

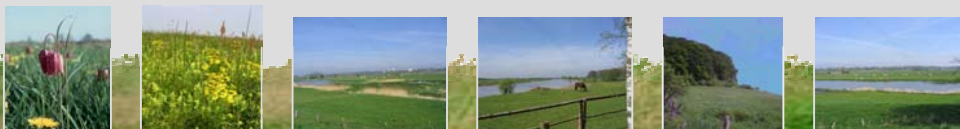
Species-rich grasslands in Northwest Germany

An indicator species approach for result-orientated subsidies of ecological services in grasslands

Burghard Wittig, University of Bremen
Department of Ecology and Evolutionary Biology (IFOE),
Vegetation Ecology and Conservation Biology



48th IAVS-Symposium. „Marginal landscapes (and nutrient-poor ecosystems) – Processes and adaptations“.
Lisbon 2005



Alfred Toepfer Akademie
für Naturschutz



New agri-environmental schemes

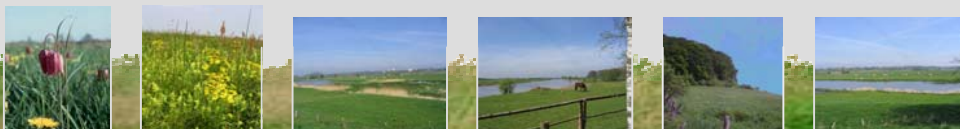
Problems:

Species-rich grasslands are highly endangered in NW-Germany:
Intensification of land-use during the past 50 years and at present;
marginalisation of agricultural sites and regions (abandonment of grasslands and fields).

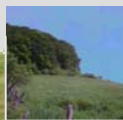
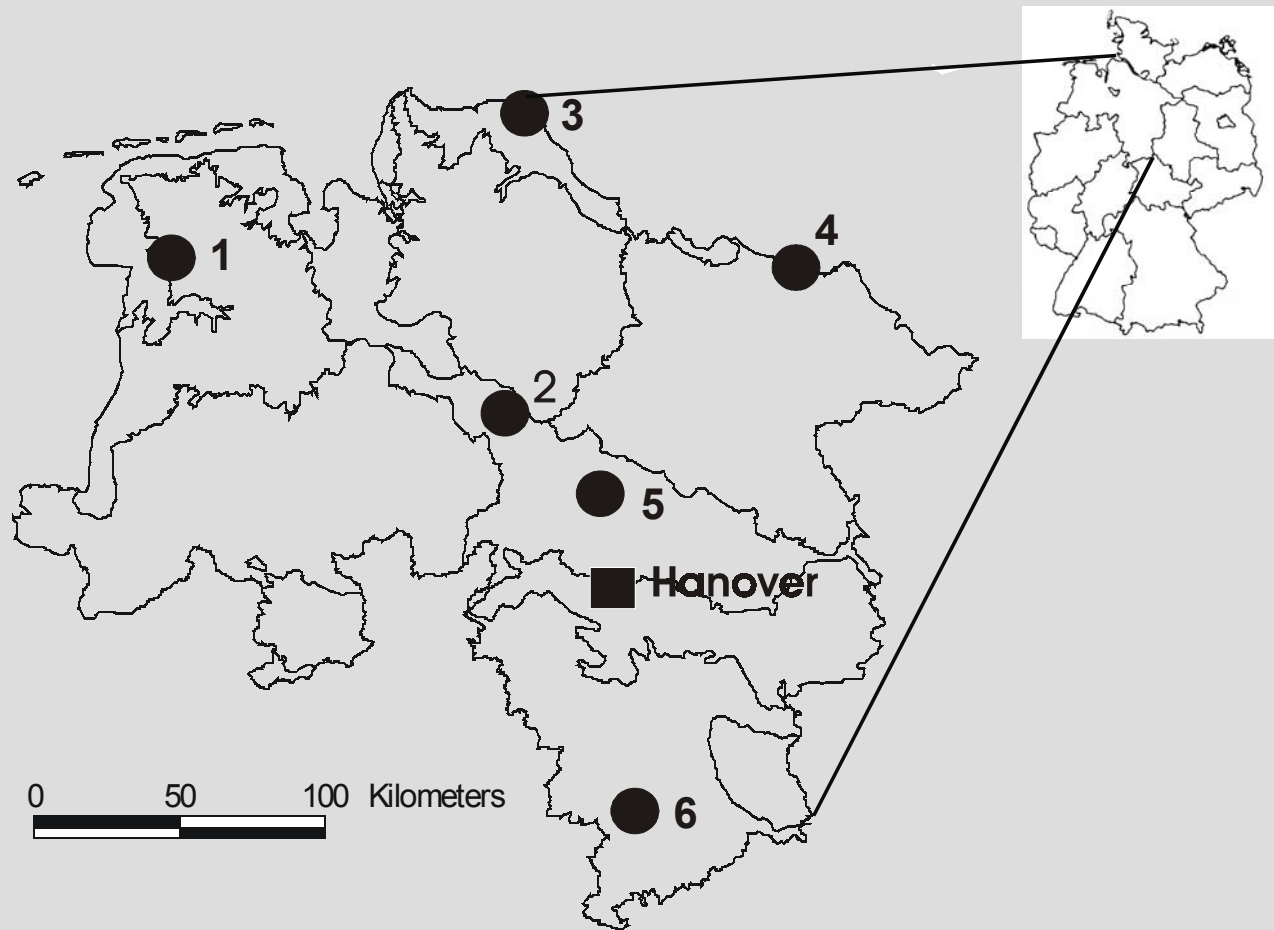
- „Action-orientated“ payments do not take into account the actual effects of these actions (management measures).
- Farmer's management is hampered by inflexible rules (for example, regarding cutting regime and stock level).

