

# Transfer of species rich hay in the moderately grazed fen meadows of the Aukrug Nature Park (N-Germany)

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## Introduction/Background:

The degraded fen meadows of the Aukrug Nature Park are moderately grazed with Heck Cattle since the recent years for the purpose of nature management. Due to the moderate disturbance by grazing animals, suitable conditions for species-rich fen vegetation should be established. But many of the typical species of fen meadows are still absent in the aboveground vegetation. We assume the most target plant species to be dispersal-limited. To improve species diversity, hay transfer was performed at two sites in the Aukrug Nature Park in 2008.

## Project area:

Our project take place at two small river valleys within the Nature Park Aukrug. For both sites donor sites for hay transfer have been chosen separately according to individual site conditions and expectations.

## Rstoration sites:

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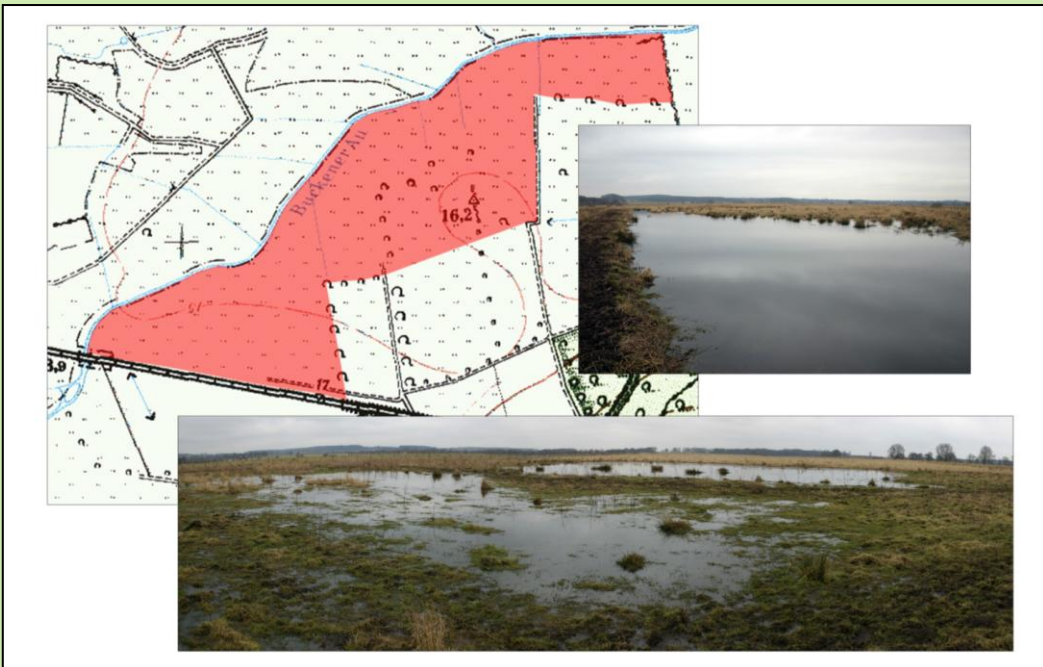
Project area „Buckener Au“

Start condition:

Abandoned in the previous years; can be characterized as high productive and dominated by *Phalaris arundinacea*

Goals:

Establishment of further tall growing species (e.g. *Eupatorium cannabinum*, *Angelica sylvestris* und *Lythrum salicaria*) to enrich the species diversity, structural diversity and floweriness for insects



