LIFE Nature project “Marine Protected Areas in the Eastern Baltic Sea”
Reference number: LIFE 05 NAT/LV/000100

Action A3 – Waterbird inventory
Action leader P13, Institute of Ecology of Vilnius University

FINAL REPORT

Authors:
Mindaugas Dagys
Antra Stīpniece
Andres Kalamees
Andres Kuresoo
Andrus Kuus
Leho Luigujõe

2009
CONTENTS

EXECUTIVE SUMMARY ............................................................................................................. 3
DESCRIPTION OF ACTIVITIES .................................................................................................. 5
METHODOLOGY OF INVENTORIES ......................................................................................... 6
  COASTAL SURVEYS ............................................................................................................... 6
  SHIP SURVEYS .................................................................................................................... 6
  AERIAL SURVEYS ............................................................................................................... 6
  BREEDING WATERBIRD COUNTS ON SMALL ISLANDS ................................................... 7
SURVEYS CARRIED OUT .......................................................................................................... 8
  ACTIVITY 1 – COASTAL SURVEYS .................................................................................... 8
  ACTIVITY 2 – SHIP SURVEYS .......................................................................................... 8
  ACTIVITY 3 – AERIAL SURVEYS ..................................................................................... 9
  ACTIVITY 4 – BREEDING WATERBIRD COUNTS ON SMALL ISLANDS ......................... 10
INVENTORY RESULTS ............................................................................................................. 11
INVENTORY MAIN CONCLUSIONS .......................................................................................... 11
  ESTONIA .............................................................................................................................. 11
  LATVIA ............................................................................................................................... 12
  LITHUANIA ...................................................................................................................... 13
DELIVERABLES AND PRODUCTS OF THE ACTION ................................................................. 13
ANNEX I. DETAILED DESCRIPTION OF WATERBIRD INVENTORY (ACTION A.3) SHIP SURVEY METHODOLOGY AND SITE DELINEATION PRINCIPLES
ANNEX II. DETAILED DESCRIPTION OF WATERBIRD INVENTORY (ACTION A.3) RESULTS IN LIFE PROJECT SITES IN ESTONIA
ANNEX III. DETAILED DESCRIPTION OF WATERBIRD INVENTORY (ACTION A.3) RESULTS IN LIFE PROJECT SITES IN LATVIA
ANNEX IV. DETAILED DESCRIPTION OF WATERBIRD INVENTORY (ACTION A.3) RESULTS IN LIFE PROJECT SITES IN LITHUANIA
Executive summary: **Action A3 – Waterbird inventory**  
*Action leader P13, Institute of Ecology of Vilnius University*

**Goal of the action**

The main goal of this action was to gain comprehensive information about the abundance, distribution and conservation status of waterbirds in coastal and offshore areas of Estonia, Latvia and Lithuania during wintering, migration and breeding seasons. Such data was essential for identification of important breeding areas and areas of significant non-breeding aggregations of waterbirds, for revision of boundaries of the already proposed SPAs and for delineation of new SPAs.

**Activities implemented**

A variety of methods were used during the inventory in order to obtain as complete area coverage (both temporal and spatial) as possible. Methods used also differed among the three countries, primarily because of different physical characteristics of the project areas as well as different target species of waterbirds.

Survey methods included waterbirds counts from the coastline, surveys from ships (transect counts), surveys from aeroplanes (transect counts and total counts) and surveys of breeding birds on islands (in Estonia only). These surveys covered all the thirteen project areas several times in all the relevant seasons.

Waterbird inventory surveys were carried out during three seasons in 2006–2009. In Lithuania, nine ship surveys were carried out, with both Lithuanian project sites surveyed during eight of these surveys. In Latvia, eight ship surveys were carried out, covering each of the five Latvian project sites 4–8 times in different seasons. Six joint Latvian-Estonian ship surveys were carried out in the Irbe Strait, covering project areas both in Latvia and Estonia. Aerial surveys were used primarily in Estonia, where 15 surveys from airplanes were carried out in different project areas. Several special aerial counts and a number of occasional observations from aeroplanes were carried out in Latvia. Breeding bird survey in Estonia in 2006–2008 covered 226 small islands.

All the data collected during the waterbird inventory surveys were stores in GIS databases and used for the analysis of waterbird distribution and abundance. Identification/delineation of important areas for waterbirds was based on the Marine Conservation Criterion (MCC).

**Results achieved**

The project allowed to vastly improve our knowledge on species composition, abundance and distribution of waterbirds both during the breeding season and outside it – on migration and wintering, in the selected project areas in Estonia, Latvia and Lithuania.

Although no new sites for the protection of birds or expansion of the existing ones have been proposed in Estonia at this stage, a number of very important findings were revealed during this
project in the existing SPAs. New concentrations of international importance (>1% flyway population) were observed in Väinameri Sea for the Long-tailed Duck, Common Eider and Smew; in Irbe Strait for Velvet Scoter, Mute Swan and Northern Pintail; in Pakri area for Tufted Duck and Smew. New information was also obtained for the Steller’s Eider and Little Gull – large concentrations of these birds were observed outside the Vislandi Archipelago SPA, therefore extension of this site or designation of a new one may be necessary there in the future. Breeding bird survey revealed that ca. 30 species of waterbirds breed on small islands in Estonia. For 10 of these species this is the primary breeding habitat, while it is also very important for another 12 species of waterbirds. Most abundant and diverse breeding waterbird fauna was recorded in Kahtla-Kübassaare site and Vislandi Archipelago.

