

Dear volunteers,

Baltic Island Wetlands and Wildlife

Many thanks from myself, Niall, Maureen, Elle, Meelis, James and Marko for all your hard work, good humour and enthusiasm during 2007. This is particularly the case for those teams challenged by long days of hot weather and swarming mosquitoes.....although I think everyone had a good time, helped no doubt by great team spirit, saunas, and lots of special wildlife.

This year was the culmination of six years of work, as we finished a series of long-term programmes designed to examine the effects of grazing abandonment and reinstated management on coastal wetlands. In 2007, this involved surveying the vegetation experiments at Hosby and Tahu (72 plots) and the disturbance experiment at Rumpo was treated to two surveys (a total of 178 plots). In addition, bird surveys included an assessment of diversity at four sites using 40 point counts, while our main survey recorded bird communities in relation to habitat quality. This comprised 109 point counts at five sites and located 1,835 different bird contacts, complemented by 288 samples of five habitat variables and the cover of all plant species. It is a testimony to your hard work and knowledge that this survey recorded 70 different bird species and 189 plant species, and it shows the value of having a team of committed (and well-trained!?) surveyors in the field.

Of course, collecting good quality data is only part of the project – using the information is just as vital. The data from this year have been entered into the project database and have been disseminated amongst all Estonian and other stakeholders. One scientific paper has been published, and several more are on the way, so that we can spread the results of all of this hard work far and wide. Our results have already been used to guide restoration management on over 400ha of coastal wetlands in Estonia and we are really looking forward to seeing the study being used as an educational resource for school children after working with the teaching fellows this year.

And that is not all. With one eye on the future, this year we pilot tested a new field technique linking plant distribution with micro-topography in order to predict what might happen to wetland vegetation if sea level rises due to climate change. This included recording plant species and soil characteristics at 630 points and taking over 2000 elevation records....not bad for an initial survey! The information collected will serve as a foundation for future development of our studies in Estonia and beyond.

Once again, thanks for your support in 2007 – this was our sixth successful year and we look forward to more in the future.

Dr. Chris Joyce,
Principal Investigator

EARTHWATCH INSTITUTE FIELD REPORT 2007

Completed by: Dr. Chris Joyce

Period covered by this report: October 2006 to September 2007

Project title: Baltic Island Wetlands and Wildlife

Objectives:

	Indicators (from section 7 of your last proposal)	Means of measuring the indicators (from section 7 of your last proposal)	Frequency of monitoring (from section 7 of your last proposal)	Has work started on this objective? (y/n) IF No – state expected start date	Provide report on this objective
Objective 1 Establishment and maintenance of long-term experiments	Field experimental sites established and maintained	Physical inspection of sites and check of data recorded	Three times each field season with data checked in October	Yes	All three long-term (3-5 years) experimental sites at Hosby, Silma, and Rumpo have been maintained this year, including the collection of vegetation and hydrological data. Data from 2007 have been added to the project database. Results are being written up as a PhD thesis and will be published as papers from 2008.
Objective 2 Impacts of management and abandonment on small mammal communities	Field surveys undertaken; results disseminated	Data collated	Annually	Yes	This objective was proposed in 2005 and a paper has been drafted from data collected in previous years, which will be submitted for publication by 2008. Mammalian fieldwork this year was superseded by surveys to gather environmental data to address climate change issues (see objectives 4 and 5).
Objective 3 Effects of abandonment and reinstated management on bird communities	Breeding bird and habitat use surveys undertaken; results disseminated	Data checked and added to project database	Three times each field season with data checked in October	Yes	Breeding bird surveys were carried out in June and habitat use surveys in July-August, the latter including a novel assessment of habitat conditions to quantify bird relationships with management. Data from 2007 have been added to the project database. Results are being written up as a PhD thesis and will be published as papers from 2008.
Objective 4 Environmental characteristics that control coastal wetland vegetation	Field surveys undertaken; results disseminated	Data collected and checked	Twice each field season with data checked in October	Yes	Field surveys of environmental characteristics (e.g. topography, soil moisture, soil resistance, vegetation structure) were carried out in June, July and August 2007. Data have been added to the project database and will also be used to

					inform bird habitat use (objective 3) and climate change scenarios (objective 5).
Objective 5 Hydrology of key coastal wetlands and impacts of climate change	Water monitoring stations maintained; field surveys undertaken	Data checked	At least four times annually	Yes	Water monitoring stations were maintained during 2007 and data downloaded. A pilot study was undertaken in June 2007 to quantify micro-topographic controls on wetland vegetation in order to predict sea level rise effects under climate change forecasts. Data have been entered into the project database and are being analysed for a short communication paper in 2008.