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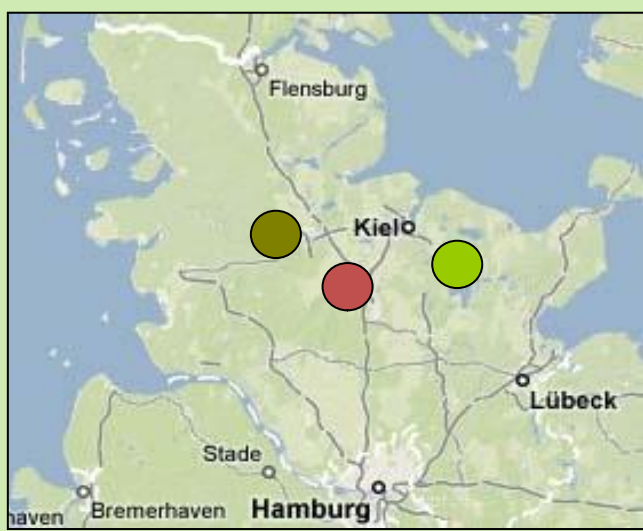
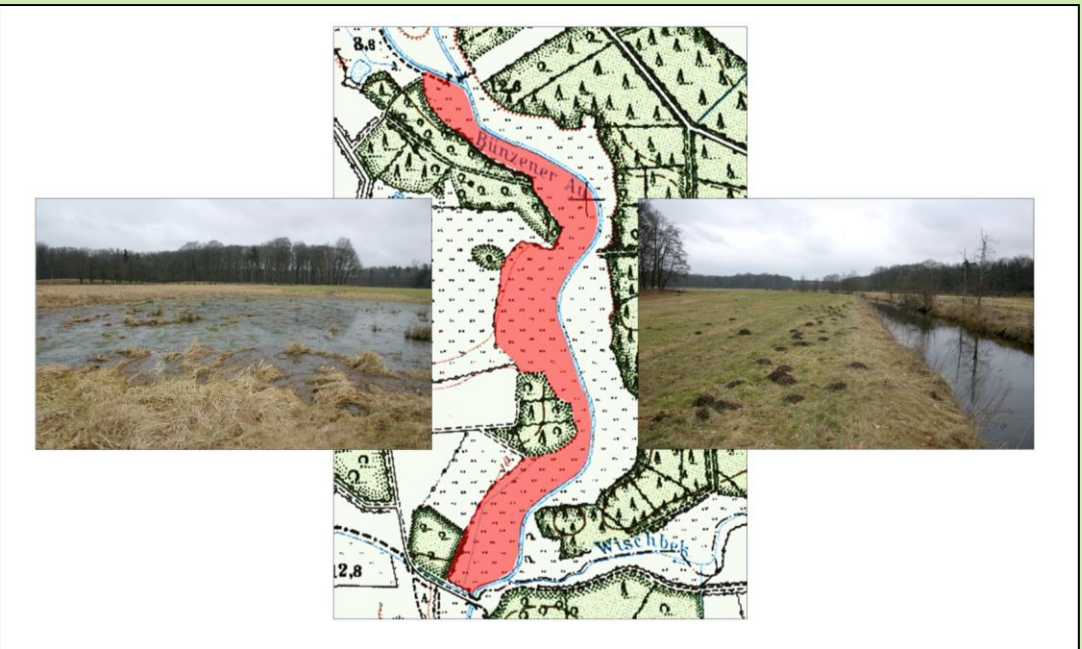
Project area „Bünzener Au“

Start condition:

Formerly intensively grazed, now species poor and characterized by *Carex acuta* and some more species of the agricultural grassland

Goals:

Establishment of a species rich fen meadow with small sedges and further rare an endangered plant species like e.g. *Rhinanthus angustifolius*, *Pedicularis palustris*, *Valeriana dioica*)



## Donor sites:

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Lehmkuhlener Stauung

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Ca. 35 km NO from the project area “Bünzener Au”

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About 30 km southern from Kiel nearby Preetz

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Usage: late mowing once a year and occassional removing of shrubs

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Vegetation: low-productive and medium productive, more or less sedge-dominated fen meadows (*Caricetum nigrae*, *Caricetum rostratae* and nutrient poor sections of the *Calthion*)

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Hohner See

➡

Ca. 30 km NW from the project area “Buckener Au”

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About 30 km western from the city of Rendsburg

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Gathering of hay from a site SW from the actual lake area at the federal road B202

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Usage: none

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Vegetation: Abandoned fen meadow, that is especially rich on flowers with a high percentage of tall perennials (abandoned *Angelico-Cirsietum oleracii*, dominant species: *Lythrum salicaria*, *Angelica sylvestris*, *Eupatorium cannabinum*)

## Methods:

The donor sites were mown regularly in August (Lehmkuhlener Stauung) and September 2008 (Hohner See). Hay material was immediately transferred to restoration sites and laid out in proportion 1:1 on defined stripes (4 x 50 m, two on each site). In addition to hay, seeds of a few target species (fruiting and releasing the seeds earlier or later in relation to mowing time) were gathered manually and sown within the stripes. Prior to hay transfer the plots had been mown and harrowed to produce gaps with open soil in the dense vegetation. Vegetation on transfer plots and the surrounding (2x50 m stripes on each site of transfer stripes) was surveyed before the sites had been prepared for hay transfer in 2008 and the following vegetation periods. Observations in 2009 showed the successful transfer of several species at both investigation sites. Vegetation surveys will be continued this year to proof the establishment of the species which were transferred with hay and their secondary dispersal within the nearby areas.