Although overall waterbird numbers, observed during this project in Latvian waters, were considerably lower than those observed in the 1990’s, data collected during the inventory resulted in the proposal of five new SPAs that broadly coincided with the previously identified Important Bird Areas (IBAs) in Latvian waters. Ainaži-Tūja site in the eastern part of the Gulf of Riga was found to be important for Little Gulls in spring (up to 9,000 birds estimated) and wintering divers. West Coast of Gulf of Riga – another proposed SPA in the Gulf of Riga, holds significant internationally important numbers of divers (up to 5,600 birds), Velvet Scoters (up to 27,000 birds), Long-tailed Ducks (up to 22,000 birds) and Little Gulls (up to 15,000 birds). The third propose Latvian SPA is located in the Irbe Strait and it has the greatest variety of qualifying waterbird species – Velvet Scoter (up to 40,000 birds), Common Scoter (up to 20,300 birds), Long-tailed Duck (up to 22,000 birds), Black Guillemot (up to 1,400 birds), Little Gull (up to 3,000 birds) and divers (up to 1,800 birds). The last two proposed Latvian SPAs are located along the open Baltic Sea coast – Akmeņrags-Pāvilosta and Nida-Pērkone sites both hold significant numbers of Little Gulls migrating in late summer (up to 4,700 and 2,400 birds, respectively). Nida-Pērkone site is also important for wintering Goosanders, with up to 4,650 birds recorded in January.

Similarly to Latvia, numbers of waterbirds observed during the project in Lithuania were also considerably lower than the ones recorded during the surveys in the 1990s. Reasons for this decrease are unclear, but overall decrease in population numbers, climate change and fishery impact may be named as some of the possible contributing factors. Ship surveys revealed that abundant and dense aggregations of Velvet Scoters extend far beyond the borders of the present SPA along the Curonian Lagoon, thus clearly indicating the need for the extension of this SPA (or the establishment of a new one). Up to ca. 40,000 Velvet Scoters were estimated to winter in this area. The proposed site is also important for dense aggregations of Little Gulls, as well as numerous (although below threshold) concentrations of divers and Razorbills. Rather stable and dense aggregations of Velvet Scoters and, to a lesser degree, Razorbills were also observed at depths exceeding 30 m off the coast of Palanga. However, these aggregations did not meet the criteria for the delineation of new SPAs, since the absolute numbers of birds there were below the population threshold.

Main lessons learned

Overall, methods used for the surveys of waterbirds during this project proved to be robust and reliable, even though often labour intensive and sensitive to weather conditions and availability of suitable ships/airplanes. Site delineation methods and data analysis techniques were also straightforward and rather unambiguous, although bird density distribution analysis methods still have some room for improvement, particularly in terms of more advanced modelling techniques, including the addition of more environmental variables. Finally, despite the fact that waterbird inventory lasted for almost three seasons, weather conditions (particularly in winter) were rather mild during all of them, which did not allow to assess the previously (in the 1990s) observed importance of investigated areas for waterbirds in cold or severe winters.
**DESCRIPTION OF ACTIVITIES**

The aim of this action was to gain comprehensive information about abundance, distribution and conservation status of waterbirds in coastal and offshore areas of Estonia, Latvia and Lithuania during wintering, migration and breeding seasons. Such a data was essential for identification of areas of significant aggregations of waterbirds, for revision of boundaries of the already proposed SPAs and for delineation of new SPAs. Thus this was the key action for the implementation of the requirements of the EU Birds Directive – establishment of Special Protection Areas in the marine waters of the Baltic Sea.

Due to the distinct and varied marine habitats in the eastern Baltic Sea, a number of different waterbird survey methods were used for the collection of data (all described in detail in the section “Methodology of inventories”).

Because different waterbird species utilize different habitats in different seasons and locations, each Baltic country focused on species that are of particular importance in their project sites, using the following criteria: species listed in Annex I of the Birds Directive and migrating species that occur in the project sites with at least 1% of the flyway population, in accordance with the Criterion 6 of the Ramsar Convention (Convention on Wetlands of International Importance especially as Waterfowl Habitat, Ramsar, 1971). Directly targeted waterbird species in the three countries are shown in black in the table below, while those occurring in the project areas but not meeting the abundance criteria are shown in grey.

