

October 2005

Dear Volunteers

### **Baltic Island Wetlands and Wildlife**

Many thanks from myself, Dawn, Niall, Maureen, Silvia, Elle and Marko for all your hard work, good humour and enthusiasm during 2005. It was probably the busiest year yet, with various field protocols being undertaken as part of the overall research project, which you kept moving forward despite a very wet July-August in Estonia. Each year, we accumulate more and more rubber boots to cope with the wet conditions....this year our first pair of wading boots appeared! In spite of the storms, it seems everyone had a good time, helped no doubt by great team spirit, saunas, pub visits, and lots of special wildlife.

Each team contributed to the successful maintenance of existing projects and were able to help try something new. The established vegetation experiments at Hosby and Tahu were sampled (64 plots) and all their fencing was repaired. Breeding bird surveys continued for the fourth year running, with the 44 transects completed being the highest number since the first year of the project. In addition, 54 point counts were taken, despite difficult weather conditions. The existing three hydrological monitoring stations were checked and their data downloaded, and five new stations were set up. Volunteers were also brave enough to set up a new vegetation experiment that involved surveying and setting up 80 plots, most of which were tweaked, twiddled or tickled (i.e. artificially disturbed!) late into the Estonian evening. Teams still found time to pioneer our environmental sampling procedure, taking over 250 soil samples from wetlands all over Vormsi island, and to endure the elements for over 280 hours in order to radio-track small mammals as the mice scattered through the reeds when the flood waters rose!

The data are currently being entered onto computer spreadsheets for inclusion into the Geographic Information System (GIS) and will be disseminated amongst all Estonian and other stakeholders before the end of 2005. Two scientific papers are well on the way to being produced so that we can spread the results of all of this hard work far and wide.

There was still time for teams to take the 'Baltic Birdwatching Challenge' and Team I did just that, beating the record for the most bird species seen in one team by breaking the 120 barrier for the first time. Not to be outdone, Team II set the record for the most hours spent in the pub at Vormsi and Team II definitely got the wettest!

Next year, we plan to build on the excellent work of this summer by continuing to sample vegetation in all the experiments, and to monitor birds and track mammals. It is now a full-time job maintaining the existing research during the field season, but we still hope to find time to extend the project further, perhaps by surveying butterflies as indicators of wetland quality.

Once again, thanks for your support in 2005....it was eventful, wet, and great fun!

Dr Chris Joyce  
Principal Investigator

# EARTHWATCH INSTITUTE FIELD REPORT

**Earthwatch Institute Mission:** *Earthwatch engages people worldwide in scientific field research and education to promote the understanding and action necessary for a sustainable environment.*

Earthwatch Institute uses the UNESCO Definition of a Sustainable Environment:  
*A sustainable environment is one in which the natural environment, economic development and social life are seen as mutually dependent - and the interaction between them contributes to the sustainability and enhancement of the quality of people's lives and the natural environment.*

## **SECTION I: UNEP- WCMC WEBLINK INFORMATION**

Section I of the field report will be publicized on our weblink with the United Nations Environment Program (UNEP) World Conservation Monitoring Centre (WCMC) at [www.unep-wcmc.org](http://www.unep-wcmc.org). This website is available to the general public.

**Project Title: Baltic Wetlands and Wildlife**

**Principal Investigator (s): Dr Chris Joyce**

**Position/Affiliations: Principal Lecturer in Environmental Geography, University of Brighton, UK**

**E-mail address: C.B.Joyce@bton.ac.uk**

**Research Site(s) (geographic location, include coordinates if known, e.g. Lat/Long): Vormsi island, Silma and Matsalu, West Estonia**

**Local Management Status of the Research Site(s) (e.g. National Park, RAMSAR Site, World Heritage Site, IBA etc.): National Park, Ramsar site, IBA (Matsalu); Biosphere Reserve, IBA (Silma, Vormsi)**

**Scientific names of primary species being studied (if appropriate):**

**Key Research Objectives (5-8 brief bullet points):**

- **to establish the sensitivity of biodiversity to abandonment in coastal wet grasslands**
- **to classify coastal wetlands in relation to abandonment**
- **to identify and assess the abundance of biodiversity indicators in relation to abandonment**
- **to monitor any recovery in biodiversity following the restoration of management**
- **to examine plant and animal community dynamics following vegetation management**
- **to establish the relationship between environmental factors (e.g. hydrodynamics) and plant communities in coastal wetlands**

**Date this report was completed: 11 October 2005**

### **Data Collection and Results**

a) Give a concise account of the data you have collected during the past field season.

