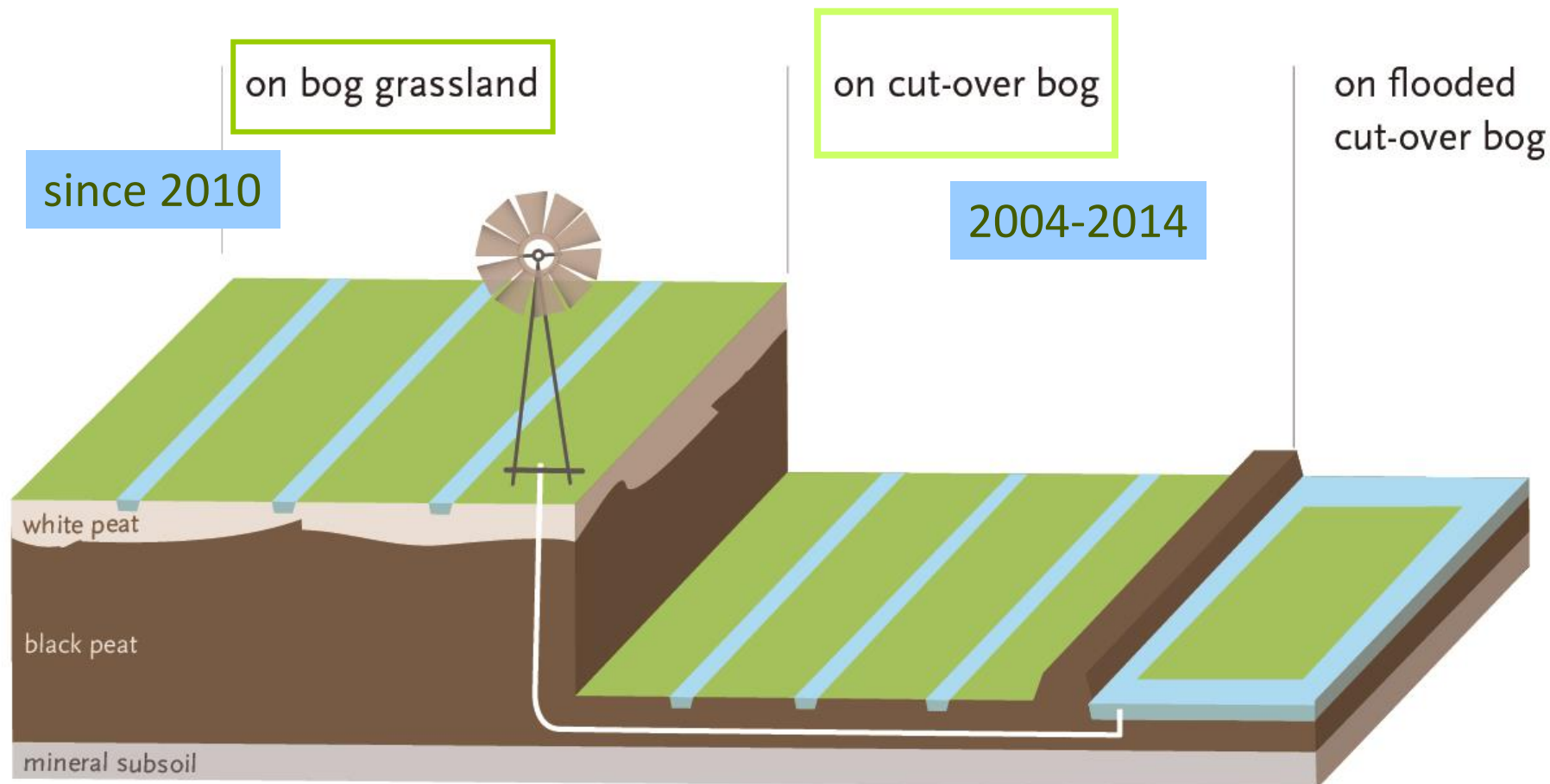
Sphagnum farming site as surrogate habitats?