<table>
<thead>
<tr>
<th>Species</th>
<th>EST</th>
<th>LAT</th>
<th>LIT</th>
<th>Species</th>
<th>EST</th>
<th>LAT</th>
<th>LIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alca torda</td>
<td></td>
<td></td>
<td></td>
<td>Gavia stellata</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anas acuta</td>
<td></td>
<td></td>
<td></td>
<td>Larus canus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anas clypeata</td>
<td></td>
<td></td>
<td></td>
<td>Larus fuscus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anas crecca</td>
<td></td>
<td></td>
<td></td>
<td>Larus minutus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anas penelope</td>
<td></td>
<td></td>
<td></td>
<td>Larus ridibundus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anas platyrhynchos</td>
<td></td>
<td></td>
<td></td>
<td>Melanitta fusca</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anas strepera</td>
<td></td>
<td></td>
<td></td>
<td>Melanitta nigra</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anser anser</td>
<td></td>
<td></td>
<td></td>
<td>Mergus albellus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anser fabalis</td>
<td></td>
<td></td>
<td></td>
<td>Mergus merganser</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aythya fuligula</td>
<td></td>
<td></td>
<td></td>
<td>Podiceps auritus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aythya marila</td>
<td></td>
<td></td>
<td></td>
<td>Podiceps cristatus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Branta leucopsis</td>
<td></td>
<td></td>
<td></td>
<td>Podiceps grisegena</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cepphus grylle</td>
<td></td>
<td></td>
<td></td>
<td>Polysticta stelleri</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlidonias niger</td>
<td></td>
<td></td>
<td></td>
<td>Somateria mollissima</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clangula hyemalis</td>
<td></td>
<td></td>
<td></td>
<td>Sterna albitrons</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cygnus bewickii</td>
<td></td>
<td></td>
<td></td>
<td>Sterna caspia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cygnus cygnus</td>
<td></td>
<td></td>
<td></td>
<td>Sterna hirundo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cygnus olor</td>
<td></td>
<td></td>
<td></td>
<td>Sterna paradisaea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fulica atra</td>
<td></td>
<td></td>
<td></td>
<td>Sterna sandvicensis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gavia arctica</td>
<td></td>
<td></td>
<td></td>
<td>Uria aalge</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table explanation:
- **Black**: Species, which fulfil Annex I and/or 1% of flyway population criteria
- **Dark grey**: Species, which are regular and important, but do not fulfil the above-mentioned criteria

Overall, the Waterbird inventory action (A.3) was carried out successfully – all the planned project areas were covered, although the coverage somewhat varied between the areas, depending mostly on weather conditions. Due to adverse weather periods in the first season and some logistics issues, the surveys were extended for another wintering period (2007/2008), compared to the period planned in the project application.
**METHODOLOGY OF INVENTORIES**

Four main types of methodology (with some modifications) were applied for the waterbird inventory during this project. The set of methods used in the three Baltic countries slightly differed.

**Coastal surveys**

Waterbird counts from the coast were conducted by walking/driving along the coastline and observing birds up to a distance of 2–3 km, depending on weather conditions and the state of the sea. Binoculars and telescopes (magnification 20–60×) were used to observe birds. The aim of the survey – total count of waterbirds in a stretch/sector of inshore waters. Slightly different approaches of observation point selection were adopted in different countries. For example, in Lithuania, the inshore waters were divided into 1 km-long stretch along the coast, i.e. observation points were spaced evenly along the coastline at 1 km intervals. In total, 75 observation points were used in Lithuania – 25 observation points in 12LIT and 50 observation points in 13LIT (Fig. 1). Elsewhere, e.g. in Estonia, survey sectors, extending up to 2 km offshore, were observed from fixed watching points on the coastline (e.g. see Fig. 2).

A special modification of the coastal survey was used in Lithuania for the observation of migrating Little Gulls in July–August. Only two observation points were used (Fig. 1), one in each project site, but observations were carried out for 6 hours every day for the duration of three weeks from late July to mid-August. Thus, a passage of Little Gulls and terns was observed.

**Ship surveys**

Ship surveys were mostly used for waterbird counting in Lithuania and Latvia. Estonian part of the Irbe Strait was surveyed by a joint Latvian–Estonian team of observers on a Latvian ship. The only additional ship survey in Estonia was carried out in project area 2EST.

In ship surveys, waterbirds are counted in a 300 m wide transect along the course of the ship, sailing at a constant speed along a predefined route, from a stable sheltered platform no less than 5 m above the sea level in good weather conditions. A constant GPS track of the ship route is recorded into a log and data of bird observations are later georeferenced according to the time-stamp. Observed numbers of birds are later recalculated into observed bird densities and various statistical and GIS techniques are used to intrapolate bird densities for the entire study area and to estimate the total numbers of birds present and their distribution. Detailed description of ship survey methodology is presented in a separate annex (Annex I).

**Aerial surveys**

Aerial surveys were mostly used in Estonia, because the Estonian coastline is very ragged and ship navigation around numerous islands is problematic. Two different types of aerial surveys were used – total survey and transect survey. Total survey was used to count waterbirds concentrating close to the coast or in shallow waters (ducks, geese, swans etc.), while transect survey was used for covering offshore areas and dispersed waterbird species (divers, eiders, Long-tailed Ducks, scoters etc.).

**Aerial total survey**

- Single-engine and high-wing aircraft (Cessna 172);
- Flight speed 170 km/h at 70–100 m altitude (depending on target species, visibility);
- 2–3 trained observers, one covering each side of the aircraft, with all observations recorded continuously on dictaphone;
- Positioning I: using GIS-based count areas;
- Positioning II: GPS positions are recorded at least every 5 seconds (computer logs flight track); in years 2007–2008 more accurate positioning (Pos II) was used as a rule;
• The time of each bird sighting were recorded, ideally to the nearest second, but within 10 seconds accuracy, using a GPS attached to the window of the plane;
• During surveys, two observers, one covering each side of the aircraft, record all observations continuously on dictaphone (digital voice recorder), giving information on count areas, species, number, behaviour and time.