Possible solution or supplement:

- Amount of subsidies paid depends of the ecological value (better: nature conservation value)
- „Result-orientated subsidies“



Study regions in Lower Saxony



Study regions



Fehntjer Tief



Aller



Lower Elbe



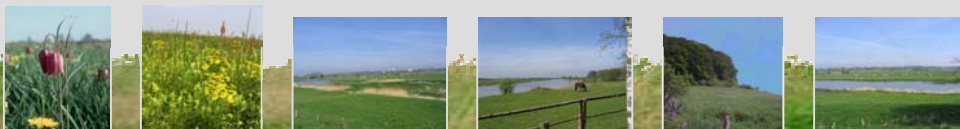
Fuhrberger Feld



Middle Elbe

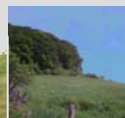
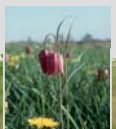


Northeim



General approach

- **Development and test of a simple method for the indication of species-rich grasslands in NW Germany**
- **Indicators (vascular plants) should be easily recognizable also by non-professionals. Farmers should be able to do most of the sampling.**



Selection of indicator species

Indicators should be

- good indicators of general species richness and of the number of red-listed species
- applicable to different grassland plant communities of NW-Germany, including wet to dry and poor to rich sites.

43 indicators were selected for a first test in 2004



Silene flos-cuculi



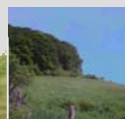
Rhinanthus spec.