Project development

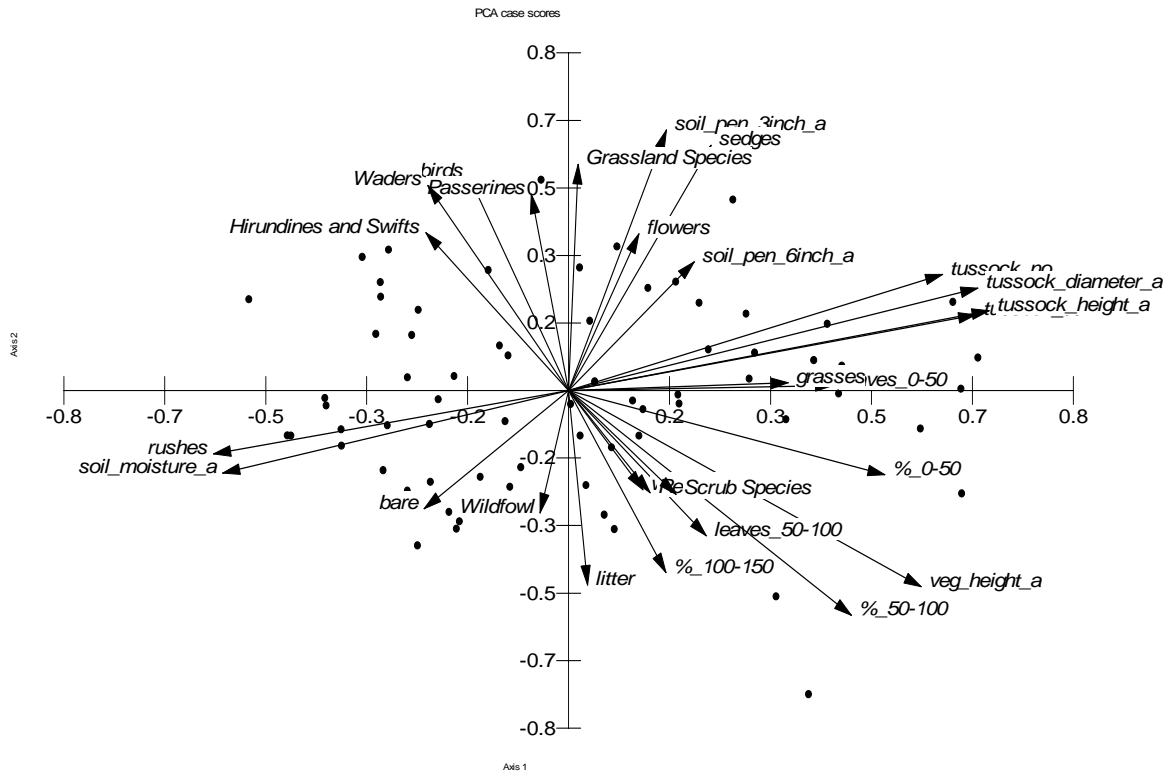
Phase I of this project (2002-4) focussed upon collecting good quality baseline data while phase 2 (2005-7) examined the effects of abandonment and reinstated management upon wetland biodiversity. This is the final year of phase 2 and during this three-year period climate change issues (objective 5) have emerged as a critical research aim going forward for the project. As a consequence, objective 2 (impacts of management and abandonment on small mammals) has been revised in order to free up resources to develop field surveys that better address the climate change objective. In 2007, for example, considerable time, equipment and human resources were invested in a pilot study that quantified micro-topographic variation and vegetation distribution in the coastal wetland landscape so that this may be related to sea level rise scenarios. This included the use of DGPS equipment (costing £35K) provided by the University of Brighton. It is intended that the successful survey will be published as a short communication and the method provides a foundation for future climate change research in this field.