_Aerial transect survey_
• Twin-engine and high-wing aircraft (L-410, Cessna 172, Partenavia P-68);
• Line-transect methodology with sub-bands (A – 50–500 m, B – 500–1000 m; 0–50 m “dead angle”, underneath the aircraft that the seated observers cannot cover)
• Transects 3 km apart;
• Flight altitude during surveys was standardised at 100 m at a cruising speed of 160 km/h (Cessna 172), 175 km/h (Partenavia P-68) and 190 km/h (L-410);
• Use of an inclinometer to measure declination from the horizon;
• 2–3 trained observers, one covering each side of the aircraft, with all observations recorded continuously on dictaphone (digital voice recorder); giving information on time, species, number, behaviour and transect band.
• Positioning II: GPS positions are recorded at least every 5 seconds (computer logs flight track);
• The time of each bird sighting were recorded, ideally to the nearest second, but within 10 seconds accuracy, using a GPS attached to the window of the plane.

Aerial waterbird surveys in Estonia were conducted using aircraft L-410 of Estonian Border Guard Aviation Group, Cessna 172 (AS Pakker Avio) and Partenavia P-68 (Military Parachute Club). L-410 and Partenavia P-68 are twin-engine and Cessna 172 one-engine aircraft. All are high winged planes, which is very important for good all round visibility for observers. Performance of L-410 is good, but not ideal for waterbird surveys. Main problems are the minimum flight altitude of 100 m (internationally recommended altitude is 80 m), which influence the spotting and identification of some „difficult“ waterbirds (divers, grebes) and high noise level (disturbance of shy species – e.g. Common Scoter from long distance and probable underestimation of the species numbers). L-410 provides high security level (plane is operated by 2 pilots and 1 flight operator, aircraft is equipped with modern safety equipment). Cessna 172 is perfect aircraft for most of the tasks, except offshore flights (prohibited with single-engine planes). The Italian Partenavia P-68 is an excellent aircraft for the offshore bird counting – probably the best available in EU countries and wider. However, only a single flight was performed in May 2007 and, unfortunately, the P-68 was not available since June 2007 (legal problems, low security level etc).

_Breeding waterbird counts on small islands_

This type of survey was carried out in Estonia only. Small islands were visited by boat. Each surveyed island was visited only once between the middle of May and the middle of June in 2006–2007 breeding seasons. Single-visit survey methodology was chosen, because one visit disturbs birds less, is workable in practice and gives results of adequate quality. However, the possible drawback is that later breeders (e.g. Velvet Scoter, Red-breasted Merganser) may be underestimated. During the survey, all nests and pairs of waterbirds were counted. Total counts were carried out on smaller islands, while coastal transects were used on larger islands. Survey data are stored in the database, GIS layers of these surveys have been produced.
SURVEYS CARRIED OUT

Activity 1 – Coastal surveys

Estonia

In Estonia, coastal surveys were carried out in the eastern part of the project site 4EST (West Saaremaa) as a special investigation in order to obtain more detailed data for the preparation of management plan and harbour impact monitoring. 1–2 counts per month were carried out from December 2005 to June 2008, 51 counts in total. Some observations from the coast in winter were also carried out in other LIFE project sites in Estonia.

Latvia

All project areas were surveyed from coast, weather permitting, as a part of waterbird mid-winter counts in January of 2006, 2007 and 2008 (Fig. 3). Coastal counts were also used for counting moulting Goldeneyes in June – July 2006 and 2007 in the project sites 8LAT and 10LAT.

Lithuania

In Lithuania, coastal counts were carried out regularly in both project areas (12LIT and 13LIT) from mid-November to April, starting in January 2006 and ending in April 2008 (Fig. 1). The counts were usually carried out 1–2 times per month, depending on the weather conditions and the sea state. In total, more than 30 coastal counts were carried out in Lithuanian project sites during the project period.

A special modification of coastal counts – the Little Gull count from two fixed observation points (one in each project area) were carried out in Lithuania in July – August of 2006 and 2007 (Fig. 1). In total, more than 400 hours of observations of Little Gull migration were made.

Activity 2 – Ship surveys

Estonia

Ship-based transect counts in Estonia were implemented in close cooperation with Latvian ornithologists in the project area 6EST (Irbe Strait). The survey was carried out onboard of the Latvian military ship by an international Latvian – Estonian team of observers. In total, six counts in different seasons were carried out in the Estonian part of the Irbe Strait: 25–27 April 2006, 28–29 July 2006, 28–29 March 2007, 5 August 2007, 30 November – 1 December 2007 and 22–29 January 2008. Similar survey transects were used in different years and seasons (Fig. 4).

The only additional ship-based survey in Estonia was made in the project area 2EST (West Gulf of Finland) on 15 November 2007.