Data collection in 2005 involved the continuation of established field research in relation to plant and bird communities. For plants, this included initiating, surveying and maintaining long-term vegetation experiments containing 64 permanent plots to assess the response of plant communities to restoration management. For birds, monitoring bird community composition in managed compared to abandoned wetland landscapes continued for the fourth year, with 44 breeding bird transects and 54 point counts completed in sites on Vormsi island and the Estonian mainland. Data were also collected from a new experiment at Rumpo, Vormsi island, which was initiated this year and involved surveying and setting up 80 permanent plots to establish the effects of disturbance upon abandoned wetland vegetation. New protocols were piloted to assess environmental factors influencing wetland vegetation and small mammal use of wetland habitats. For the former, over 250 samples of soil parameters were taken and for the latter data collection comprised live-trapping and radio-tracking mice for 280 hours, with approximately 800 location fixes obtained. In addition, field work included installing hydrological monitoring stations at four key study sites to enable water level and soil moisture data to be logged.

b) What progress have you made towards achieving your original objectives?

The original objectives, namely to classify coastal wetland sensitivity to abandonment and identify biodiversity indicators, were a focus of the first three years of field work and results are being reported in conference presentations and scientific papers (e.g. Joyce and Burnside, 2004; Burnside *et al.*, in prep., Scott *et al.*, in prep.). Field effort in the second phase of the project (years 4-6) is directed towards consolidating the first phase with objectives monitoring the recovery of biodiversity following restoration management and assessing the dynamics of coastal wetland systems. Thus, this season two long-term experiments were sampled for the third year and another experiment was established to investigate plant community response to disturbance. Initial surveys of environmental variables, pilot radio-tracking of small mammals, and hydrological monitoring were also carried out to meet the project objectives as it progresses into its second phase.

c) Please provide a summary of your results (even if they are preliminary).

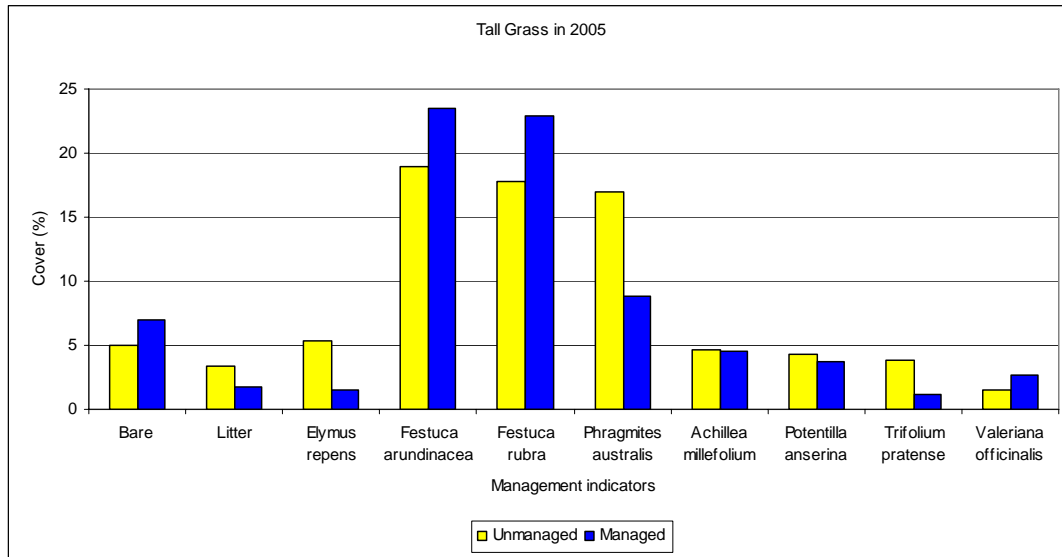
Classification of coastal wetlands and the identification of plant biodiversity indicators in Estonia have been achieved by surveying over 350ha of characteristic landscape and sampling over 250 plant community quadrats. Results from these data are summarised in a phytosociological key (sample shown in Table 1) that for the first time identifies the main wetland community types with their characteristic indicators, linked to successional status (i.e. abandonment). The results show that lower shore grassland, which is an important forage resource for wildfowl, is characterised by frequent bare ground and an abundance of *Agrostis stolonifera*, *Juncus gerardii*, *Eleocharis palustris* and *Glaux maritima*. Upper shore, which is good breeding wading bird habitat, has a similar plant community although bare ground is less frequent and there is a higher frequency of moss. In addition, upper shore grasslands are indicated by more *Carex distans*, *Carex nigra*, *Leontodon autumnalis* and *Trifolium pratense*, and less *Juncus gerardii* and *Glaux maritima*, than their lower shore counterparts. The character species, *Festuca rubra*, is abundant but may not serve as a good indicator of the upper shore, as it is also frequent in other coastal grasslands. Tall grassland represents the early stages of abandonment and is characterised by an abundance of the robust grasses *Elymus repens* and *Festuca arundinacea*. There is also a high frequency of *Phragmites australis*, *Potentilla anserina*, *Valeriana officinalis* and *Vicia cracca*, as well as the presence of colonising woody species (i.e. *Frangula alnus* and *Pinus sylvestris*).