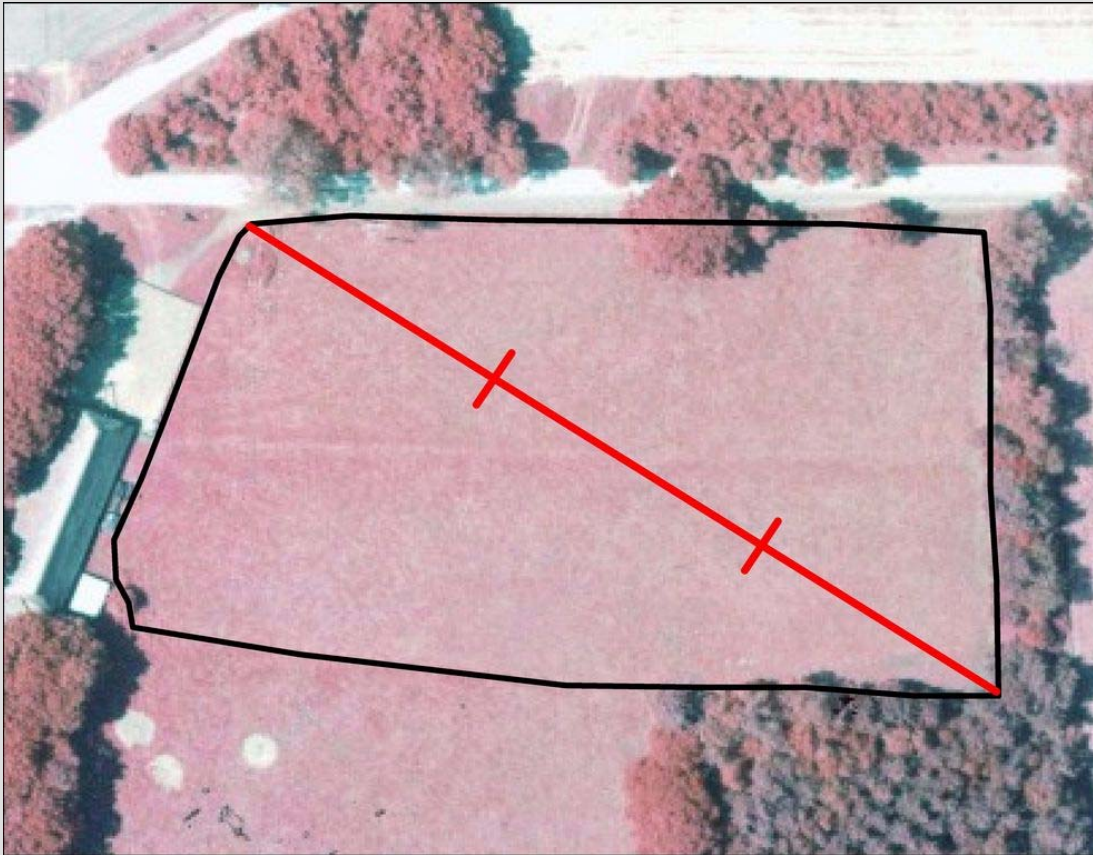
Centaurea spec.



Trifolium pratense



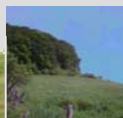
The simple method:



Each transect was divided into three segments.

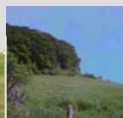