The biggest logistical challenge this year has been the maintenance of a range of experimental sites, including hydrological monitoring stations, set up when Darwin Initiative funding was available. Darwin funds between April 2004 and March 2007 were used to expand and extend the reach of the project extremely successfully, but a legacy of this is that considerable field equipment remained to be managed by reduced staff resources. Thus in 2007, time was spent finishing field experiments and converting labour-intensive experimental sites into plots that can be used relatively easily to continue to collect monitoring data. The leaner field resource base is now ideally suited to take the project forward with a sharper focus upon climate change objectives, as it includes hydrological monitoring equipment and permanent vegetation quadrats linked to a project GIS.

Non-technical summary of results

There were three main projects carried out in the field in 2007: a topographic-vegetation survey; a bird-habitat quality survey; and sampling long-term vegetation experiments. The topographic survey encompassed seven transects of 30m each at two sites (Rumpo on Vormsi island and Silma on the mainland), with all plant species, and soil moisture, conductivity, and temperature recorded at a total of 630 points. Elevation was measured using a state-of-the art DGPS at a total of 2,108 points along the transects. The data have been checked and are being analysed for a short paper to be published in 2008. This pilot study demonstrated that the technique of mapping micro-topography using a DGPS is productive in Estonia and that this can be related to environmental and plant variables in order to elucidate sea level and other climate change impacts.

Bird surveys this year began with an assessment of diversity at four study sites using 40 point counts to compile a MacKinnon list, which is a standard technique that allows comparison between different sites and studies. The main bird survey this year extended and developed previous successful surveys by recording habitat quality and bird use. The survey took place in five sites with a total of 109 point counts recording 1835 different bird contacts of 70 different species. Habitat quality at the same five sites was measured at 288 sample points using various soil and vegetation parameters, yielding 27478 measurements, and the cover of all plants, which amounted to 189 species in total. This constitutes one of the most concerted attempts to quantify bird-habitat relationships in wetlands. Analysis is proceeding by using multivariate analysis to indicate patterns in the dataset (Figure 1).



Vector scaling: 2.02

Figure 1. Principal Components Analysis of bird and vegetation data in categories for Estonian coastal wetlands.

Figure 1 shows that birds associated with abandoned habitats (scrub and reed) increase with vegetation density and height while wading birds avoid dense vegetation, suggesting they favour short, open vegetation. Wading birds and grassland birds (such as skylark) increase with flower abundance. Further analysis suggests that wading birds are generally associated with well-managed grasslands containing *Festuca rubra*, which produces a short, dense sward. In contrast, reed and scrub birds (such as reed and sedge warblers, and yellowhammer, red-backed shrike and whitethroat respectively) are strongly associated with *Elytrigia repens*, a tall, robust grass that creates a lot of litter and invades abandoned grasslands. More specifically, wading birds can be separated into two sets by the analysis. One set, characterised by dunlin and spotted redshank, favour wetter habitats with little or no vegetation while the other group prefer grass-dominated habitats and include snipe, lapwing and ruff.

The vegetation experiment at Rumpo aims to test different levels of disturbance (i.e. control, litter removal, cutting of vegetation, top soil ploughing and deep ploughing) and assess the effects on the wetland plant community with a focus on two competitive species that invade abandoned wetlands, namely *Elytrigia repens* and *Phragmites australis*. The field sampling for this experiment began in 2005 and concluded this year. Results from the *Phragmites*-encroached wetland experiment show that this species recovered from disturbance during the study, despite the sustained presence of bare ground in highly disturbed plots (Figure 2). *Agrostis sp.* abundance was initially strongly depleted by soil disturbance treatments in 2005; however, it recovered strongly thereafter (Figure 2), probably due to the colonization by vegetative growth of the bare ground created by disturbance. *Juncus gerardii*, an important species for foraging wildfowl in coastal wet grasslands, presented seasonal fluctuations within the control plots (Figure 2) and showed a general decrease in June 2006,

when the very wet spring with high water table might have delayed its growth. Disturbance also seemed to restrict this species, as it remained under 10% mean cover in ploughed plots compared to almost 30% for control plots. In the *Elytrigia*-encroached experiment, the target species was reduced by disturbance but then declined in all plots between 2006 and 2007, while *Agrostis stolonifera* was able to rapidly colonise the bare ground created by high levels of disturbance.