**Table 1. Sample of phytosociological key of west Estonian wetland plant communities.** US = Upper shore grassland; LS = Lower shore grassland; TG = Tall grassland. Species marked with an asterisk are nationally rare and/or of particular conservation importance. Frequency is shown by Roman numerals, where: 1-20% frequency = I; 21-40% = II; 41-60% = III; 61-80% = IV; 81-100% = V. Abundance is shown as bracketed numbers using the Domin scale of ground cover (*sensu* Rodwell, 1992): cover of <4% with few individuals = 1; <4% with several individuals = 2; <4% with many individuals = 3; 4-10% = 4; 11-25% = 5; 26-33% = 6; 34-50% = 7; 51-75% = 8; 76-90% = 9; 91-100% = 10.

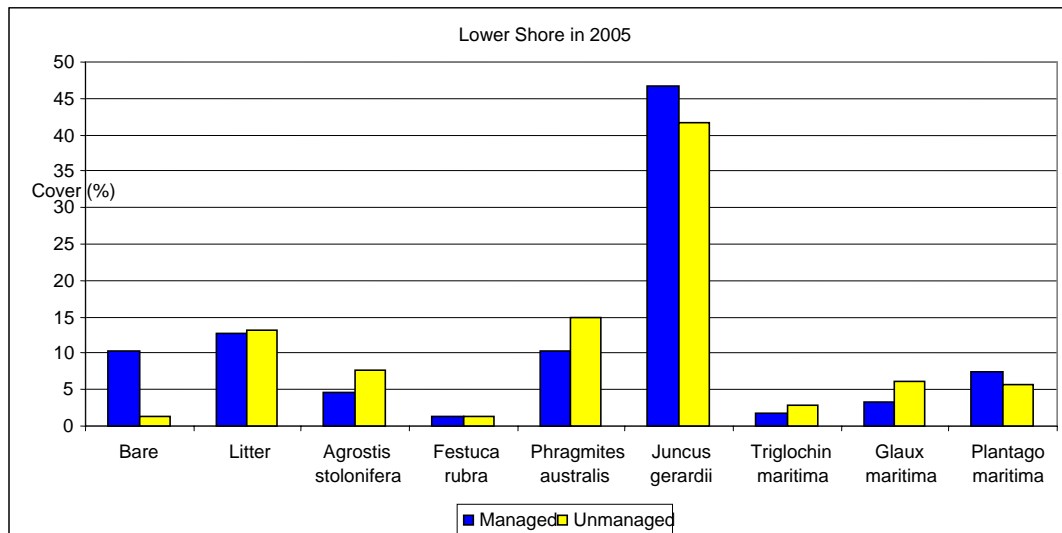
Variable/species	US	LS	TG
<i>Bare</i>	III (1-4)	V (1-5)	III (1-5)
<i>Litter</i>	V (1-7)	V (3-5)	V (3-6)
<i>Moss</i>	IV (1-3)	II (1-4)	III (1-5)
<i>Agrostis stolonifera</i>	IV (3-7)	V (3-7)	III (3-5)
<i>Elymus repens</i>	I (3-4)		V (3-8)
<i>Festuca arundinacea</i>			III (3-7)
<i>Festuca rubra</i>	V (4-8)	V (3-7)	V (3-7)
<i>Molinia caerulea</i>	II (1-7)	I (3-5)	I (1-8)
<i>Phragmites australis</i>	I (1-3)	III (2-5)	IV (1-5)
<i>Carex distans</i>	II (1-6)	I (1)	II (1-6)
<i>Carex glareosa*</i>	I (1-4)		
<i>Carex nigra</i>	II (1-5)	I (1-4)	I (1-3)
<i>Juncus gerardii</i>	IV (1-5)	V (4-9)	I (1-3)
<i>Scirpus lacustris</i>	I (1)	I (1)	
<i>Scirpus maritimus</i>	I (1)	I (1-5)	
<i>Achillea millefolium</i>			II (1-5)
<i>Angelica palustris*</i>			II (1-3)
<i>Centurea jacea</i>			I (1-4)
<i>Centaurium littorale</i>	II (1-3)	I (1-2)	
<i>Eleocharis palustris</i>	II (1-7)	III (1-5)	
<i>Glaux maritima</i>	IV (1-4)	V (1-7)	II (1-3)
<i>Galium palustris</i>	II (1-4)	III (1-3)	III (1-5)
<i>Galium verum</i>	I (1)	I (1)	II (1-4)
<i>Leontodon autumnalis</i>	V (1-4)	II (1-3)	II (1-4)
<i>Peucedanum palustre</i>	II (1-5)		III (1-4)
<i>Plantago maritima</i>	V (1-7)	V (1-5)	II (1-5)
<i>Potentilla anserina</i>	II (1-4)	II (1-4)	V (1-5)
<i>Triglochin maritimus</i>	V (1-4)	V (1-5)	II (1-4)
<i>Trifolium pratensis</i>	II (1-3)	I (1)	III (1-4)
