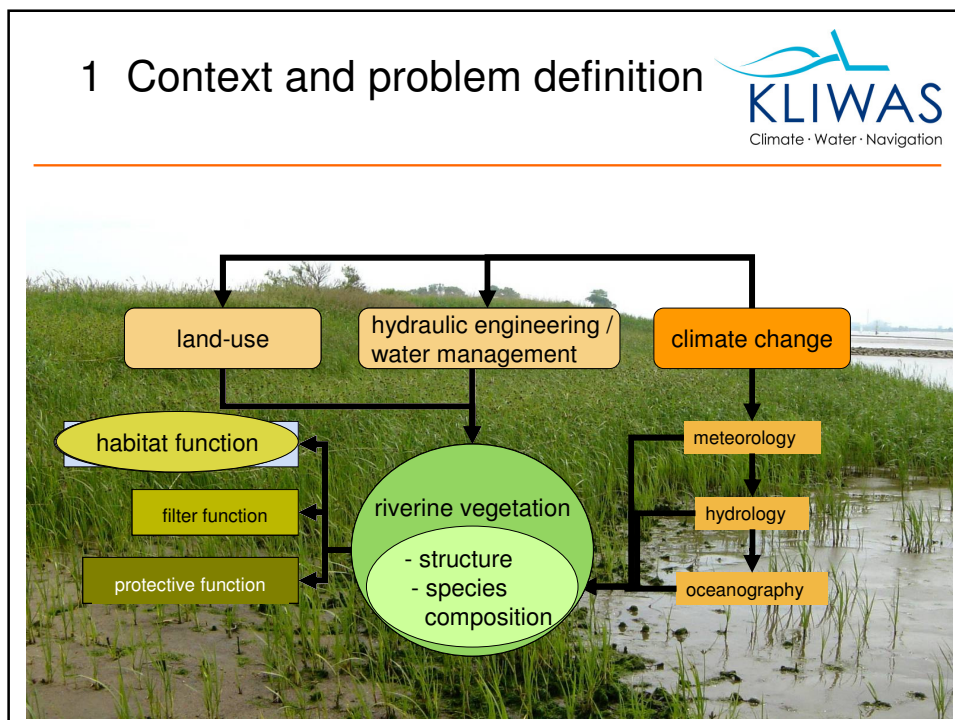




1 Context and problem definition



Promotion of neophytes in estuaries by climate change?

Limits:

-> Pod production of *Impatiens glandulifera* correlated with post-emergence heat sum.
(Willis & Hulme 2002)

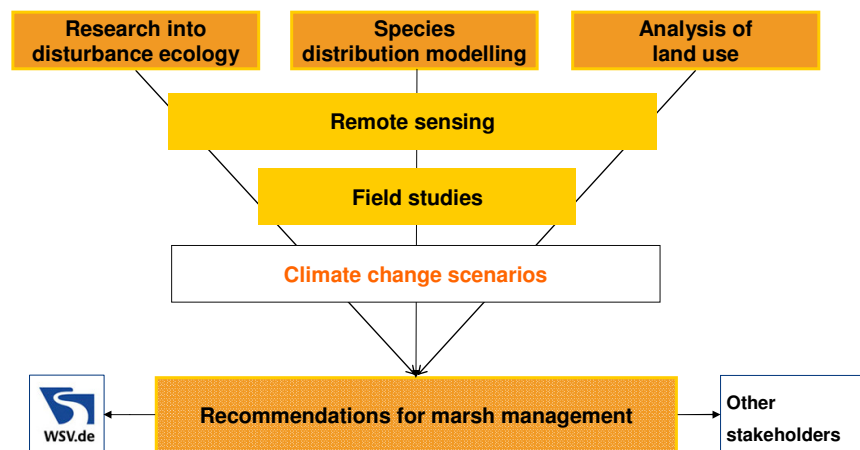
-> frost-sensitivity of *Impatiens* and *Fallopia*

-> global warming might promote both species, also in estuaries

Observation:

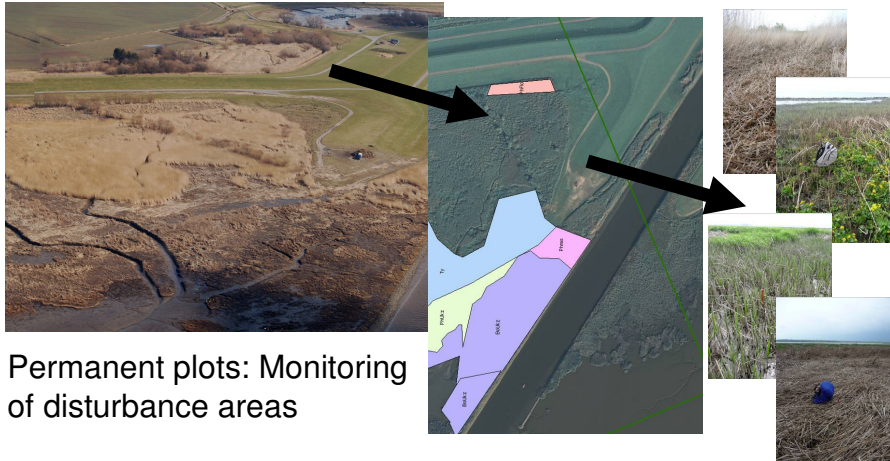
Recent increase of *Impatiens glandulifera* in the Elbe estuary close to Hamburg.

2 Methods and work packages



2 Methods and work packages

2.1 Research into disturbance ecology



Permanent plots: Monitoring of disturbance areas

2 Methods and work packages

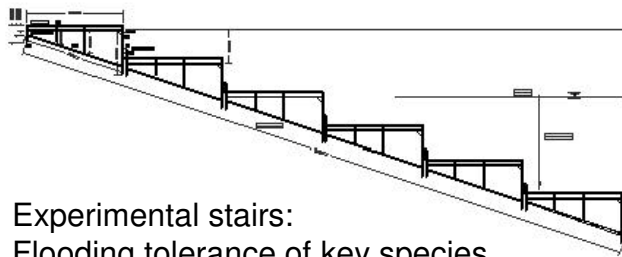
2.1 Research into disturbance ecology

Neophyte-reed-transects:
Effects of natural and anthropogenic disturbances



2 Methods and work packages

2.1 Research into disturbance ecology



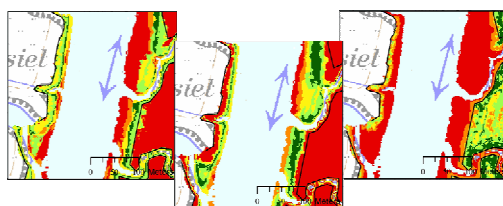
Experimental stairs:
Flooding tolerance of key species

(Kai Jensen & Anna Roeder, University of Hamburg,
Biozentrum Klein Flottbek)



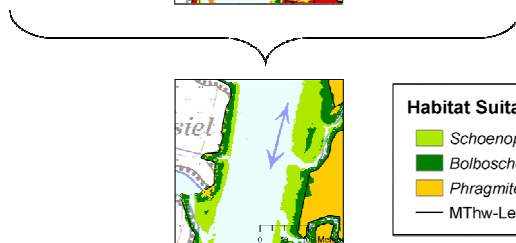
2 Methods and work packages:

2.2 Species distribution modelling



Habitat Suitability

very suitable	unsuitable
suitable	very unsuitable
moderately suitable	MTHw-Level

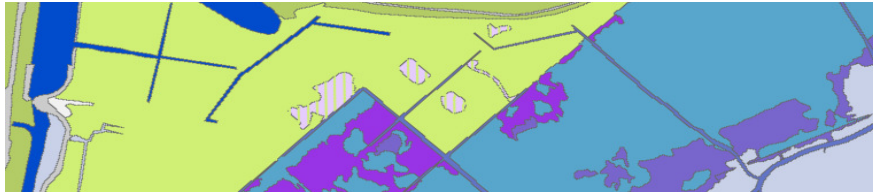


Habitat Suitability of Reed Types

<i>Schoenoplectus tabernaemontani</i>
<i>Bolboschoenus maritimus</i>
<i>Phragmites australis</i>
MTHw-Level