Indicator species were recorded on both sides of the transect (1 m distance from the line of walking).

Two transects were analysed in each grassland site (= field).

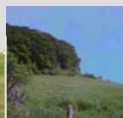
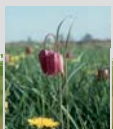
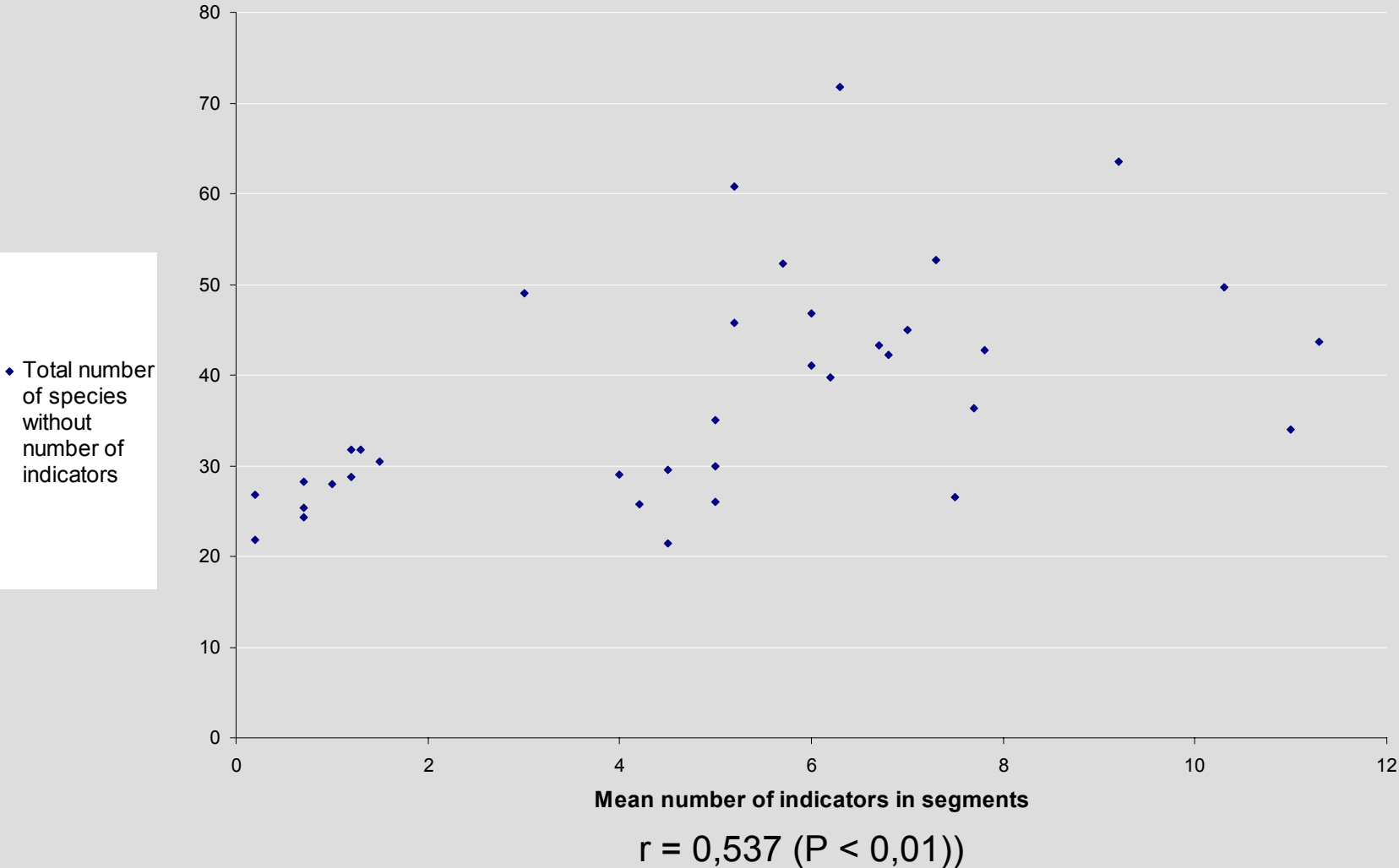