Sphagnum farming

- use of *Sphagnum* biomass
- aimed cultivation as an agricultural plant
- paludiculture on degraded bogs

Mosaic of different Sphagnum farming types on degraded bogs



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- Investigations on biodiversity at two Sphagnum farming sites

study site cut-over bog: before installation

June 2004



Foto: D. Kamermann

study site cut-over bog: site preparation

November 2004



Foto: D. Kamermann

study site cut-over bog: spreading of mosses and straw



- *Sphagnum papillosum*
- initial cover ~95% (brownish mosses)
- fragment length 0.5-2 cm

study site cut-over bog: after installation

November 2004



Foto: D. Kamermann

study site cut-over bog: development



Foto: Uni Greifswald

Nov 2004



May 2005



Aug 2005



Aug 2006



Fotos: D. Kamermann

study site cut-over bog: 6 years after installation



Green field in the peat extraction area, size: 1,200 m²

study site bog grassland: before installation

October 2010



study site bog grassland: spreading of mosses and straw



- applied *Sphagnum* species:
S. papillosum , *S. palustre*, *S. fallax*

study site bog grassland: after installation

June 2011

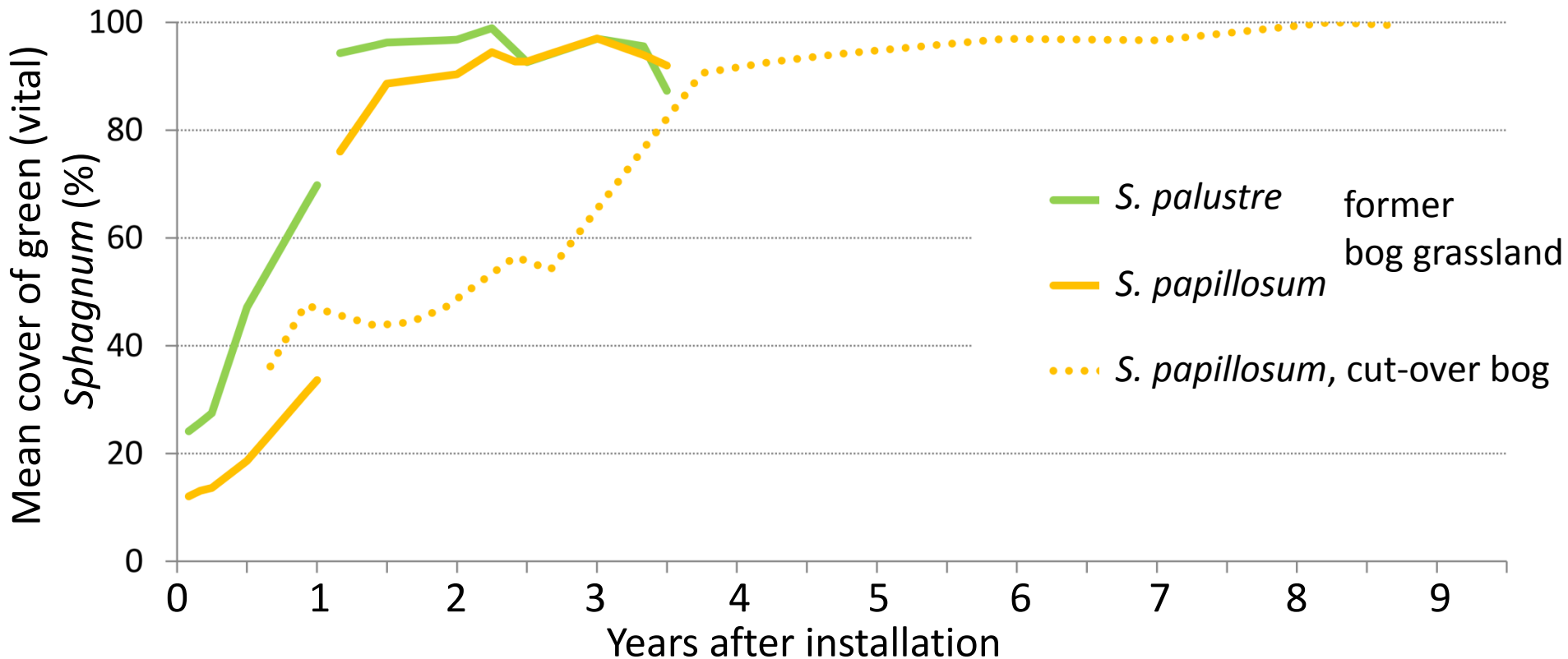


Foto: Uni Greifswald

study site bog grassland: 3 years after installation



development of the *Sphagnum* lawn



- 90% *Sphagnum* cover after 1.5 to 3.75 years
- *Sphagnum* species: bog grassland n= 6, cut-over bog n= 5
- *S. palustre*, *S. papillosum*, *S. magellanicum*, *S. fallax*,
S. cuspidatum, *S. fimbriatum*, *S. teres*

