

**Draft Minutes**  
**TMAP Salt Marsh Workshop**  
**Mandoe 22 – 23 May 2002**

## **1 Opening of the meeting and adoption of the agenda**

The secretary, Mr. Harald Marencic opened the meeting and welcomed the participants to the Wadden Sea Center on Mandoe. Because the chairman, Mr. Jan Bakker (Uni Groningen), could not attend the workshop, the meeting agreed that the secretary chaired the meeting. Mr. Nobert Hecker (National Park Administration, Wilhelmshaven) could not attend because of illness.

The meeting adopted the agenda as in **Annex 1**. A list of participants is in **Annex 2**. A list of documents is in **Annex 3**.

The meeting regretted that the Danish colleagues attended the workshop only part of the time (on 22.5.02 from 9:30 – 16:30h) and that therefore several details concerning the classification scheme, data delivery, and follow-up activities could not be discussed sufficiently.

## **2 Presentations**

A detailed inventory of the monitoring programs was compiled at the salt marsh workshop 2000 (see Annex 3 of the Workshop Report 2000). The participants gave a short update on recent results and developments in salt marsh monitoring.

### **Lower Saxony**

#### *a. Biotope type mapping (see Annex 4)*

- two complete biotope mappings of all Wadden Sea islands and the mainland in 1991 and 1997 (based on aerial color-infrared photographs, 1:10,000);
- ground truth verifications in 1992 and 1999.
- interpretation of about 200 biotope types; interpretation key based on 542 reference areas;
- transfer to GIS (Arc/info),
- GIS analysis using the original Ringot-code, the Lower Saxony Code and the Natura 2000 Code;
- Description of the biotope development from 1991 to 1997;

The main limitations of the applied method concerned the interpretation procedure of the photographs itself, the scale of interpretation (thickness of lines relates to 10 m in the field), inaccuracy in geo-referencing.

The next survey is scheduled from 2003 to 2006. It is planned to get a higher accuracy by reducing the analog working steps (e.g. digital airborne data or increase precision of analog data), to reduce the work effort (costs) and the time needed for an assessment of the results.

#### *b. Field surveys (by NLÖ)*

- regular vegetation mapping in the Leybucht, Elisabeth-Außengroden, Jadebusen (by NLÖ);
- in the future: undertake more field surveys (vegetation mapping) in combination with aerial surveys to get a better qualitative information necessary for Habitat Directive reporting.

### **Schleswig-Holstein**

- salt marsh monitoring in cooperation with coastal protection agency ("Vorland Management");
- Parameter: location, size, vegetation types and complexes;
- Surveys about every 5 years;
- Aerial photographs (CIR, scale 1:5,000 or 1:10,000), July/August, verification in the following year;
- GIS analysis: Arc/Info

- comparison between 1988 and 1996 survey, presentation of vegetation maps (book), results: increase of mainland salt marshes in most areas about 10% (see **Annex 5**);
- Continuation: new aerial survey in 2000, fieldwork in 2002, inclusion of all islands and Halligen in 2002 survey.
- Yearly field surveys at 8 reference sites on the mainland (transects and permanent plots);

## Netherlands

### a. Vegetation maps (RWS, MD)

- regular mapping of salt marshes (whole NL) every 6 years (in some areas adaptation to every 5 or 6 years)
- aerial photographs (false color scale 1:5,000 or 1:10,000) in August, stereoscopic interpretation, ground truth verification in the following year,
- polygon minimum is 20 x 20 m plus description of vegetation, relevées are 5 x 5 m (Braun-Blanquet method);
- preparation of digital maps (Arc/Info GIS),
- vegetation types SALT 97 (about 50 sub-types and 10 landscape types),
- Additionally: eelgrass mapping by MD every year (PDF maps on website: [www.zeegras.nl](http://www.zeegras.nl))

### b. Alterra

- transects in mainland salt marshes since 1960;
- sedimentation rates (monitoring of soil subsidence from gas extraction);
- grazing inventory of mainland and island salt marshes (at the scale of the SOVON bird counting areas, update of data from Daan Bos);
- drainage data of mainland salt marshes.