Three questions:

1. Are the selected species good indicators of species richness in the fields?
2. Does the number of selected indicators correlate with the number of endangered or rare species?
3. Are the length of the transects and the field size important for the predictive power of the method?



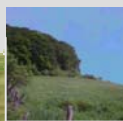
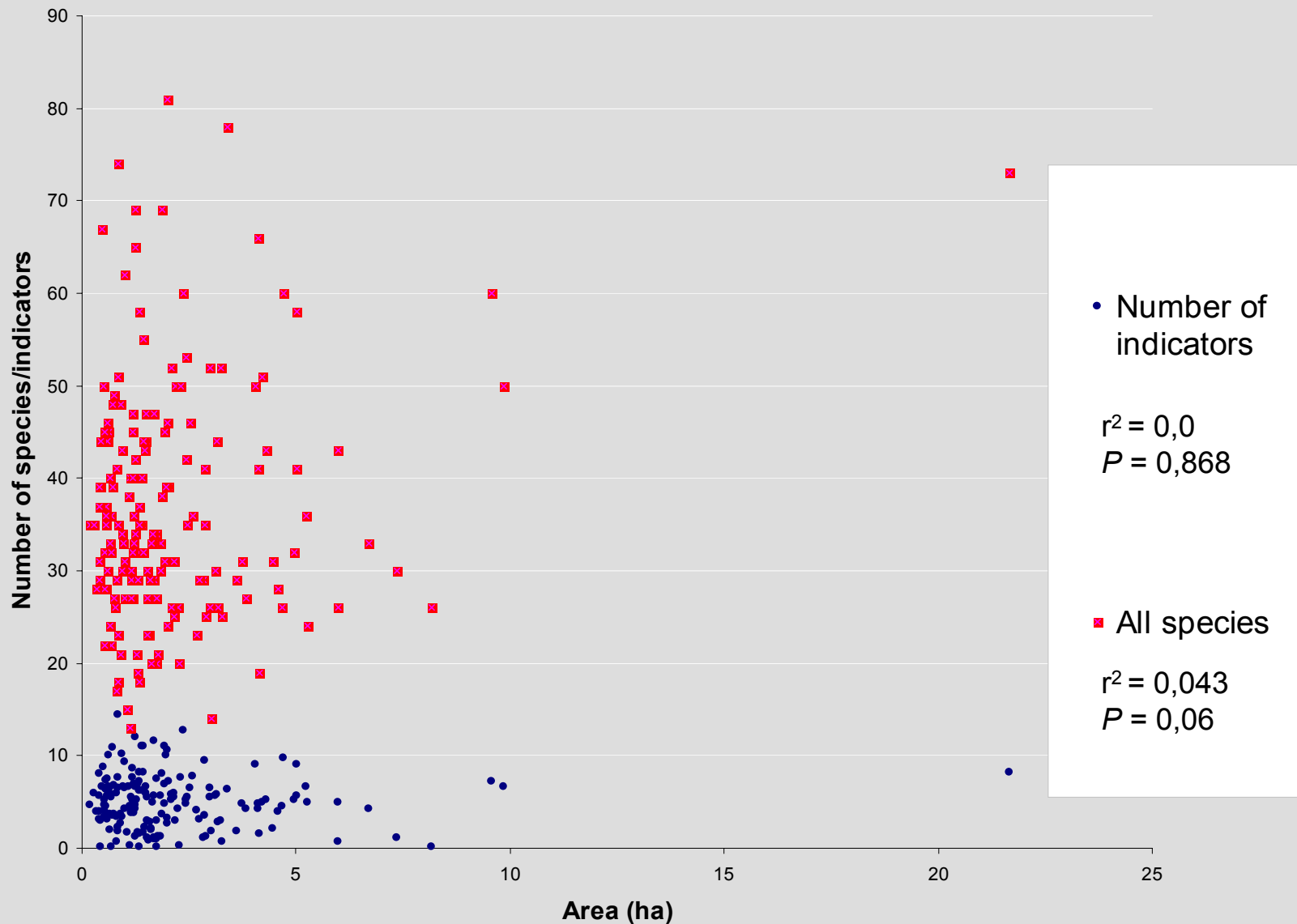
Relationship