<i>Valeriana officinalis</i>			IV (1-5)
<i>Vicia cracca</i>	I (1-4)		IV (1-4)
<i>Frangula alnus</i>			I (1)
<i>Juniperus communis</i>	I (1)	I (1)	
<i>Pinus sylvestris</i>			I (1)

Results from the plant community experiments show differential species responses to reinstated management. Species characteristic of abandonment in tall grassland decreased after three years of cutting management, notably the ‘invasive’ grasses *Elymus repens* and *Phragmites australis* (Figure 2). Litter, which characteristically increases as succession in grasslands proceeds, also decreased. In contrast, cutting management resulted in an increase in bare ground, the grasses *Festuca arundinacea*, *Festuca rubra* and the forb *Valeriana officinalis* compared to unmanaged grassland (Figure 2). In lower shore grassland, cut plots showed greater cover of bare ground, *Juncus gerardii* and *Plantago maritima* after three years compared to unmanaged plots (Figure 3). As in tall grassland, the later-successional grass *Phragmites australis* was reduced, as were *Agrostis stolonifera* and *Glaux maritima* (Figure 3).

**Figure 2. Mean (n= 8) % cover of key species of tall grassland in unmanaged and managed plots.** Managed plots have been cut annually for 3 years.



**Figure 3. Mean (n= 8) % cover of key species of lower shore in unmanaged and managed plots.** Managed plots have been cut annually for 3 years.



Data from the bird transects and point counts are currently being collated and analysed as part of a post-graduate (MPhil) project sponsored by the University of Brighton. Small mammal data from 2005 are being collated as part of two undergraduate projects funded by a European Union Socrates exchange programme. The environmental database has been collated in an Excel database for subsequent analysis. All data will be disseminated to stakeholders before 2006.

### **Significance/Benefits of Research**

a) What is/are the significance/benefits of your research at the following levels?