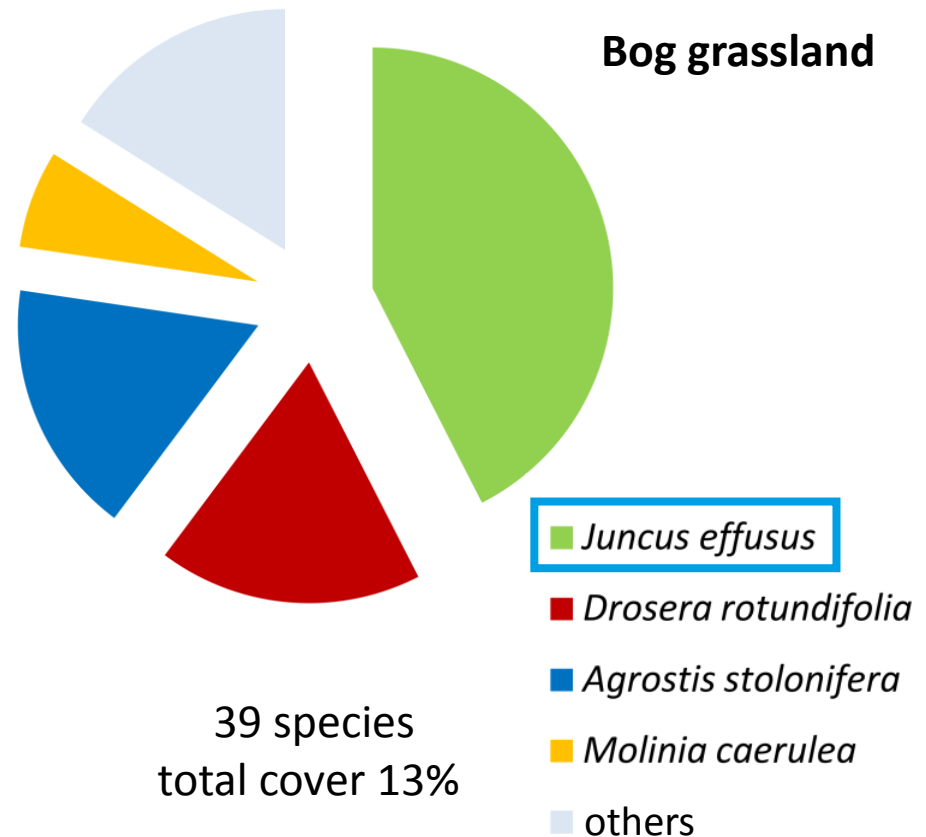
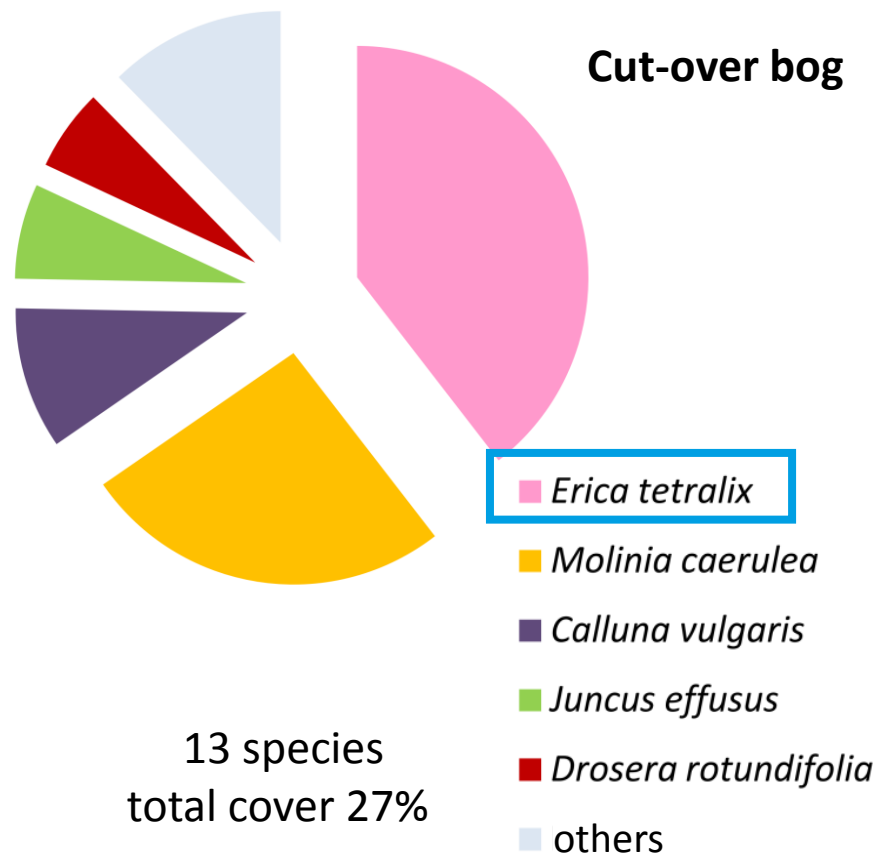
Vascular plants on Sphagnum farming sites