2 Methods and work packages:

2.3 Analysis of land use

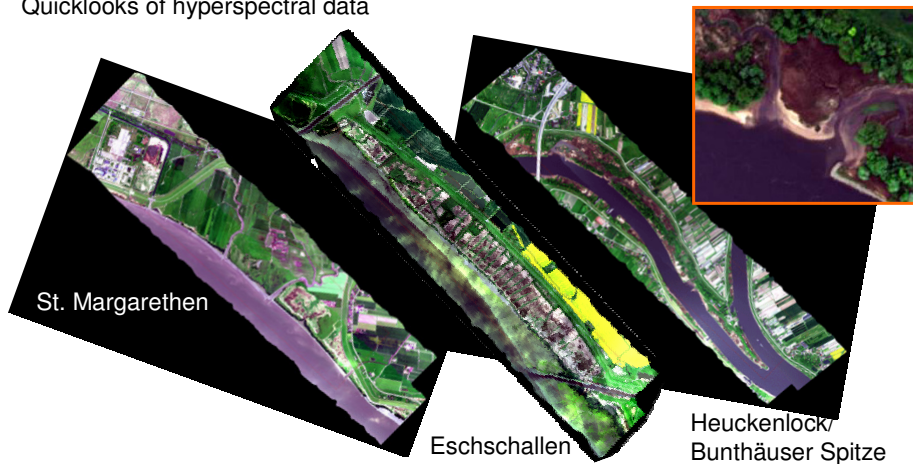


- Land use in the potential tidal reed bed areas
- Proportions of the different habitat types
- Protection against erosion
- Habitat function

2 Methods and work packages:

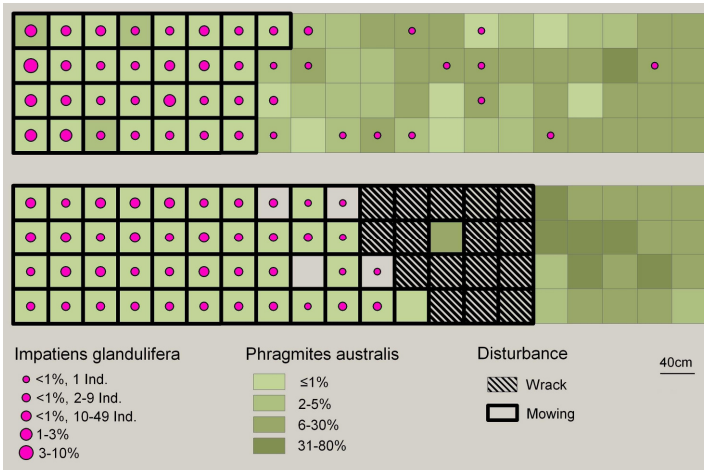
2.4 Remote sensing

Quicklooks of hyperspectral data



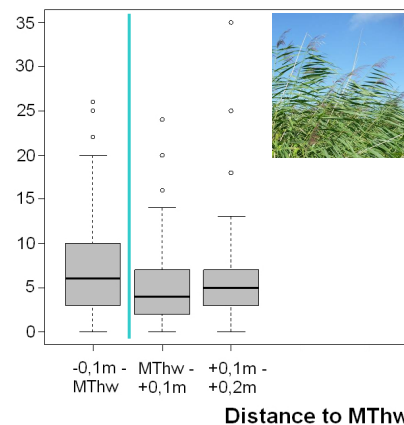
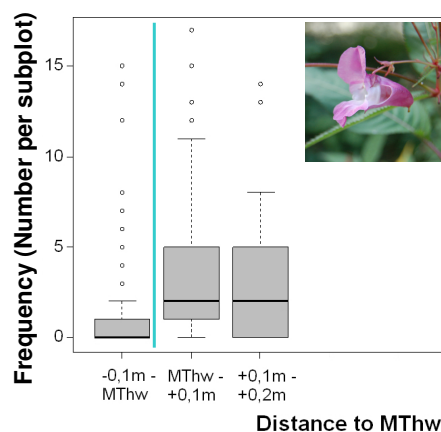
3 Results:

3.1 Neophyte-reed-transects



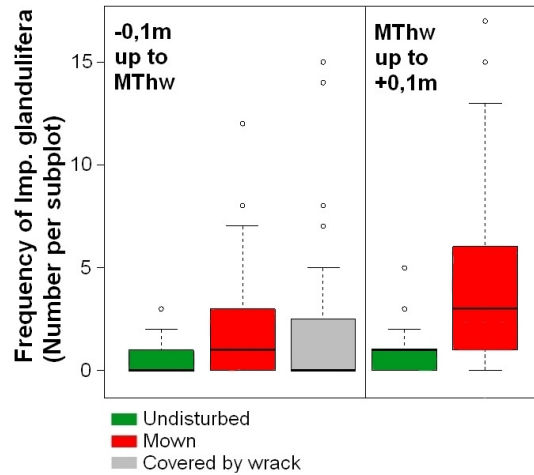
3 Results:

3.1 Neophyte-reed-transects



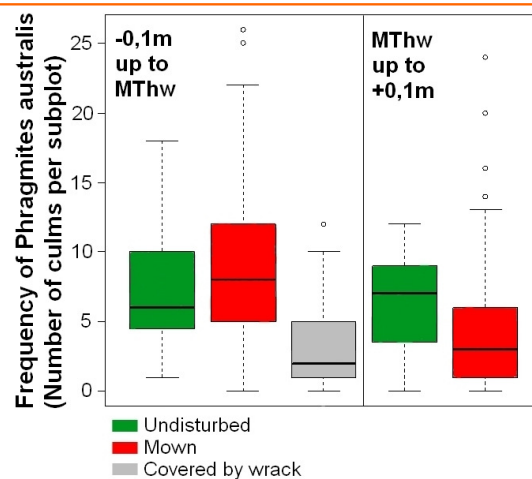
3 Results:

3.1 Neophyte-reed-transects



3 Results:

3.1 Neophyte-reed-transects



3 Results:

3.1 Neophyte-reed-transects



-> Mown *Phragmites*-stands contain less phytophagous arthropods



3 Results:

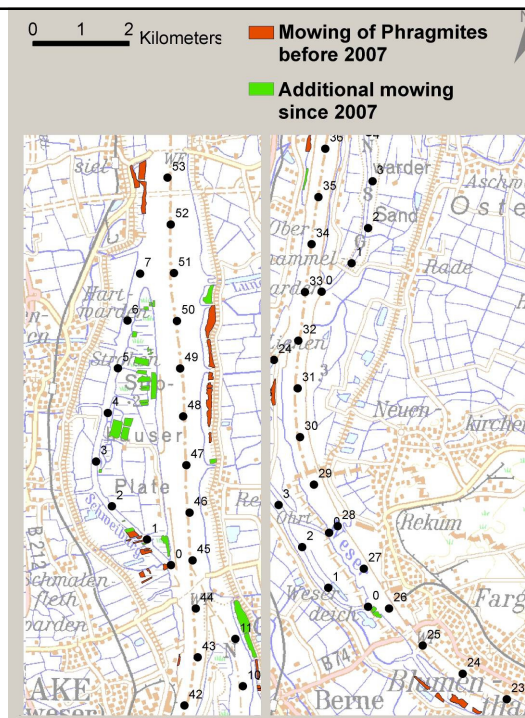
3.2 Land use change

Mowing of *Phragmites australis*-stands in the Weser estuary

km 16 - km 63:
2007: 77 ha
2010: 151 ha

-> Without neophytes, even in the south!?

- Sources:
- Planungsgruppe Grün
 - WSA Bremerhaven
 - WSA Bremen
 - Federal Institute of Hydrology



4 Summary

Methods of disturbance ecology, species distribution modelling, land use analysis and remote sensing are used to study the influence of climate change on the estuarine vegetation of Elbe and Weser.

Mowing of *Phragmites australis*-stands in autumn or winter can promote *Impatiens glandulifera* if present as seeds.

However the increasing mowing of *Phragmites* in the Weser estuary doesn't seem to affect the frequency of *Impatiens* so far.

Further studies will show if mowing of *Phragmites*-stands < MThw

- can contribute to erosion control in the estuaries by means of strengthening the reed vitality
- or if it, together with increasing temperatures, promotes invasive species, and thus impairs natural bank protection

Final results of all work packages of KLIWAS 3.09 will be presented in 2013.

Many thanks to:

- Conservation authorities of Hamburg, Niedersachsen, and Schleswig-Holstein
- WSÄ Bremen, Bremerhaven, and Hamburg
- Planungsgruppe Grün

and to you for your attention



www.kliwas.de

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- German Federal Institute of Hydrology (BfG)
- German Federal Waterways Engineering and Research Institute (BAW)