- local (in the area of the research site) – The data are used within a Geographic Information System managed by Estonian stakeholders that is used to direct planning and monitoring locally. The data are contributing to management plans, monitoring strategies, and educational proposals at nature reserves (e.g. Silma, Mataslu) within the study area. Monitoring plans will be produced for each of the study sites in conjunction with Estonian stakeholders based upon the results of field work undertaken on the Earthwatch project.
- national – The Earthwatch project is providing examples of practice and procedure to develop appropriate monitoring strategies for Estonia as it harmonises its policies with the European Union, and Earthwatch stakeholders have been advising Government and NGO bodies in this respect. Indeed, Estonian monitoring strategies for their nature reserves, including wetlands, have been modified in 2005 to reflect this advice and meet European requirements.
- international – The Baltic States of Estonia, Latvia and Lithuania are currently developing their policies and protocols for ecological monitoring as part of their accession to the European Union. Results from the Earthwatch project have been disseminated to key conservation stakeholders in the three Baltic States, with the aim of integrating monitoring strategies for wetlands and grasslands.

b) How do your findings contribute to issues of sustainability?

Research findings are being used by key partners NGO Laanerannik, Silma nature reserve, and Matsalu national park to develop sustainable management of the coastal wetland resource. This focuses particularly on education and profile-raising activities to show the biodiversity value of coastal wetlands and the benefits of agri-environmental management. For example, monitoring stations that can act as demonstration sites for local communities, landowners and farmers have been set up at Vormsi island, Silma and Matsalu. Also, the education officer at Silma has participated in the research project with a view to developing education materials on the importance of wetlands.

### **Dissemination of Results**

a) Have you provided details of results from your research to or within:

- Scientific papers (indicate status; e.g., peer reviewed or in progress/press)
  - Burnside, N.G., Joyce, C.B. and Puurmann, E. (in progress) The use of vegetation classification to assess the sensitivity of wetlands to abandonment. To be submitted to *Journal of Vegetation Science*
  - Scott, D.M., Joyce, C.B. and Burnside, N.G. (in progress) The impacts of coastal wet grassland landscape structure and management on small mammal communities. To be submitted to *Ecography*
- Management plans and reports (in progress or completed)

- Lotman, S. and Joyce, C.B. (in progress) Monitoring plans for Rumpo and Hosby (Vormsi), Tahu (Silma) and Matsalu (Matsalu) wetlands. Three reports for NGO Laanerannik, Silma nature reserve and Matsalu national park.
- Presentations (given or planned)
  - Burnside, N.G. and Joyce, C.B. (2005) *Vegetation classification of coastal wetland landscapes in Estonia: development and application*. Royal Geographical Society with the Institute of British Geographers Annual Conference, London. Lecture presentation to 30 academics.
  - Joyce, C.B. (2005) *Researching and monitoring coastal wetlands in west Estonia: the Earthwatch and Darwin projects*. Baltic Environmental Forum expert meeting on 'Monitoring of grassland habitat types according to the EU Habitats Directive in the Baltic States', Vilnius, Lithuania. Invited presentation to 25 nature conservation experts from the Baltic States

## **SECTION II: VOLUNTEERS**

### **Volunteer Tasks and Accomplishments**

a) How did the volunteers contribute ideas, skills, expertise and motivations beyond that which you anticipated?

Volunteers in 2005 were exceptionally good fun! They were motivated, great team players, and showed good humour during some long hours in wet weather. Some had well-developed skills and expertise useful to the project (e.g. bird identification, knowledge of mammal ecology) and some were skilled in data recording and organisation. Others were confident enough to manage small field teams and their equipment, whilst one or two volunteers even had fencing experience. The outcome was that staff felt confident in delegating a range of tasks to volunteers who worked together throughout the field season with determination and good humour to achieve all of the research goals and more. Volunteers showed motivation beyond the call of duty to set up the new disturbance experiment during long days of hard physical work in hot weather and to maintain radio-tracking mammals for 24 hours a day over four weeks, often in wet and stormy weather.

b) How have volunteers helped you to achieve your research or educational objectives? Please give specific and quantitative measures of the volunteers' contribution to your data collection. Volunteers participated in all aspects of the field research, including installation and maintenance of equipment, pilot testing methods, data collection and quality control, and as such they are instrumental to the success of the project. Teams of volunteers, students and staff completed the following:

- breeding bird surveys involving 44 transects at Vormsi island and Silma on the mainland
- bird community surveys comprising 54 point counts at nine wetland sites at Vormsi, Silma and Matsalu
- all plant species sampled in 64 permanent quadrats at long-term experiments at Hosby, Vormsi island and Tahu, Silma
- cutting 32 vegetation plots by hand (sometimes underwater!)
- setting up 80 new experimental vegetation plots and sampling all species within them twice at Rumpo, Vormsi island
- radio-tracking small mammals for 280 hours on Vormsi island with approximately 800 location fixes obtained
- taking approximately 250 environmental (soil) samples in coastal wetlands across Vormsi island and at Silma nature reserve
- installing five hydrological monitoring stations and maintaining three others
- repairing and installing new fencing at ten experimental enclosures.

### **Project Development**

a) What logistical or scientific challenges have you encountered in the past season and how will you address them during the next field season?

Logistical challenges remain related mostly to transport, as the hire vehicles provided were not ideal for larger team sizes. This was a fault of the hire car company and was despite repeated efforts by staff to change the vehicles delivered. The use of the company is being reviewed with Estonian staff investigating alternatives, although the budget limits choice considerably.

Scientific challenges were imposed by the wet weather, which meant that data collection for the radio-tracking and some of the vegetation experiments was hampered. However, the efforts of volunteers helped largely overcome this challenge although one vegetation survey did need to be repeated (due to flooding) and radio-tracking data may be a little patchy. Another practical

challenge facing the science is to prevent disturbance to experimental plots by cattle, which involves regular maintenance of the experiment fences. As the number of experiments increases, this has become an increasingly time-consuming task with volunteers and staff working for several days this year to repair enclosures. It is therefore intended to involve Estonian stakeholders more in fence maintenance outside the field season, particularly before grazing has commenced.

b) Have you used any additional methods/strategies to meet your research objectives? If so, please describe them.

The project is beginning to assess the dynamics of wetland ecosystems and their recovery from abandonment through management. This strategic development meant that two new protocols were used this year, for recording environmental variables and small mammal movement, as well as the initiation of a new experiment to test the impact of disturbance upon abandoned wetland vegetation. Environmental samples were taken across a range of wetland sites, comprising soil variables such as pH and moisture, in order to establish the controls on the spatial distribution of vegetation types. Volunteers successfully recorded over 250 samples, which was an excellent pilot study. The data from the field work has been collated on an Excel spreadsheet for subsequent analysis. Radio-tracking was employed for the first time in the project this year. This novel approach to surveying small mammals was used on Vormsi island to establish wetland habitat use of Striped field mice. Nine male and five female mice were trapped, fitted with collars, and then tracked for up to 14 days each to map their use of the coastal landscape. Despite wet weather and a large range of movements by the mice prompted by flooding, sufficient data were collected to provide subsequent analysis. The new experiment at Rumpo on Vormsi island aimed to elucidate the role of disturbance in wetland plant community dynamics and test its use as a restoration tool. It featured previously used techniques, namely replicated treatments applied to a series of permanent plots, but developed these to provide a more elegant and robust experiment (e.g. a gradient of treatment intensities, more replicates, more sample points).

c) How will you develop your research in the coming field season?

Next field season will be characterised by maintaining the existing busy programme of research with scope to develop studies of birds, small mammals and invertebrates (possibly butterflies). Thus, field research in 2006 will continue to monitor bird communities and measure plant dynamics in all three experiments. Maintenance of research sites and monitoring stations will also continue, but it is hoped that this will be kept to manageable proportions for volunteers by further involving Estonian stakeholders. Key developments are expected in relation to birds, where more intensive research on bird use of habitats in relation to management may be possible, and small mammals, where radio-tracking studies are likely to be developed. A new initiative has also been discussed within the project team, namely to pilot the use of butterflies as indicators of habitat quality in the coastal landscape. Field methods are likely to involve transects on Vormsi island and the study will collaborate with Estonian invertebrate ecologists.

### **Educational Opportunities**

a) Does your project directly or indirectly involve the following groups in your research topic?