Rhynchospora alba

Erica tetralix

Drosera rotundifolia

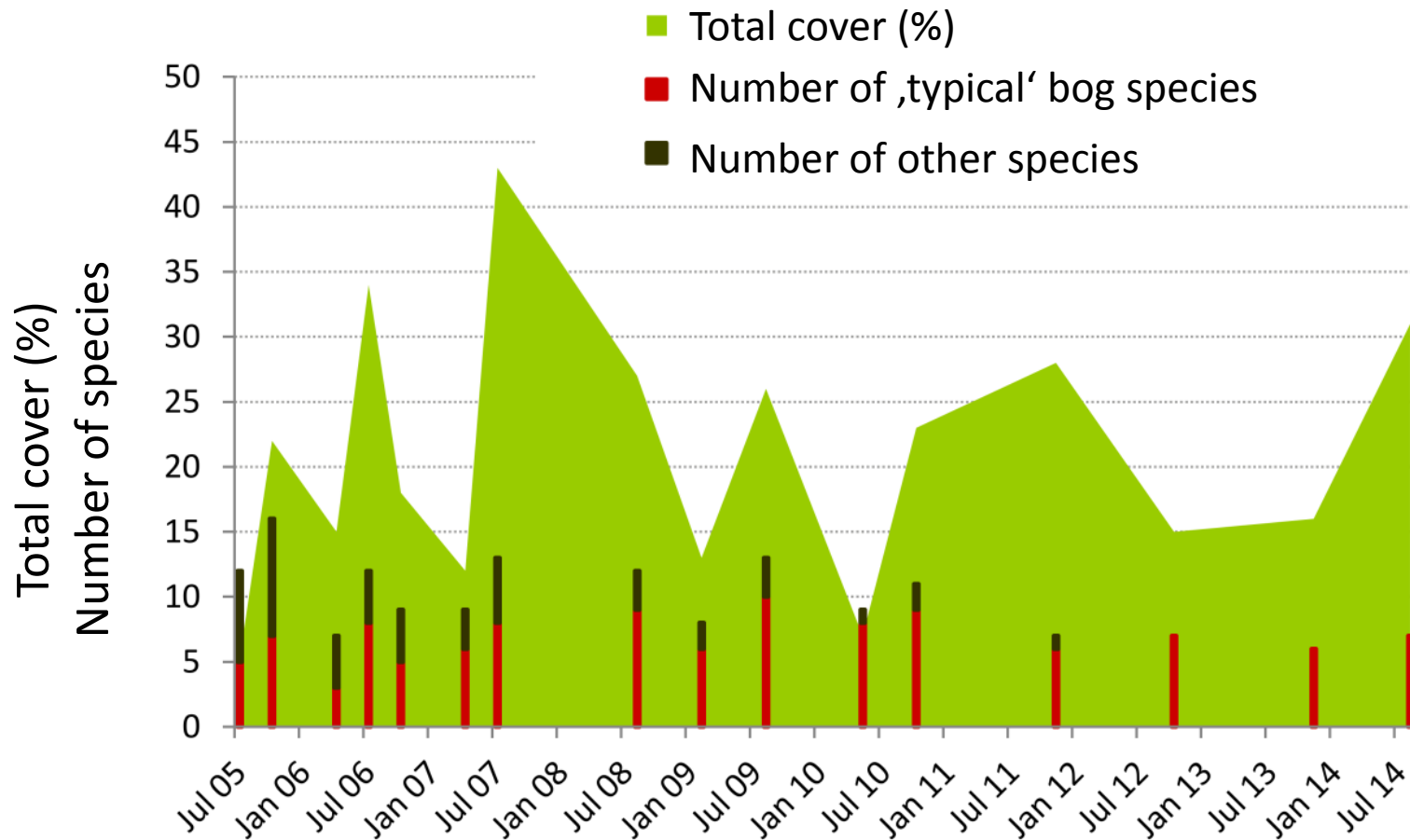
Vascular plants on Sphagnum farming sites after *Sphagnum* lawn establishment