Latvia

In total, 8 ship counts, using Latvian Navy ships A90 Varonis and K06 Gaisma, were performed throughout the duration of the project:

<table>
<thead>
<tr>
<th>Season</th>
<th>Survey dates</th>
<th>Project sites covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2006</td>
<td>24 April – 1 May 2006</td>
<td>7LAT, 8LAT, 9LAT, 10LAT, 11LAT</td>
</tr>
<tr>
<td>Summer 2006</td>
<td>27 July – 1 August 2006</td>
<td>7LAT, 8LAT, 9LAT, 10LAT, 11LAT</td>
</tr>
<tr>
<td>Autumn 2006</td>
<td>16 October and 5–8 November 2006</td>
<td>7LAT, 8LAT, 9LAT, 10LAT, 11LAT</td>
</tr>
<tr>
<td>Winter 2006/2007</td>
<td>8–26 January 2007</td>
<td>7LAT, 8LAT, 10LAT</td>
</tr>
<tr>
<td>Spring 2007</td>
<td>27 March – 3 April 2007</td>
<td>7LAT, 8LAT, 9LAT, 10LAT, 11LAT</td>
</tr>
<tr>
<td>Summer 2007</td>
<td>5–15 August 2007</td>
<td>7LAT, 8LAT, 9LAT, 10LAT, 11LAT</td>
</tr>
<tr>
<td>Autumn 2007</td>
<td>29 November – 2 December 2007</td>
<td>7LAT, 8LAT, 9LAT, 10LAT, 11LAT</td>
</tr>
<tr>
<td>Winter 2007/2008</td>
<td>15–29 January 2008</td>
<td>7LAT, 8LAT, 9LAT, 10LAT, 11LAT</td>
</tr>
</tbody>
</table>
The total length of all the surveyed transects amounted to 4882 km. All planned 8 surveys (twice each season) were carried out. It may be mentioned, that the second winter count was slightly delayed (Fig. 5). Also, the coverage in autumn and winter months had to be reduced due to severe weather conditions. Only the sites 7LAT and 8LAT, located in the more sheltered Riga Gulf, received the full set of counts planned.

**Lithuania**

In Lithuania, ship surveys were used to count waterbirds outside the coastal area – up to the extent of the territorial waters (up to 12 nautical miles off the coast). Ship surveys were initially delayed due to co-financing issues by the Lithuanian Army. However, eventually these issues were resolved and regular surveys were initiated in the spring of 2007. In total, nine ship surveys were successfully carried out in Lithuanian project areas 12LIT and 13LIT during the project period:

<table>
<thead>
<tr>
<th>Dates</th>
<th>Ship</th>
<th>Sites</th>
<th>Survey type</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-08-01-02</td>
<td>Romaste</td>
<td>12LIT, 13LIT</td>
<td>Little Gull</td>
</tr>
<tr>
<td>2007-03-27-28</td>
<td>Romaste</td>
<td>12LIT, 13LIT</td>
<td>Wintering</td>
</tr>
<tr>
<td>2007-08-07-08</td>
<td>Romaste</td>
<td>12LIT, 13LIT</td>
<td>Little Gull</td>
</tr>
<tr>
<td>2007-08-07-09</td>
<td>Vejas</td>
<td>12LIT, 13LIT</td>
<td>Little Gull</td>
</tr>
<tr>
<td>2007-12-15-16</td>
<td>Romaste</td>
<td>12LIT, 13LIT</td>
<td>Wintering</td>
</tr>
<tr>
<td>2008-02-11-12</td>
<td>Romaste</td>
<td>12LIT, 13LIT</td>
<td>Wintering</td>
</tr>
<tr>
<td>2008-03-27-28</td>
<td>Romaste</td>
<td>12LIT, 13LIT</td>
<td>Wintering</td>
</tr>
<tr>
<td>2008-04-29-30</td>
<td>Romaste</td>
<td>12LIT, 13LIT</td>
<td>Wintering</td>
</tr>
<tr>
<td>2009-01-29</td>
<td>Romaste</td>
<td>13LIT</td>
<td>Wintering</td>
</tr>
</tbody>
</table>

Each survey covered approximately 215 km of transects along the identical survey route (with the exception of the survey on the ship “Vejas”, which followed a specific expedition route of the Marine Research Centre), thus totalling some 1900 km of survey transects in the project sites (Fig. 6).

**Activity 3 – Aerial surveys**

**Lithuania**

No aerial surveys were performed in Lithuania – both Lithuanian project sites (12LIT and 13LIT) were completely covered by ship surveys and coastal surveys.

**Latvia**

Although the main methods used for waterbird surveys in Latvia were ship counts and coastal counts, waterbird observers accompanied specialists of the Latvian Marine Board during their pollution control flights on 28 occasions in order to collect additional information on bird presence/distribution (in February – May and October – December 2006, and February – April 2007). In addition, 2 special aerial total counts (on 3 July 2006 and 20 January 2007) were performed in coastal waters at the altitude most suitable for bird counts.