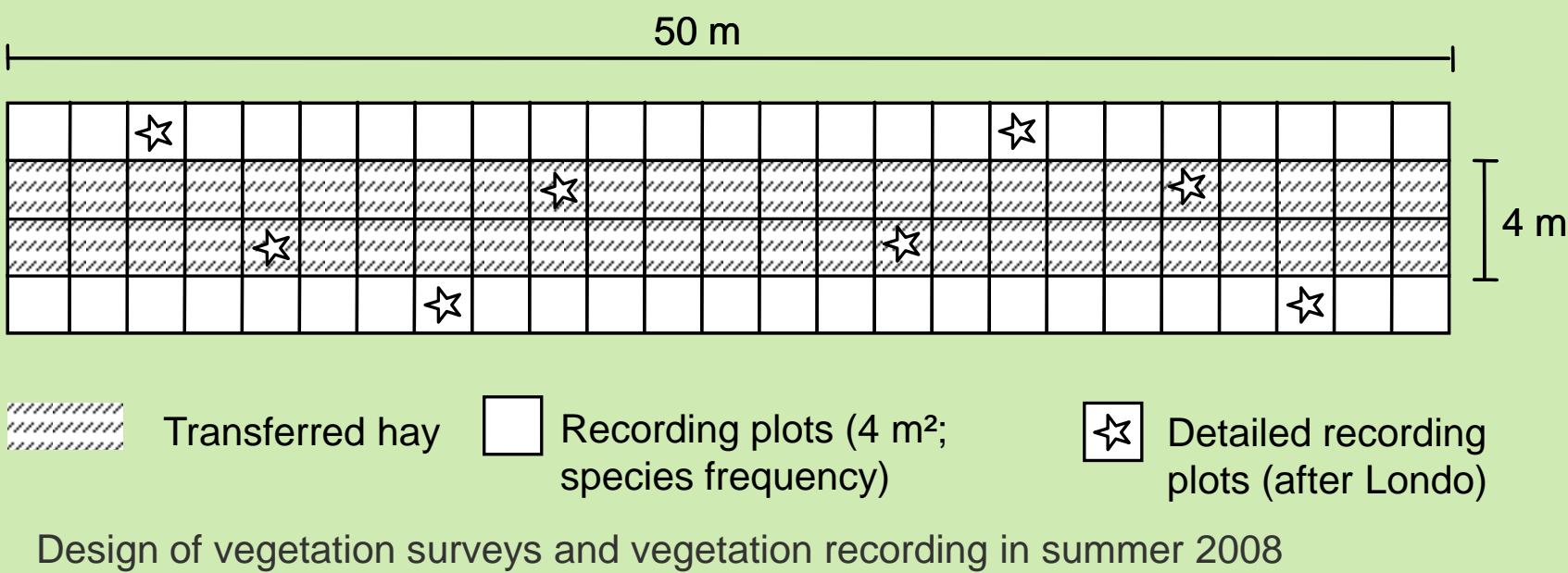
Preparing of the restoration sites in summer 2008



Harvesting of hay at the donor site “Lehmkuhlener Stauung” in August 2008



Transferred hay in August 2008 and two weeks later after heavy rain and trampling by cattle