## Denmark

### a. NERI

- the national monitoring program is under revision (shifted from Forest and Nature Agency to NERI) and monitoring scheme for terrestrial habitats will be developed by 2004 (Habitat Directive reporting requirements: pioneer zone and salt marsh); there are difficulties to safeguard the funding;
- focus on priority habitats of the Habitat Directive (problem: salt marsh habitats are not classified as priority habitats in the Directive),
- monitoring will be carried out by the counties, data compilation at the NERI data center;
- available salt marsh data: location and size (data from inventory in mid 1990s),

### b. Ribe County

- inventory of salt marshes in Ribe Amt (Report: "Strandenge in Ribe Amt 2000"):
  - o objective: development of a management plan,
  - o field work started in 1992 (Nature Protection Act);
  - o registration of location and size of salt marshes (51 locations in Ribe Amt) (each location as one polygon in GIS);
  - o description of vegetation structure and data about grazing (by yearly aerial surveys), breeding birds (trilateral data 1996) and drainage;
  - o results: high value of salt marshes for landscape, culture, plants, birds; 48 of 51 locations are grazed; high importance for breeding birds.
- Varde Aa Project: project area has increased considerably since 1998 (up to 2000 ha), half of the area are salt marshes.
- Grazing pressure relatively high on salt marshes and heath land (also on state owned salt marshes). Problem: Extensive grazing is sometimes subsidized by the EU;

### c. South-Jutland County

- Severe funding problems to monitor salt marshes (and dunes);
- explore possibilities to prepare a salt marsh report comparable to the Ribe report.

### 3 Discussion of the proposed classification schemes

The participants presented their experience with the vegetation classification proposed by the last salt marsh workshop in 2000:

- Jan Bakker: Relation of SALT 97 classification and TMAP vegetation types.
- Norbert Hecker: Translation of biotope classification into proposed TMAP vegetation types
- Martin Stock: Modification of Bakker proposal.

During the discussion the workshop pointed out that:

- different methods are in use to classify salt marsh vegetation;
- vegetation complexes (e.g. *Artemisia* and *Festuca*) are differently mapped in the Netherlands and in Schleswig-Holstein;
- a long-term and detailed vegetation mapping is necessary for target assessment, management, administration and discussion with users (grazing, coastal protection);
- in the Netherlands and Schleswig-Holstein, most of the existing data sets can be transferred into the TMAP vegetation types, proposed at the 2000 workshop;
- in Lower Saxony, the existing data sets cannot be translated adequately because the biotope mapping is not detailed enough to characterize vegetation types; more detailed field work is necessary;
- in Denmark, no information about vegetation types is available.

The workshop discussed the modification of the TMAP vegetation type classification (proposed by Schleswig-Holstein as given in Annex 6) and concluded that

- o it can be based on the Dutch SALT 97 classification but requires a wider ranged documentation for some vegetation types;
- o the background of the vegetation types has to be documented in more detail,
- o the synoptic tables (Working document by Jan Bakker Table 1 – 4) will be used for the documentation; some details in the tables have still to be checked or amended.

**Table 1:** Overview of the modified TMAP vegetation classification. Details and further explanation are given in **Annex 8**.

	Salt marsh zonation		Vegetation types
<b>1</b>	<b>Pioneer Zone</b>	1.1	<i>Spartina anglica</i> – Type
		1.2	<i>Salicornia</i> spp. – Type
<b>2</b>	<b>Low Marsh</b>	2.1	<i>Atriplex portulacoides</i> – Type
		2.2	<i>Puccinellia maritima</i> – Type
<b>3</b>	<b>Mid/High Marsh</b>	3.1	<i>Artemisia maritima</i> – Type
		3.2	<i>Atriplex portulacoides</i> – Type
		3.3	<i>Limonium vulg./Plantago mar.</i> – Type
		3.4	<i>Juncus gerardii</i> – Type
		3.5	<i>Juncus maritimus</i> – Type
		3.6	<i>Elymus arthericus</i> – Type
		3.7	<i>Festuca rubra</i> – Type
		3.8	<i>Ononis spinosa</i> / <i>Carex distans</i> – Type
		3.9	<i>Agrostis stolonifera</i> – Type
		3.10	<i>Cotula coronopifolia</i> – Type
		3.11	<i>Elymus repens</i> – Type
		3.12	<i>Carex extensa</i> – Type
<b>4</b>	<b>Dunes and Beach-ridges</b>		
<b>5</b>	<b>Reedbeds</b>	5.1	<i>Scirpus maritimus</i> – Type
		5.2	<i>Phragmites australis</i> – Type
<b>6</b>	<b>Grassland</b>	6.1	<i>Lolium perenne</i> – Type
		6.2	Molinietalia – Type