**Estonia**

Aerial surveys were the preferred method of waterbird inventory in Estonia. In total, 15 aerial surveys were performed in Estonia in 2007–2008 – eight with Cessna 172, six with L-410 and one with P-68. Each study area (1–6EST) was covered 5 times on average, with maximum 11 times (3EST) and minimum 2 times (1EST; Figs 7–11). Coverage of winter and spring seasons in 2007–2008 was substantially better than summer/moult and autumn. Special actions on target species (swans, Steller’s Eider) were performed as planned. These actions were supported by coastal surveys (point and transect counts from coast using telescopes).
### Activity 4 – Breeding waterbird counts on small islands

Breeding waterbird counts were carried out in Estonia only in the breeding seasons of 2006, 2007 and 2008. In total, 266 small islands were investigated in six project areas as detailed in the table below:

<table>
<thead>
<tr>
<th>Project area</th>
<th>Number of islands investigated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1EST East Gulf of Finland</td>
<td>13</td>
</tr>
<tr>
<td>2EST West Gulf of Finland</td>
<td>5</td>
</tr>
<tr>
<td>3EST Väinameri</td>
<td>36</td>
</tr>
<tr>
<td>4EST West Saaremaa</td>
<td>44</td>
</tr>
<tr>
<td>5EST South Saaremaa</td>
<td>160</td>
</tr>
<tr>
<td>6EST Irbe Strait</td>
<td>8</td>
</tr>
</tbody>
</table>

Surveyed islands are shown in Figures 12–16.

---

<table>
<thead>
<tr>
<th>Date</th>
<th>Aircraft</th>
<th>Survey type</th>
<th>Season/Action</th>
<th>Study areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007-01-25</td>
<td>Cessna 172</td>
<td>Total</td>
<td>Winter</td>
<td>1EST, 2EST</td>
</tr>
<tr>
<td>2007-02-08</td>
<td>Cessna 172</td>
<td>Total</td>
<td>Winter/Steller’s Eider</td>
<td>3–6EST</td>
</tr>
<tr>
<td>2007-05-10</td>
<td>P-68</td>
<td>Transect</td>
<td>Spring/Swans</td>
<td>2–3EST</td>
</tr>
<tr>
<td>2007-06-08</td>
<td>Cessna 172</td>
<td>Total</td>
<td>Swans</td>
<td>1–2EST</td>
</tr>
<tr>
<td>2007-08-08</td>
<td>Cessna 172</td>
<td>Transect</td>
<td>Moult</td>
<td>3EST, 5EST</td>
</tr>
<tr>
<td>2007-10-31</td>
<td>L-410</td>
<td>Transect</td>
<td>Autumn</td>
<td>2–3EST</td>
</tr>
<tr>
<td>2008-02-05</td>
<td>L-410</td>
<td>Transect</td>
<td>Winter</td>
<td>2–3EST</td>
</tr>
<tr>
<td>2008-02-06</td>
<td>L-410</td>
<td>Transect</td>
<td>Winter</td>
<td>4EST</td>
</tr>
<tr>
<td>2008-02-20</td>
<td>L-410</td>
<td>Transect</td>
<td>Winter/Steller’s Eider</td>
<td>2EST, 4EST</td>
</tr>
<tr>
<td>2008-04-02</td>
<td>L-410</td>
<td>Transect</td>
<td>Spring</td>
<td>2–3EST</td>
</tr>
<tr>
<td>2008-04-25</td>
<td>L-410</td>
<td>Transect</td>
<td>Spring/Steller’s Eider</td>
<td>3–4EST</td>
</tr>
<tr>
<td>2008-05-09</td>
<td>Cessna 172</td>
<td>Transect</td>
<td>Spring</td>
<td>3EST, 5EST</td>
</tr>
<tr>
<td>2008-05-12</td>
<td>Cessna 172</td>
<td>Total</td>
<td>Spring/Swans</td>
<td>3–6EST</td>
</tr>
<tr>
<td>2008-08-09</td>
<td>Cessna 172</td>
<td>Transect</td>
<td>Summer</td>
<td>3–4EST</td>
</tr>
<tr>
<td>2008-08-12</td>
<td>Cessna 172</td>
<td>Transect</td>
<td>Summer</td>
<td>2–3EST</td>
</tr>
</tbody>
</table>

All main Estonian observers (Andres Kuresoo, Leho Luigujõe, Aivar Leito) are well trained, with excellent aerial count experience (all have performed 25–35 flights/130–180 flight hours).
INVENTORY RESULTS

Detailed waterbird inventory results with accounts for each LIFE project site are presented in three separate annexes for each of the countries as follows:
Estonia – Annex II
Latvia – Annex III
Lithuania – Annex IV