NVA

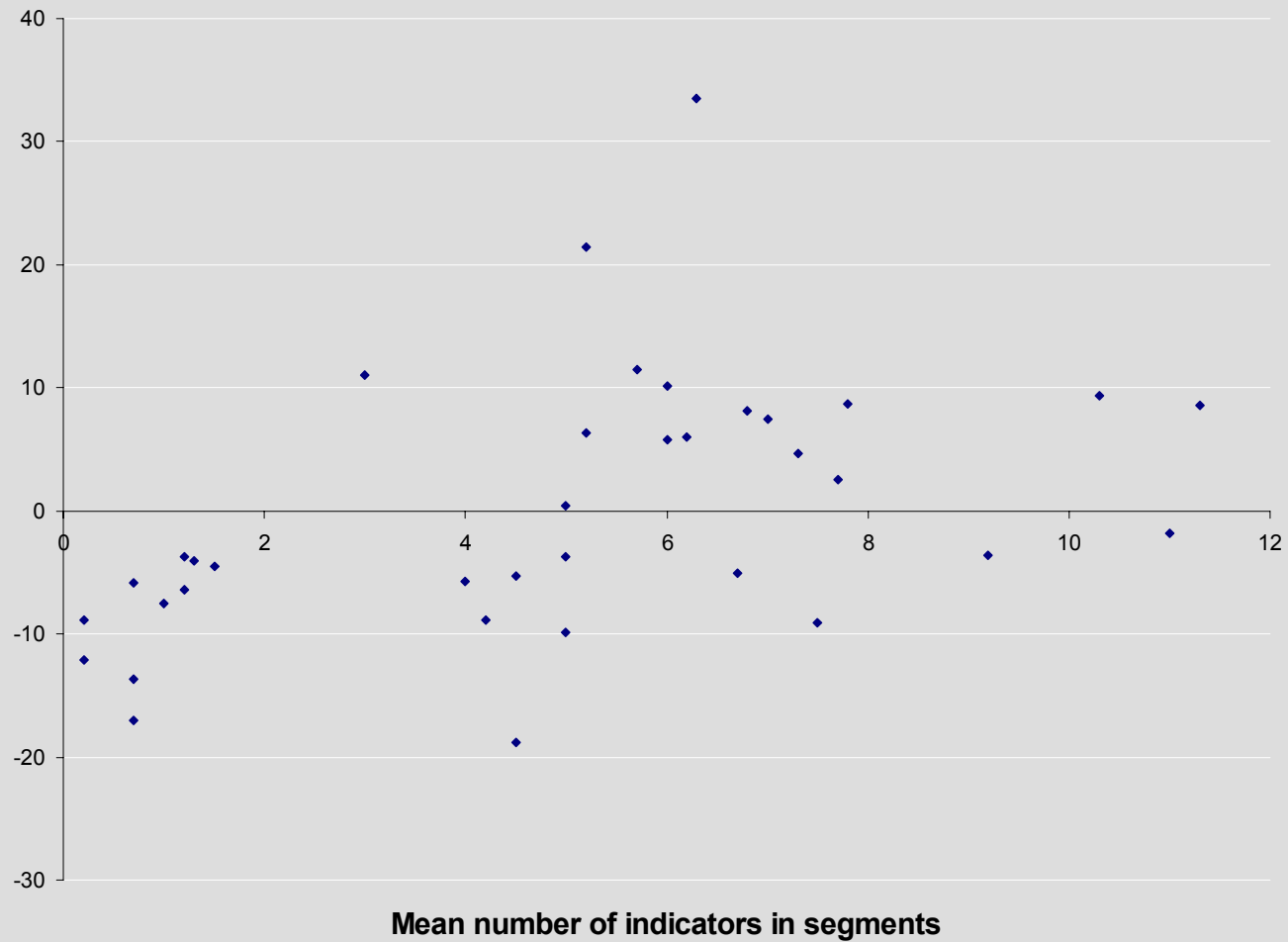


Species-area relationship of investigated fields

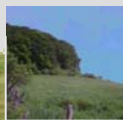


..., corrected for area effects, Aller

◆ Total number of species without number of indicators and with covariable field size



$r = 0,555$ ($P < 0,01$)



NIA

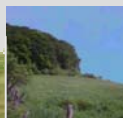


Prediction of species richness

	Fehntjer Tief	Aller	Lower Elbe	Fuhrberger Feld	Middle Elbe	Northeim
Fields (n)	37	36	30	30	34	35
No. of segments	222	216	180	180	204	210
	Mean number of indicators in segments					
Number of species (without number of indicators)	0,571**	0,537**	0,656**	0,353	0,424**	0,491**
...with covariable field size	0,557**	0,555**	0,590**	0,347	0,445**	0,461**

** $P < 0,01$

(Spearman rank correlation coefficients)

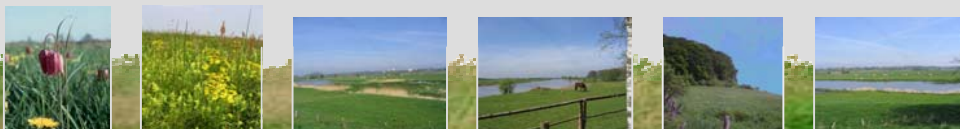


NIA



Conclusions for the prediction of species richness

- Selected indicators are reliable surrogates for species richness in most cases.
- There are only weak relationships between indicators and species richness in regions where intensively used grasslands predominate.
- Some habitat types of high nature conservation value have only few indicators (e.g., small sedge communities or flood plain grasslands).



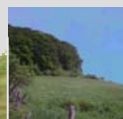
Prediction of the number of red-listed species

	Fehntjer Tief	Aller	Lower Elbe	Fuhrberger Feld	Middle Elbe	Northeim
Fields (n)	37	36	30	30	34	35
No. of segments	222	216	180	180	204	210
	Mean number of indicators in segments					
Red-listed species (categories 1,2,3, and V) without red-listed indicators	0,747**	0,762**	0,467**	0,445*	0,646**	0,355*
...with covariable field size	0,606**	0,702**	0,382*	0,074	0,642**	0,194

(Spearman rank correlation coefficients)

* $P < 0,5$; ** $P < 0,01$

Categories: 1 = „critically endangered“, 2 = „endangered“, 3 = „vulnerable“, V = „near threatened“