- Local communities – are represented by local land owners, managers and nature reserve staff. Results are disseminated through NGO Laanerannik (a local conservation charity) to stakeholders in West Estonia.
- Students – undergraduates from Tallinn and Tartu Universities in Estonia, and the University of Brighton in the UK, participated in the project in 2005, the latter through a European Union Socrates exchange programme between the UK and Estonia. The undergraduates are using their field research for their dissertations as part of their degree

course. Two post-graduate students, one studying for a PhD at the University of Brighton and one for a Masters at Tartu University, also participated throughout the field season.

- Early career scientists – the field team includes young career scientists from Estonia and the UK
- Other groups – the project involves practitioners whenever possible, notably land owners and managers. Local school children were invited to take part in the field work on Vormsi island and several participated. Academics from Tartu University also visited the project.

b) Please tell us the ways your research helps these groups better understand the conservation of a sustainable environment (see the UNESCO definition above).

The research sites act as demonstrations for local communities to learn how sustainable management and monitoring of wetlands can be implemented for conservation and economic benefits. School pupils, land owners and farmers have all visited the research sites over the year. The research has also been used to inform workshops seeking to raise the profile of biodiversity amongst land owners (particularly absentee landlords) and implement sustainable monitoring strategies for wet grasslands within European Union policies.

c) Has your project helped lead to the completion of Masters' theses, or other educational research findings?

Two undergraduate dissertations are currently being completed based on data collected during the Earthwatch field season this year, with another dissertation just beginning. Two Masters these are associated with the project (one in Estonia and one in the UK) whilst one PhD is being undertaken in the UK and Estonia.

### **Partnerships**

a) List partnerships or collaborations with other organizations that you have developed or maintained in the past season.

NGO Laanerannik

Silma nature reserve, Estonia

Matsalu national park, Estonia

Kumari travel, Estonia

Estonian Society for the Protection of Semi-natural Communities (ESPSC)

Baltic Environmental Forum (BEF)

University of Tartu, Estonia

University of Kiel, Germany

b) How have these organizations contributed to your project objectives?

NGO Laanerannik, Silma and Matsalu are partners who provide logistical support and scientific advice. Kumari travel are a sustainable travel company who provide logistical support and educational tours to volunteers as optional activities during field work. The ESPSC provide background context on management of Estonian grasslands, particularly from a historical perspective. The BEF have provided advice and background information on monitoring coastal wetlands and grasslands. The University of Tartu are partners in an EU Socrates exchange programme and provide academic and supervisory support for students participating in the project. The University of Kiel have a mutual research interest in Baltic wetlands and have provided background information.

c) How do you anticipate these organizations will use the results generated by the project, and in what timeframes?

NGO Laanerannik share the data from the project, including the GIS, and use these to underpin their activities to conserve and sustainable manage the West Estonian coast, including responding

to planning applications, promoting agri-environmental management, and producing educational material. Silma and Matsalu nature reserves also share the research database and use this regularly to inform decisions on management, monitoring and planning of their wetland resources. Kumari travel use the Earthwatch information to plan nature tours in West Estonia. The ESPSC has a committee member participating in the project and is gaining knowledge on restoration management in coastal grasslands that can be applied to other semi-natural grasslands as part of the organisation's mission. The BEF invited the PI to present results from the project at their expert meeting to develop monitoring strategies for the Baltic States. The Universities of Tartu and Kiel are able to use the Earthwatch information to develop their research agenda, hopefully via collaboration with Earthwatch project partners.

### **Acknowledgements**

The project was supported by a particularly diverse mix of participants this year, notably Earthwatch volunteers and Fellows, students from Tartu, Tallinn and Brighton Universities (some of whom were supported by European Union Socrates scholarships), and Darwin Fellows funded by the UK Darwin Initiative. They all had several characteristics in common however: they were all motivated, enthusiastic and good fun! Silvia Lotman and Maureen Berg planned and executed the field logistics with meticulous detail and great care. The PI was ably supported in project planning by Elle Puurmann and Meelis Magi of NGO Laanerannik, and in the field research by Niall Burnside and Dawn Scott. Radio-tracking and two-way radio equipment was purchased from a Vodafone Communications Technology grant (£5000) and hydrological monitoring equipment from a Darwin Initiative grant (£28000).