INVENTORY MAIN CONCLUSIONS

Estonia

The available data of waterfowl concentrations on sea and breeding birds on islets were assembled in the early 2000s. As the result of this work, 25 Important Bird Areas (IBA) of European Importance (with marine parts) was established. Site selection process of IBAs has been carried out mainly on the basis of category C2 and C3 (sites that regularly hold at least 1% of a flyway population of a species) for the birds stop-over on the sea and category C6 (sites is one of the five most important in the region in question for a species considered threatened in the EU, Annex I species) for breeding birds on islets. Out of these 25 sites, 13 are located within the current LIFE project areas: Lahemaa and Kolga Bay (1EST), Pakri (2EST), Väinameri Sea (3EST), Küdema Bay, Koorunõmme, Tagaõisa penisula and Vilsandi archipelago (4EST), Irbe Strait (6EST), Kasti Bay, Sutu Bay, Siiksaare-Oessaare bays and Kahtla-Kübsaaare (5EST). For globally threatened Steller’s Eider (Polysticta stelleri) most essential sites with international importance are Tagaõisa Peninsula Vilsandi Archipelago, Koorunõmme and Küdema Bay. The largest number of bird species (fulfilling the criteria) using the deep sea habitats (Divers, Long-tail Duck, Velvet Scoter, Common Eider, Razorbill and Black Guillemot) can be found in the Irbe Strait. As sites of international importance for Long-tail Duck and Velvet Scoter respectively Pakri, Kahtla-Kübsaaare and Väinameri Sea was registered. For the rest of the waterfowl (ducks) and swan species most important stop-over area is Väinameri Sea which holds international importance as concentrations area for 16 species. Six species met the criteria of categories was observed in Irbe Strait. For breeding birds on islets the most important site is also Väinameri Sea (10 species from the current project target species list met the criteria), followed by Kahtla-Kübsaaare and Siiksaare-Oessaare areas (respectively 6 species fulfil the criterion).

This LIFE project allowed to take an enormous and very important step forward and considerably improved our knowledge of marine bird species, especially concerning the offshore and breeding bird issues. Internationally important new concentration sites (>1% of a flyway population) was found from Väinameri Sea area for Long-tailed Duck (max. 89,000 ind.), Common Eider (max. 7,300 ind.) and Smew; from Irbe Strait area for Velvet Scoter, Mute Swan and Northern Pintail; and from Pakri bird area for Tufted Duck (max. 4,800 ind.) and for Smew (max. 450 ind.). Special Steller’s Eider survey confirmed that all areas mentioned above still hold a significant proportion of the species in numbers that exceed the 1% of a flyway population. New important data on Steller’s Eider wintering concentrations have been gathered by airplane surveys outside the Vilsandi Archipelago Natura 2000 area (700–1,200 ind.). Another new information from offshore area west of Vilsandi Archipelago refers to remarkable summer concentrations of Little Gull (2,000–3,000 ind.) on marine shallows. Both species have been recorded in numbers, which allow to start planning procedures to extend the existing Natura 2000 area. In designated Vilsandi Archipelago SPA the largest winter concentration of the Common Goldeneye in the whole Estonia was recorded with up to 11,500 individuals.

About 30 project targeted bird species may breed on Estonian small marine islets. This type of breeding habitat is the only one (or the main one) for the following species: Cormorant, Barnacle Goose, Scaup, Common Eider, Velvet Scoter, Red-breasted Merganser, Lesser Black-backed Gull, Caspian Tern, Sandwich Tern and Razorbill. Small islets in Estonian waters play very
important role as one of the main breeding habitat also for another 12 species like Mute Swan, Greylag Goose, Shoveler, Tufted Duck, Goosander, Little Gull, Black-headed Gull, Common Gull, Little Tern, Common Tern and Arctic Tern. All species mentioned above have exceed in some of the areas 1% of national breeding population. In Kahtla-Kübassaare site 18 such species were recorded and in Vilsandi Archipelago bird area respectively 17 species. Absolute number of Scaup and Razorbill remain in fact small and these species hold more as national importance.

Compared to data summary from 2003, the census results have been often changed, and in many cases the numbers of different species have been reduced. The main reason beside the general decline in numbers of different bird species populations and changes on marine environment itself could be also different counting methods used during the different projects.

When the most important breeding islets lies mainly within the existing Natura bird areas then in case of stop-over sites it was noticed that concentrations of some species could be extend outside the designated area. Due to the very large shallow sea areas around the Estonia all this data have to be carefully examined as it is not realistic to cover the entire marine area with some protection regime. One more concrete proposal for the extension of the designated area (or making new separate area) could be made near the Vilsandi Archipelago due to the new data on Little Gull summer and Steller’s Eider winter concentrations.

**Latvia**

The previous offshore counts in Latvian waters had taken place in the early 1990s. According to them, high concentrations of bent-hivorous ducks (Long-tailed Duck, Velvet Scoter, Common Scoter) could be expected in the Irbe Strait and Riga Gulf western part, while high concentrations of piscivorous divers – in the eastern part of the Riga Gulf. Black Guillemots and Long-tailed Ducks had been registered at the western part of the Irbe Strait (Bezimjanaja, Vinkov and Petropavlovsk banks). Cape Akmenrags was known to be important for Little Gull in summer, and Pape surroundings – for Goosander in severe/normal winters (observations from coast). Three IBAs showed concentrations of moulting Goldeneyes according to 1% criteria levels valid in the late 1990s. Riga Gulf west coast sheltered also 10% of Red-necked Grebe (Podiceps grisegena) Baltic Sea wintering population.

The results of the LIFE Project showed surprisingly similar distribution patterns to the previous counts. Exception is the Red-necked Grebe – one single specimen was seen during one of the 8 counts performed.

New important concentrations were found for Little Gull in spring in the Riga Gulf (site Riga Gulf west 15,000 birds in late March 2007 and site Tūja offshore 5,900–9,000 birds, both springs). Also borders of Little Gull distribution in August now are known to be up to 20 m water depth zone thanks to ship counts.