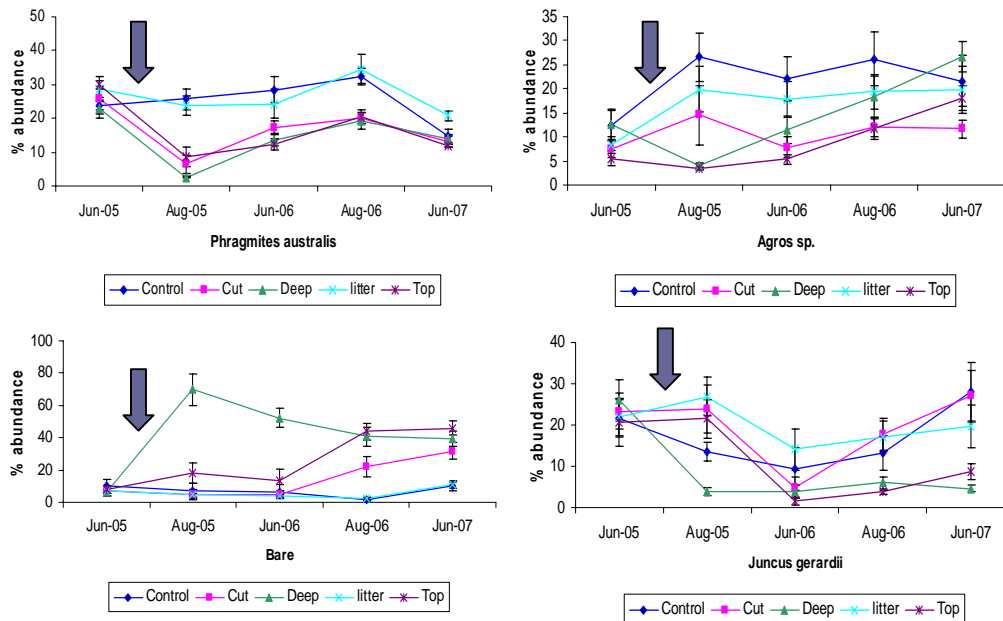


Figure 2. Mean abundance of *Phragmites australis*, *Agrostis sp.*, *Juncus gerardii* and bare ground for each treatment between June 2005 and June 2007 in the *Phragmites*-encroached wetland. The arrow indicates when the disturbance was conducted.

How do these data contribute to achieving conservation impacts?

The field vegetation experiments and bird surveys are having a positive impact upon Estonian conservation of coastal wetlands. Results have been used to inform restoration management at priority sites such that approximately 430ha of coastal wetlands are benefiting from reed and scrub clearance, grazing and cutting to enhance bird and plant diversity. This management has been funded by the European Union and Estonian government agri-environment schemes. Permanent quadrats established through the Earthwatch experiments are being used to monitor the effects of this restored management. Results from the Earthwatch surveys have been incorporated into revised and new management plans for wetland sites in West Estonia while the survey method forms part of the Estonian government monitoring protocol for Natura 2000 grassland sites.

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

- Local (to the area of the research site): results have been used to inform restoration management at three study sites (Hosby, Rumpo, Silma); study sites have been used as demonstrations for wetland monitoring and management, with visits from local school children, farmers and landowners; monitoring plans have been produced for five study sites.
- National / Regional: restoration and low-intensity management techniques for coastal wetlands have been adopted by national agri-environmental schemes; restoration

management has been implemented at several West Estonian wetlands; data have been used to develop eco-tourism opportunities in West Estonia; thirty Estonian scientists and conservation practitioners participated in Darwin-funded workshop featuring Earthwatch-funded research in February 2007; monitoring plans have been archived in the national biodiversity database and are freely available to all; Estonian species identification guides for coastal wetlands produced based upon indicators identified by the project.