## TMAP Guidelines

### *Methods*

The workshop confirmed the recommendations of the 2000-workshop with regard to monitoring methods (see TMAP salt marsh guidelines):

- in general, survey frequency 5 – 6 years (lower frequency possible in some regions);
- mapping scale 1:5,000 to 1:10,000;
- surveys should be tuned between countries as far possible,
- interpretation of aerial photographs should be documented (see also: John Janssen: Monitoring of salt marsh vegetation by sequential mapping. RWS-MD Delft);

### *Drainage*

With regard to drainage intensity, the workshop proposed to compile data for the period of the last 5 years and to classify them as follows:

- no artificial drainage in the past 5 years;
- last year of artificial drainage;
- ongoing regular artificial drainage (every 2 or 3 years).

## Conclusions

1. The workshop agreed on a TMAP salt marsh zonation system (6 types: pioneer zone, low marsh, mid/high marsh, dunes and beach ridges, reedbeds, grassland ), for which a sufficient information basis exists in all three countries (except Denmark) for over 95% of the salt marshes. This zonation will be used to prepare trilateral salt marsh maps in 2002/2003.

2. The modified vegetation classification on the community level (20 sub-types) was adopted as the future basic trilateral system for salt marsh monitoring in the Wadden Sea (Annex 6). Further amendments or modifications may be necessary and will be discussed at a follow-up workshop in 2003.

3. The national monitoring schemes should be adapted to fulfill the requirements for a vegetation classification on the community level in the TMAP in the future also with regard to the requirements of the Habitat Directive.

4. The data about drainage measures should be compiled on the national level on the basis of the trilateral classification for discussion at the next workshop in spring 2003.

5. A trilateral remote sensing meeting should be organized in Hamburg in autumn 2002 to exchange the experiences with different remote sensing methods and to support the Danish colleagues in establishing remote sensing surveys in the Wadden Sea.

## 4 Salt marsh inventory and report

The meeting discussed the preparation of a survey on the present situation of salt marshes on the basis of the common TMAP classification schemes (vegetation zonation, drainage, grazing) according to § 8 Esbjerg Declaration. This report should be tuned with the preparation of the QSR or policy assessment report to the next Governmental Conference in 2005.

The workshop participants agreed to carry out this task provided that sufficient resources will be made available on the national level on request of the TMAG/TWG.

The report should be planned as a comprehensive "Trilateral Salt Marsh Book" and should contain the following elements:

- trilateral GIS maps (e.g. 1:50,000) of zonation, grazing and drainage (if possible, additional regional maps, e.g. on vegetation classes);
- documentation of monitoring methods;
- description of important salt marsh processes (sedimentation, succession, future of salt marshes);
- management regimes and protection (national, international regulations, EU policy, e.g. subsidy of agricultural use in Denmark),
- Target assessment.

The report should be organized by a salt marsh project group and a chairman responsible for data compilation, assessment and drafting. Trilateral workshops should be carried out to prepare the assessment and discuss the results.

The workshop requested the TMAG to give further guidance for the preparation of the salt marsh report, on which a description of work steps, time schedule, work effort, and resources (personnel and financial) can be prepared by the workshop by September 2002.

## **5 Data handling**

### **Technical overview**

The TMAP data handling system serves as a tool to make monitoring data available for trilateral experts. The system consists of autonomous but identically structured data units, which can mainly be seen as databases with an Internet access. The data of each country or federal state is related to one data unit. Data units are located in Roskilde (Denmark), Tönning (Schleswig-Holstein/Hamburg), Wilhelmshaven (Lower Saxony) and Haren (the Netherlands).