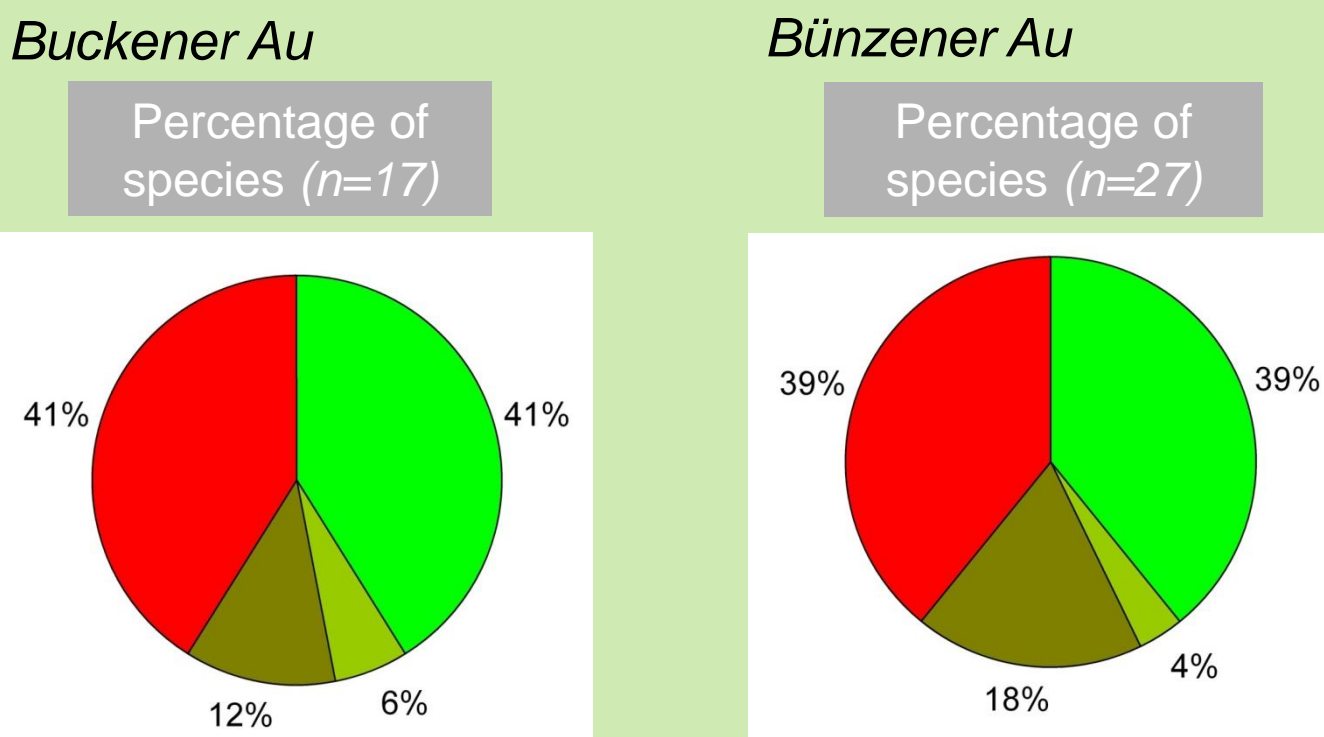


## First results (after 1 year):

The following tables give an overview over the transferred species. Number 1-3 show a quantity of seeds in hay (from 1=few to 3=dominant); A – additional sowing of manually gathered seeds.

Buckener Au			
Species	Presence of seeds in the hay	Receiver site 1	Receiver site 2
Angelica sylvestris	1/A	X	X
Calamagrostis canescens	1		
Caltha palustris	A		
Carex elata	A		
Carex paniculata	A		
Cirsium oleraceum	1		
Cirsium palustre	1	(x)	(x)
Epilobium hirsutum	3		X
Eupatorium cannabinum	1/A	X	X
Filipendula ulmaria	1		X
Juncus effusus	1	(x)	
Lotus pedunculatus	1	(x)	X
Lycopus europaeus	1		X
Lythrum salicaria	3	X	X
Mentha aquatica	1		
Silene flos-cuculi	A	x	
Typha latifolia	1		

Bünzener Au			
Species	Presence of seeds in the hay	Receiver site 1	Receiver site 2
Anthoxanthum odoratum	1		
Carex acuta	2		
Carex echinata	3		
Care flava agg.	1		
Carex nigra	2		
Carex panicea	2		
Carex rostrata	2		
Cirsium palustre	1	(x)	X
Epilobium palustre	2	(x)	(x)
Eriophorum angustifolium	1		
Galium palustre	1	x	x
Galium uliginosum	1	X	X
Holcus lanatus	1	(x)	(x)
Iris pseudacorus	1		
Juncus articulatus	1	(x)	(x)
Juncus effusus	2	(x)	(x)
Lotus pedunculatus	1	X	x
Luzula multiflora	1		
Mentha aquatica	1	X	X
Pedicularis palustris	1/A	X	X
Potentilla erecta	1	X	X
Potentilla palustris	1	X	X
Rhinanthus angustifolius	2/A	X	X
Scutellaria galericulata	1		X
Silene flos-cuculi	1/A	X	x
Succisa pratensis	A		
Valeriana dioica	*1/A	X	



- Species, that were transferred by hay and/or seeding on at least one of the two receiver sites
- Species, that were probably transferred by hay/seeding
- Species, that were possibly transferred by hay/seeding
- Species, whose seeds were available in the hay (or had been sown) that were not detected at the receiver sites in 2009



Seedlings at the restoration sites in summer 2009

## Conclusions:

Hay transfer is a well known method for restoration of degraded grassland sites. For fen areas dominated by a few tall-growing species the successful application of this method needs several prerequisites. A continuous disturbance by e.g. grazing animals and an initial damage of thick tussocks before applying the hay transfer are the most important ones. Furthermore a realistic estimation of the restoration potential based on results and evaluation of prospects of single projects should lead to a proper selection of the restoration and donor sites.

## Outlook:

- Observation of the control stripes and their surrounding in summer 2011 (end of the project)
- Expansion of the method on further moderately used grassland sites in Schleswig-Holstein
- Construction and use of a donor-site-database (“Spenderflächenkataster” ; in cooperation with the “Artenagentur SH“, <http://artenagentur-sh.lpv.de/service/spenderflaechenkataster.html>)