What differed from the previous counts was the overall number of birds. Seaduck species (Velvet Scoter and especially Long-tailed Duck) showed much smaller numbers than in the early 1990s, yet still met the conservation criteria in the Irbe Strait and Riga Gulf west. Three possible explanations for the difference could be: 1) winters during the project were mild and birds had opportunity to use some unknown sites more to the north from the project areas; 2) condition of the sites has deteriorated; 3) the total population has changed. Also Black Guillemot numbers were lower than in the previous counts in the Irbe Strait.

Goldeneye numbers observable from the coast during moulting time have remained stable (Riga Gulf west, Salacgriva-Vitrupu) or slightly decreased (Akmenags), but the 1% criterion has risen in comparison to the 1990s, therefore this species was not used for site delineation.

Also 1% criterion for divers has risen to 3,000 birds. The criterion was convincingly exceeded in the Riga Gulf West (5,600 birds in spring 2006). Numbers in the Irbe Strait and Tūja offshore
were the same or higher than in the 1990s, but below the criterion C3. Therefore, the criterion C6 was used for site delineation.

To conclude, for most species the key concentration areas have remained the same and the numbers, although lower than in the 1990s, exceeded conservation criteria. Five SPAs were proposed according to the project results.

**Lithuania**

Previous systematic waterbird surveys in Lithuanian territorial waters of the Baltic Sea, which provided data for the delineation of Important Bird Areas (IBAs), were carried out in the early 1990s. They resulted in the selection of two IBAs in Lithuanian marine waters – off the coast of Palanga and off the coast of the Curonian Spit. Both these sites were found to hold large numbers of sea ducks, particularly Velvet Scoters and Long-tailed Ducks as well as divers and alcids. Numbers of waterbirds in these areas were found to be particularly high during cold winters. However, no more recent waterbird data were collected in the offshore waters after the 1990s, therefore the designation of SPAs in Lithuanian marine waters in the mid-2000s was based primarily on the data available from the coastal counts, which were carried out regularly as a part of the State environmental monitoring programme, and, consequently, the designated SPAs were limited to coastal areas only.

This LIFE project allowed to collect up-to-date information on the importance of Lithuanian territorial waters for migrating and wintering waterbirds and to complete the selection of SPA sites in this area. Surveys, carried out during the project both from the coast and from the ship, confirmed the importance of the already established SPAs, but also indicated that the presently established SPAs are insufficient for the adequate protection of waterbirds wintering in Lithuanian territorial waters of the Baltic Sea, in particular off the coast of the Curonian Spit. Therefore the main outcome of the waterbird inventory in Lithuania in this project is the suggested expansion of the already established SPA along the Curonian Spit. This site will be very important for the protection of wintering Velvet Scoters as well as Razorbills, divers and migrating Little Gulls.

Rather stable and dense aggregations of Velvet Scoters and, to a lesser degree, Razorbills were also observed at depths exceeding 30 m off the coast of Palanga. However, these aggregations did not meet the criteria for the delineation of new SPAs, since the absolute numbers of birds there were below the population threshold.

Surveys, carried out during this project in the territorial waters of Lithuania, broadly confirmed the species composition and distribution of waterbirds observed in the 1990s, but the observed and estimated bird numbers overall were considerably lower. This may be due to the overall decline in populations of some waterbird species as well as the fact that weather conditions during this project were rather mild, whereas it has been previously established that Lithuanian waters become of particular importance to waterbirds in adverse winters.

**Deliverables and Products of the Action**

**Annex I.** Detailed description of Waterbird Inventory (Action A.3) ship survey methodology and site delineation principles

**Annex II.** Detailed description of Waterbird Inventory (Action A.3) results in LIFE project sites in Estonia

**Annex III.** Detailed description of Waterbird Inventory (Action A.3) results in LIFE project sites in Latvia

**Annex IV.** Detailed description of Waterbird Inventory (Action A.3) results in LIFE project sites in Lithuania
Figure 1. Waterbird inventory in Lithuania: coastal survey points, Little Gull survey points and ship survey routes.
Figure 2. Survey sectors in Küdema Bay (4EST).

Figure 3. Land based count routes in Latvia.
Figure 4. Ship survey transects in 6EST (excluding summer counts).

Figure 5. Ship survey routes in Latvia.
Figure 6. Ship survey routes in Lithuania.
Figure 7. Flight tracks of the winter aerial surveys in 2007-2008.
Figure 8. Flight tracks of the spring aerial surveys in 2008.
Figure 9. Flight tracks of the summer aerial surveys in 2008.
Figure 10. Flight tracks of the autumn aerial surveys in 2007-2008.
Figure 11. Flight tracks of the winter and summer aerial surveys in 2007 (Gulf of Finland).
Figure 12. Islands surveyed during the breeding waterbird survey in 1EST.
Figure 13. Islands surveyed during the breeding waterbird survey in 3EST.
Figure 14. Islands surveyed during the breeding waterbird survey in 4EST.
Figure 15. Islands surveyed during the breeding waterbird survey in SEST.
Figure 16. Islands surveyed during the breeding waterbird survey in 6EST.