The salt marsh data is stored in a trilaterally harmonized data model, which is divided into three parts. Data on originators, time, stations and areas is needed to identify and select data in the database and is stored in the data catalogue of the TMAP database. The salt marsh data itself will be stored in ArcView shape files, which allows to store area and location of salt marshes within a GIS. Additional information on the shape files, like information on background data (e.g., aerial photographs), processing steps and how the GIS data is produced is also stored in the database. Beside the geographical data the shape files will also contain attribute data

### **Planned data management**

The salt marsh data are collected on the national level. To harmonize and to check the quality of data on the trilateral level, the data will be sent to the secretariat and compiled to a trilateral GIS ArcView shape file. The shape file will again be separated per country and send back for a national quality check before finally stored in the TMAP data units.

### **Discussion points**

The use of national salt marsh data will be controlled by the national data units and the national TMAG members. For trilateral purposes and access to all available data units the TMAG will be responsible. In data access and usage modalities of the data, owners will be involved.

Other points:

- metadata description to be specified,
- legend colors to be harmonized,
- inclusion of topographical data in TMAP data units is not possible because of copy rights,
- trilateral maps should include an overview map to be able to easily locate the sub-areas.

### **Conclusion**

The workshop agreed to deliver the requested data (vegetation zonation, drainage, grazing) to the CWSS where the data will be harmonized and distributed to the TMAP data units.

## **6 Follow up work**

### **1. Workshop Minutes**

- draft minutes to be prepared by 4 June (CWSS)
- comments by participants within two weeks (by 17 June)
- Annexes with presentation to be delivered to the CWSS by 17 June

### **2. Transboundary cooperation**

- explore funding possibilities of coordinated aerial surveys in SH and DK (Aksel Voigt),

### **3. Remote sensing**

- experiences with different remote sensing methods: Dutch report to be distributed (Madelein Vreeken-Buis),
- inform workshop about company offers (Norbert Hecker),

### **4. Remote Sensing Meeting**

- exchange of experience and support of DK in establishing RS surveys
- to be organized by CWSS (autumn 2002, in HH),
- in connection with 3.,

### **5. Salt Marsh Report**

- outline of report by CWSS/TMAG (26 June)
- estimation of effort and project planning (September 2002)
- data compilation and assessment work (2003)
- drafting and publication (2004)

### **6. Data delivery**

- data about: zonation, grazing, drainage
- specification of data to be delivered by CWSS by end of June,
- deadline data delivery: 30 October 02

### **7. Information exchange**

- distribution of DK report of 1993 (by DK)
- prepare list of salt marsh reports (by CWSS)

### **8. EU Subsidies**

- information from Denmark about recent practices of salt marsh grazing subsidies (Aksel Voigt)

### **9. Synoptic table**

- check synoptic tables which are to serve as basis for TMAP classification (Madeleine Vreeken to contact Jan Bakker, Dick de Jong and Kees Dijkema),
- deliver amendments/changes to CWSS to be discussed at the next workshop.

### **10. Field work**

- comparability of mapping method to be discussed in FRG (SH and LS field surveys),
- exchange method description LS and S-H (Wilfried Heiber, Martin Stock)
- discussion at meeting 2003

### **11. Next Meeting**

- April 2003, Spiekeroog, Germany.

## **ANNEXES**

- Annex 1      Agenda
- Annex 2      List of participants
- Annex 3      List of documents [*Annex not yet included*]
- Annex 4      Biotope mapping in Lower Saxony [*Annex not yet included*]
- Annex 5      Salt marsh developments in Schleswig-Holstein [*Annex not yet included*]
- Annex 6      Dutch salt marsh mapping program
- Annex 7      ALTERRA salt marsh monitoring
- Annex 8      Modified TMAP salt marsh classification scheme

## **ANNEX 1**

### **TMAP Salt Marsh Workshop, Mandoe, 22 –23 May 2002**

#### **Agenda**

- 1      Opening of the meeting and adoption of the agenda**
- 2      Presentations**
- 3      Discussion of the proposed classification schemes**
- 4      Salt Marsh Inventory**
- 5      Data handling**
- 6      Follow up work**
- 7      Any other business**
- 8      Closing**

## Annex 2

### TMAP Salt Marsh Workshop, Mandoe, 22 –23 May 2002

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## ANNEX 6

### The Dutch Salt Marsh Mapping Program

Summary of the contribution of the Meetkundige Dienst (MD) to the TMAP Saltmarsh Workshop, Mandø, 22-23 May 2002.