- International: the research has produced the first classification of wet grassland vegetation related to grazing abandonment (published in an international, peer-reviewed journal as Burnside *et al.*, 2007); results of the project have informed monitoring protocols for the Baltic States Natura 2000 grassland sites; a network of approximately 100 scientists and practitioners from various countries established via the Earthwatch and Darwin projects; results of the topographic-vegetation survey will quantify wetland plant community changes linked to climate change scenarios for the first time in the Baltic States; results of bird-habitat assessments and vegetation experiments will be published in international, peer-reviewed journals, demonstrating their value to scientists around the world; data are being used by UK Earthwatch teaching fellows to produce teaching resource packs for ecological study at A-level and higher education levels.

Communication of results

Printed: peer reviewed scientific publications; books / book sections; reports, management plans or policies; fact sheets, brochures, leaflets, pamphlets, posters, academic dissertations, annual reports, proceedings of conferences or workshops; letters; newsletters.

Burnside, N.G., Joyce, C.B., Puurmann, E. and Scott, D.M. (2007) Use of vegetation classification and plant indicators to assess grazing abandonment in Estonian coastal wetlands. *Journal of Vegetation Science*, 18, 645-654. Earthwatch acknowledged.

Monitoring plans for Rumpo, Hosby, Hullo Bay, Tahu and Matsalu submitted to the Estonian Nature Information System (archives).

Darwin project 162/13/013 final report submitted to UK government. Earthwatch acknowledged.

Visual: artwork; visitor centre, poster or display, slides, photographs

N/A

Digital: database; internet - websites, email group/ blog/forum; CD Rom, e-newsletter

Darwin/Earthwatch project website: <http://vormsi.lk.ee/darwin/index.php?lang=english>
Earthwatch acknowledged.

Mass media: broadcast production; film; TV, radio, print (newspaper/ magazine coverage); press releases; press conference; interview, article creation; press trip

Published interview with Dr. Roger Mitchell (Earthwatch Europe Chief Scientist) in regional newspaper. Earthwatch acknowledged.

Meetings and conferences: presentations/ lectures; conferences; workshops; training sessions; discussions; local community meetings and events.

Darwin/Earthwatch project workshop on monitoring coastal wetlands (February 2007 on Vormsi island) attracted 30 participants and included four Earthwatch-acknowledged oral presentations.

Educational resources: lesson plans; resource packs

Educational resources are currently being developed by Earthwatch teaching fellows using data collected during the field season.

Educational Opportunities

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

- Local communities: landowners and managers involved via study sites; local school children participate via talks and visits; local tour operators host the project 'rest' day; local communities maintain monitoring sites; local guesthouse managers and shop keepers benefit
- Students: undergraduate students from Tallinn, Tartu and Brighton Universities participate, usually as part of their dissertation studies
- Early career scientists: three post-graduate students participated in 2007, one Estonian, one French and one British.

How does your research help these groups better understand the conservation of a sustainable environment?

The development of sustainable management of coastal wetlands lies at the core of this project. Participants quickly appreciate that, in contrast with generally perceived wisdom, many ecosystems depend upon positive human intervention to maintain their special wildlife, and the Baltic coastal wetlands are a particularly fine example. Local children and others who visit the study sites are encouraged to discuss issues of management during their visit while students and early career scientists have ample opportunity to learn and debate sustainability concepts during their work with the project. This year particularly, the project has begun to include ideas of adaptive management in order to cope with climate change scenarios, which have been discussed with local scientists, students and volunteers during the project.

Has your project contributed to the completion of Masters' theses, or other educational research findings?

The project has contributed to two PhD theses (due for submission in December 2007 and September 2008) and one Masters thesis (due summer 2008).

Acknowledgements

Once again, the project successfully achieved its objectives because of a well-organised and enthusiastic team, at the heart of which were the Earthwatch volunteers and fellows who carried out a huge amount of data collection with sustained diligence and good humour. The work was very well organised throughout the summer by Maureen Berg (University of Brighton) with James Phillips (UoB) looking after the bird survey in July-August. Niall Burnside (UoB) led the field team in June and developed the topographic survey method. Elle Puurmann, Meelis Mägi and Silvia Lotman from the Estonian State Nature Conservation Centre (ESNCC) once again gave logistical and administrative support throughout and Marko Valker (ESNCC) provided ornithological consultancy.