- Mixture of bog and ,non-bog' species
- More species on former bog grassland
- Dominant species: *Erica tetralix* (cut-over bog),
Juncus effusus (bog grassland)

Vascular plants on Sphagnum farming sites

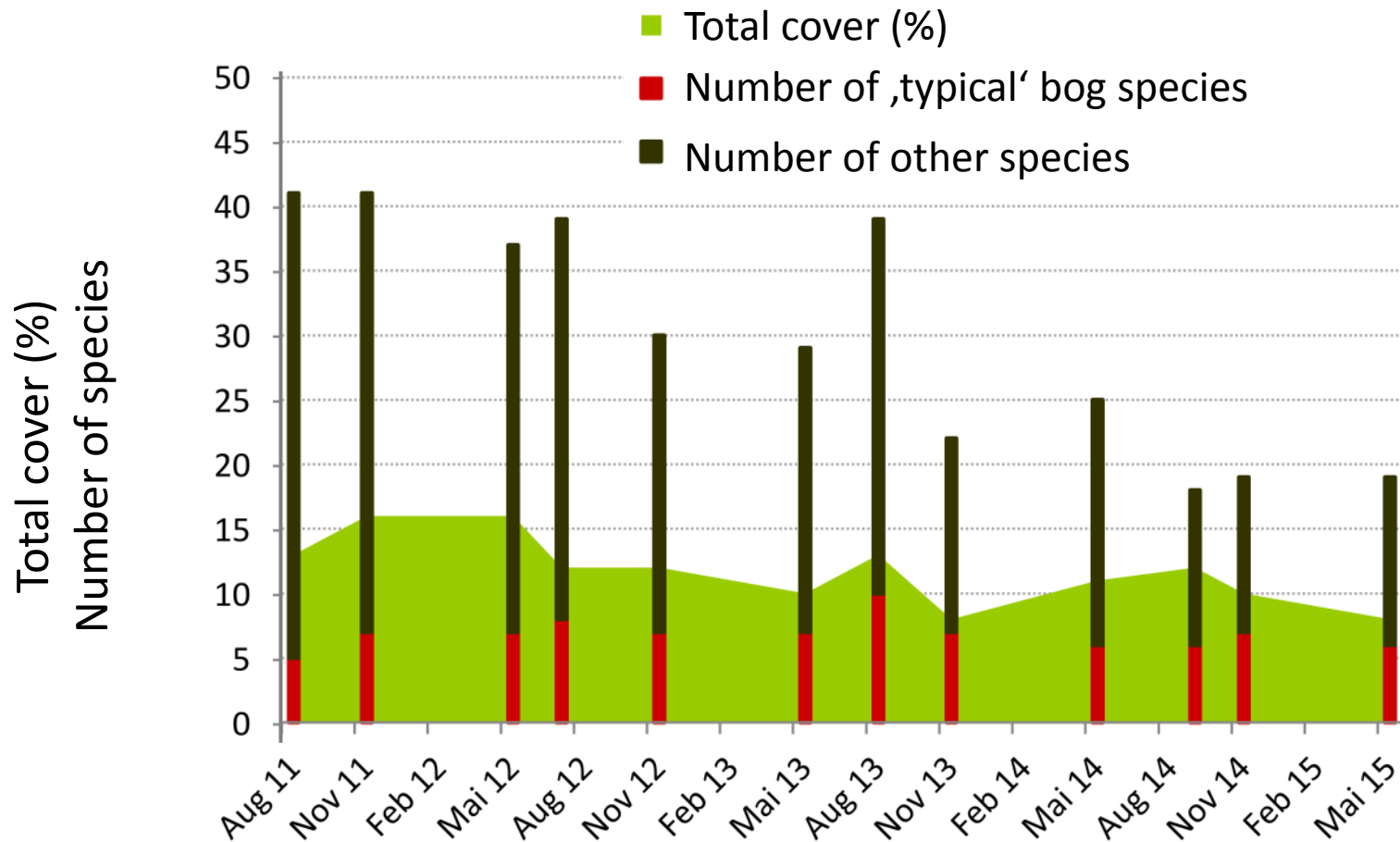
development on **cut-over bog** (9 years)