#### Organisation

The Meetkundige Dienst (Survey Department), a sub-division of the Directorate-General of Public Works and Water Management (RWS), manages all the saltmarsh vegetation-mapping projects in the Dutch part of the Wadden Sea, in the so-called VEGWAD program. The RIKZ (also RWS) yearly commissions the MD to put part of the VEGWAD program into effect. The RIKZ is accountable for the execution of the MWTL program (national water management monitoring program). This is a continuous monitoring program with fixed (?) long term funding.

Aim of the VEGWAD program is:

- Monitoring of active management programs
- Input for future management programs
- Input for political and management decisions
- Warning, verifying and predicting

The mappings serve to give information

- On the nature and quality of the saltmarshes
- On changes in total area of the saltmarshes

#### Frequency

The frequency of mapping of the different salt marsh areas is six years. Less dynamic areas are mapped every 7 years; more dynamic or vulnerable areas are mapped every 5 years.

	Most recent	cyclus									
	photos	(years)	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>Mapping programme:</b>											
Saltmarshes North Holland	1999	6				photos	fieldwork	report			
Saltmarshes Texel	1999	6	report			photos	fieldwork	fieldwork	report		
Slufter Texel	1999	6	report			photos	fieldwork	fieldwork	report		
Boschplaat (Terschelling)	1999	7	report				photos	fieldwork	report		
Dollard estuary	1999	7	report				photos	fieldwork	report		
Griend	1999	7					photos	fieldwork	report		
Kroonspolders (+Westerveld) (Vlieland)	1999	4/6	report	photos	fieldwork	report				photos	fieldwork
Noordv + Gr Strand (Terschelling)	1999	4/6	report	photos	fieldwork	report				photos	fieldwork
Foreland saltmarshes (Groningen)	1996	5	photos	fieldwork	report			photos	fieldwork	report	
Ameland	1997	5	photos	fieldwork	report			photos	fieldwork	report	
Schiermonnikoog	1997	7			photos	fieldwork	report				
Rottum	-	5			photos	fieldwork	report			photos	fieldwork

*Methods used:*

In the first year of a mapping project 1:5000 false color aerial photographs taken with 60% overlap. These photographs are interpreted using a mirror stereoscope. Photo units containing either a uniform structure, texture and color or a defined complex of these properties, are mapped. Smallest polygons are 20 x 20 meter. Hand drawn photo-overlays are scanned, vectorised and a topology is build, using ArcInfo.

In the second year ground truth is sampled. In every so-called photo unit ca.5 relevées are recorded according to Braun-Blanquet. The relevees are stored using Turboveg for Windows and classified using Megatab and the SALT97 classification program. SALT types are then translated back to the photo interpretation and linked to the polygons. In case of complexes the percentage cover of each contributing vegetation type are recorded in the attribute table. ArcInfo is used for all data manipulation and storage. The third year is used for this data handling and reporting.

In case of repeated mapping, the "Previous Boundary Method" is used for more efficient photo interpretation. Hereby only those polygon boundaries are edited, that definitely are changed in the photograph. This way apparent changes due to different interpretations are evaded and therefore monitoring results are more reliable.

## **ANNEX 7**

### **ALTERRA Salt Marsh Monitoring**

Kees Dijkema, Marine and Coastal Research Team, ALTERRA  
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**1. Transects in mainland salt marshes 1960-2000 with Rijkswaterstaat**  
(monitoring sedimentation, vegetation, management, and sea level rise) SUMMARIZING BOOK IN 2001

**2. Monitoring effects of soil subsidence by gas extraction**

**3. In 1990 designer of fixed classification for salt marsh vegetation**  
(nowadays only user of Salt 97)

**4. Contribution to TMAP**

(finances from Agriculture and Nature Department agreed 15-5-2002):

- Grazing inventory (update of existing data from Daan Bos) ?
- Drainage data ?
- Contribution to interpretation and writing about vegetation data ?