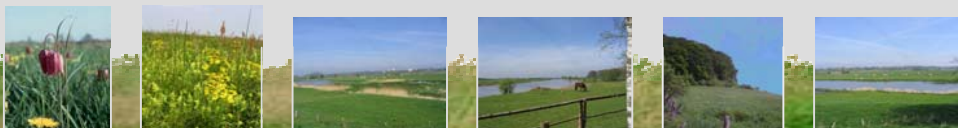


NIA



Conclusions for the prediction of the number of red-listed species

- Indicators and red-listed species are significantly positively correlated in most cases
- Correction for area effects:
 - areas with few red-listed species do not show positive relationships
 - in the south of Lower Saxony the method fails: there are fields with high species richness, but only few red-listed species



Length of transects

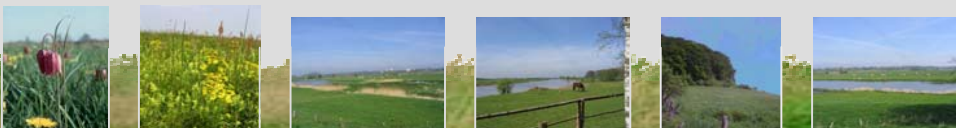
	Fehntjer Tief	Aller	Lower Elbe	Fuhrberger Feld	Middle Elbe	Northeim
Fields (n)	37	36	30	30	34	35
No. of segments	222	216	180	180	204	210
	Mean length of transects					
Mean number of indicators in transects	0,213	0,195	0,385*	-0,34	0,073	0,236
	Length transect 1					
Length transect 2	0,709**	0,890**	0,942**	0,870**	0,909**	0,729**

Conclusions:

- The length of the transects is not important for the practical application of the method.
- Species-area-relationships have no obvious importance for the application of the method.

** $P < 0,01$

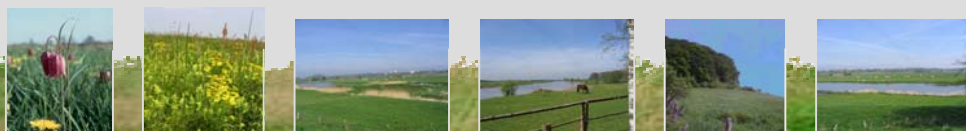
(Spearman rank correlation coefficients)



NIA

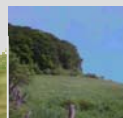
Suitability and problems of the method

- The method is simple, but efficient and suitable.
- Valuable fields of high conservation interest are well separated from non-valuable fields
- Some habitats of high nature conservation value have only few indicators and are species-poor (e.g., small sedge communities or flood plain grasslands); for these, other methods have to be applied.



General conclusions/perspectives for the future

- **The method can probably be used without problems also in grasslands of other European countries with a different set of indicators (or other habitats like arable fields).**
- **The reform of the European agricultural policy leads to new agri-environmental schemes.**
- **This method does not replace exact monitoring methods (permanent plot studies) or other methods for the assessment of whole regions or landscapes.**
- **The administration and/or vegetation scientists should co-operate with the farmers in a good partnership.**

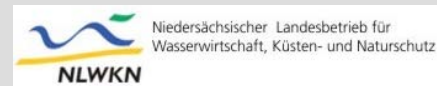


NIA

Partners

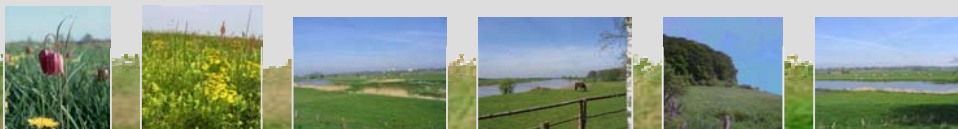
Project management and coordination

- Alfred Toepfer Akademie für Naturschutz
- Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz
- mensch und region, Hanover



Research

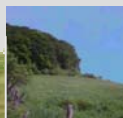
- University of Bremen
Department of Ecology and Evolutionary Biology (IFOE), Vegetation Ecology and Conservation Biology (*Aller, Fehntjer Tief*)
- Hochschule Bremen (University of Applied Sciences)
International Course of Studies for Technological and Ecological Biology (ISTAB), (*Lower Elbe*)
- Universität of Göttingen
Research Centre for Agriculture and the Environment (ZLU), (*Northeim*)
- entera, Hanover
in cooperation with ILN, University Hanover (*Fuhrberger Feld, Middle Elbe*)



„Nordic grassland walking“



<http://www.artenreiches-gruenland-nwd.de/index.htm>



NWA