- Mainly <30% total cover due to regular mowing
- Decrease of species number and ,non bog' species

Vascular plants on Sphagnum farming sites

development on **former bog grassland** (4 years)



- Mainly <20% total cover due to regular mowing
- Decrease of species number and ,non bog' species

Vascular plants on *Sphagnum* farming sites

→ in irrigation channels



Utricularia vulgaris

Spiders on Sphagnum farming sites

→ Good indicators of early stages
of ecosystem development

Spiders on Sphagnum farming sites

→ Rare species on cut-over bogs sites

Pardosa sphagnicola

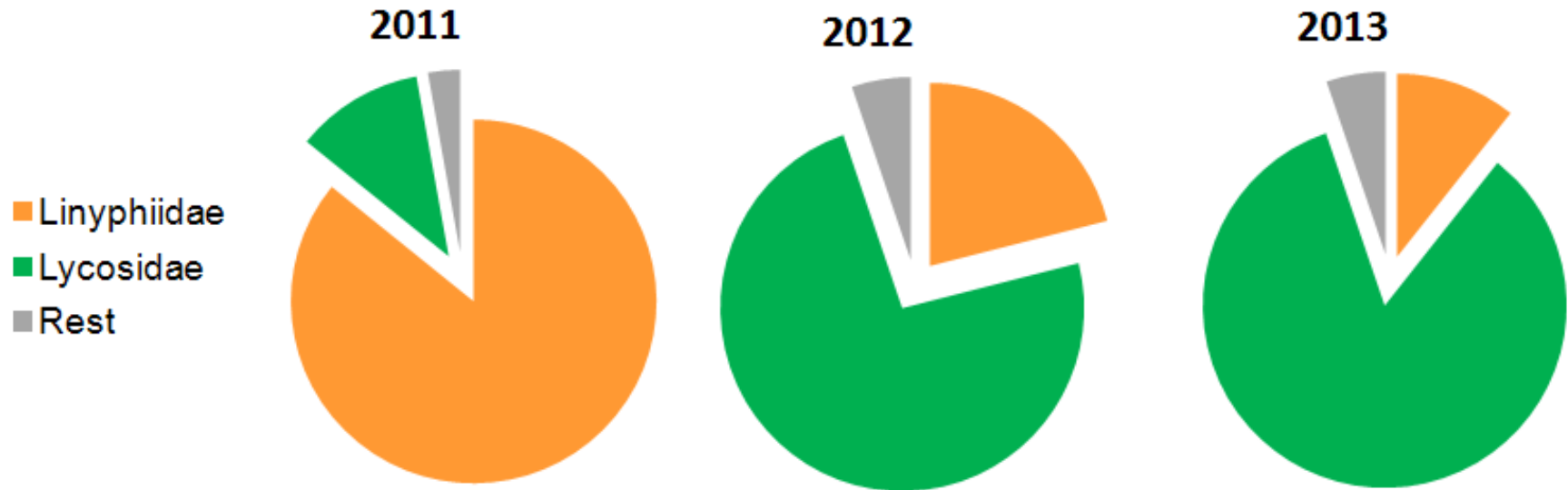


Bathyphantes setiger