## ANNEX 8

### Modified TMAP salt marsh classification scheme

Modification of the Bakker proposal (Working document 2) by Schleswig-Holstein (to be further specified). P = Pioneer zone, LS = Low salt marsh, MUS = middle and high salt marsh.

1	Pioneer Zone (cover > 5% <sup>1</sup> ); P > LS + MUS)	Code (Coena)	Criteria
1.1	<i>Spartina anglica</i> - Type	1.1	<i>Spartina</i> > <i>Salicornia</i> and <i>Suaeda</i>
1.2	<i>Salicornia</i> spp. <sup>2</sup> ) - Type	1.2	<i>Salicornia</i> and/or <i>Suaeda</i> > <i>Spartina</i>
<b>2</b>	<b>Low Marsh</b> (P < LS > MUS)		
2.1	<i>Atriplex portulacoides</i> - Type	1.7	<i>Atriplex</i> > 25% <sup>3</sup> ) or ( <i>Atriplex</i> and <i>Limonium</i> > 15%)
2.2	<i>Puccinellia maritima</i> - Type	1.3/1.4/1.5	other low marsh
<b>3</b>	<b>Mid/High Marsh</b> (P + LS < MUS)		
3.1	<i>Artemisia maritima</i> - Type	2.2	<i>Artemisia</i> > 15% or <i>Artemisia</i> > <i>Festuca</i>
3.2	<i>Atriplex portulacoides</i> - Type		<i>Atriplex</i> > 15%
3.3	<i>Limonium vulg./Plantago mar.</i> - Type	1.6	<i>Limonium</i> > 15%
3.4	<i>Juncus gerardii</i> - Type	2.3	<i>Juncus gerardi</i> > <i>Festuca</i> <sup>4</sup> )
3.5	<i>Juncus maritimus</i> - Type	2.4/2.8	<i>Juncus maritimus</i> > 10%
3.6	<i>Elymus arthericus</i> - Type	2.1	<i>Elymus arthericus</i> > 25% <sup>5</sup> )
3.7	<i>Festuca rubra</i> - Type	2.6/2.7/2.14	other mid and high marsh
3.8	<i>Ononis spinosa</i> / <i>Carex distans</i> - Type	2.9	<i>Ononis</i> > 25% or <i>Carex</i> > 0 %
3.9	<i>Agrostis stolonifera</i> - Type		<i>Agrostis</i> > 70%
3.10	<i>Cotula coronopifolia</i> - Type		<i>Cotula</i> > 5%
3.11	<i>Elymus repens</i> - Type	2.12	<i>Elymus rep.</i> > 30%
3.12	<i>Carex extensa</i> - Type		<i>Carex</i> > 5%
<b>4</b>	<b>Dunes and Beach-ridges</b>	2.15/2.16/3.1/3.2/3.3	
<b>5</b>	<b>Reedbeds</b>		
5.1	<i>Scirpus maritimus</i> - Type	1.9	<i>Scirpus</i> > 15%
5.2	<i>Phragmites australis</i> - Type		<i>Phragmites</i> > 15%
<b>6</b>	<b>Grassland</b>		
6.1	<i>Lolium perenne</i> - Type	2.11	<i>Lolium perenne</i> > 30%
6.2	<i>Molinietalia</i> - Type		

1) in SH > 10 % cover

2) in SH *Salicornia ramosissima* = low marsh

3) in SH > 35 % cover

4) in SH > 5 %

5) in SH > 30 %

#### Species used for prospective classification

Pioneer species:

*Spartina anglica*, *Salicornia* sp., *Suaeda maritima*

Species of the low marsh:

*Puccinellia maritima*, *Atriplex portulacoides*, *Cochlearia anglica*, *Aster tripolium*, *Spergularia* sp., *Triglochin maritima*, *Limonium vulgare*, *Plantago maritima*, *Pharapholis* sp., *Atriplex pedunculata*

Species of the middle marsh:

*Artemisia maritima*, *Artemisia maritima*, *Juncus gerardii*, *Glauc maritima*, *Festuca maritima*

Species of the high marsh:

*Potentilla anserina*, *Trifolium* sp., *Poa* sp., *Lolium* sp., *Elymus* sp., *Lotus corniculatus*, *Plantago coronopus*