Spiders on Sphagnum farming sites

succession on former bog grassland



1st year: high proportion of aeronautic pioneer species

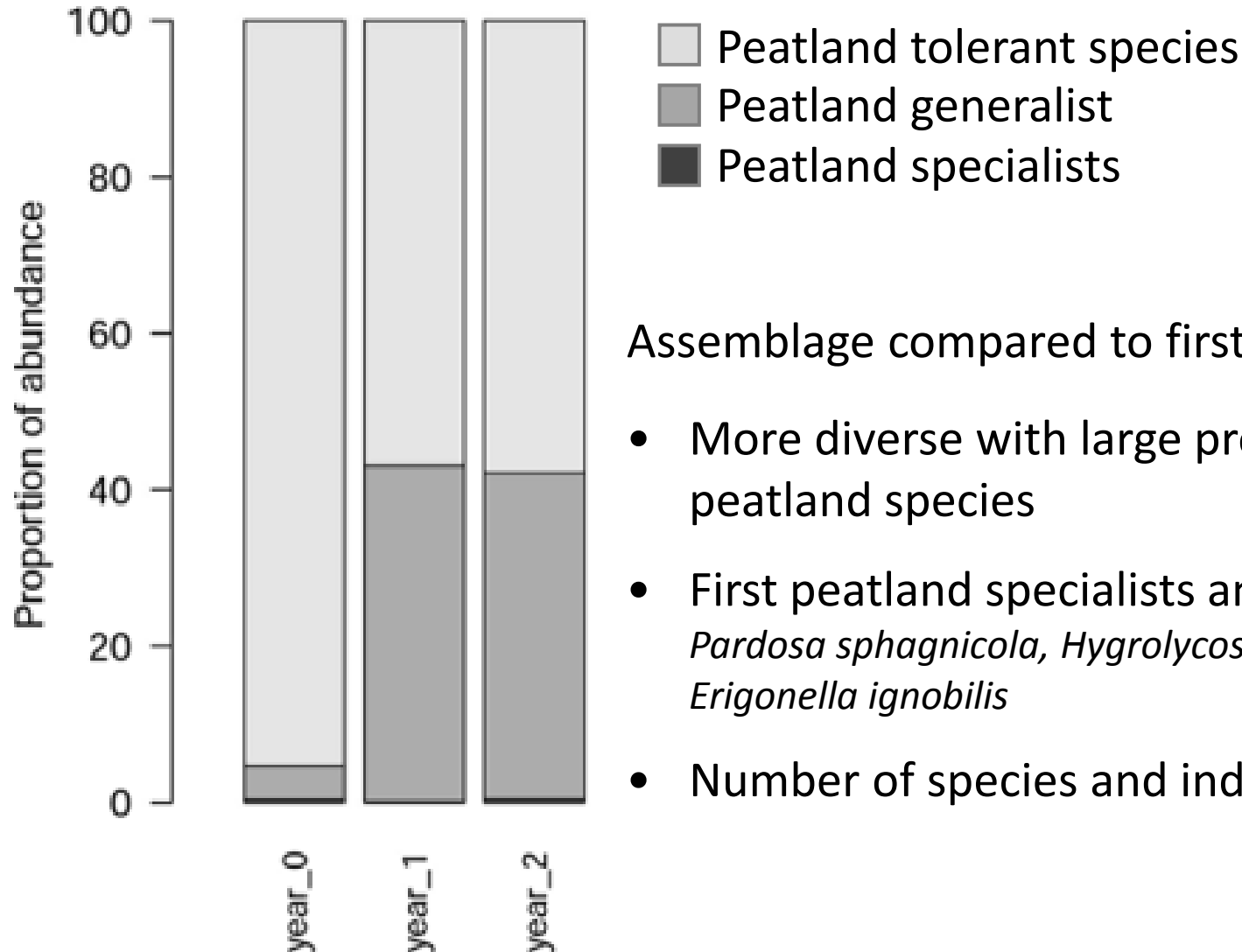
Erigone atra, *E. dentipalpis* and *Oedothorax fuscus* (77%)

2nd and 3rd year: strong change in species composition

dominant species: *Pirata piraticus* (42%) in 2nd year

Spiders on Sphagnum farming sites

succession on former **bog grassland**



Assemblage compared to first year:

- More diverse with large proportion of peatland species
- First peatland specialists and red list species
Pardosa sphagnicola, *Hygrolycosa rubrofasciata*,
Erigonella ignobilis
- Number of species and individuals increased

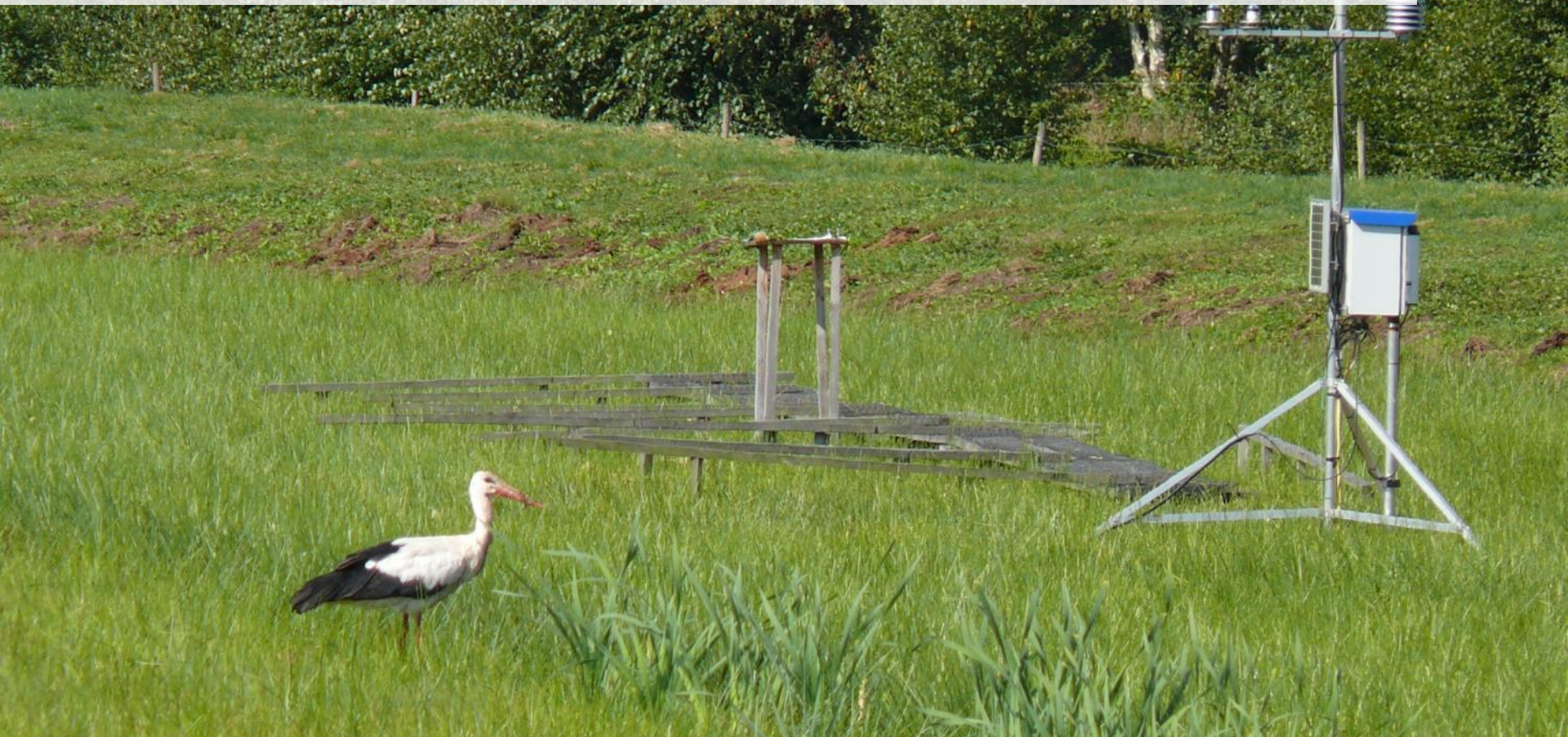
other species groups on Sphagnum farming sites



Badhamia lilacina

Foto: Uni Greifswald

other species groups on Sphagnum farming sites



Birds, e.g. *Tringa ochropus*, *Vanellus vanellus*, *Gallinago gallinago*

other species groups on Sphagnum farming sites



→ Current investigations on dragonflies

Factors for biodiversity on Sphagnum farming sites

- **Origin of the seeding material**
 - moss material collected from natural sites include parts of animals (eggs, living individuals) or plants (e.g. seeds, sprouts)



Factors for biodiversity on Sphagnum farming sites

- **Origin of the seeding material**
 - moss material collected from natural sites include parts of animals (eggs, living individuals) or plants (e.g. seeds, sprouts)
- **Input from the surroundings**
 - Plant parts and animals reach via air, water and soil
- **Conditions of the surficial soil**
 - Vascular plant colonize faster at bare peat areas
- **Age of the Sphagnum farming site**
 - Succession leads to more bog specific species
- **Management**
 - Expansion of vascular plants is limited by regular mowing
- **Harvest method and frequency**
 - current investigations

Conclusions

Sphagnum farming sites

- are valuable surrogate habitats for bog species
- can strengthen bog conservation
 - a) by wet agriculture in the surroundings of nature reserves
 - b) by the creation of corridors between wet ,nature‘

Thank you for your attention!

www.sphagnumfarming.com