**Aquatic Warbler Conservation Team**

# Searching for wintering sites of the Aquatic Warbler *Acrocephalus paludicola* in Senegal

## 17th January to 10th February 2007

Indega Bindia, ornithologist at the 'Parc National des Oiseaux du Djoudj' with one of the first captured Aquatic Warblers at Grand Lac, Mirador President, 25th January 2007 (photo: Martin Flade)

# Final Report

written by Martin Flade (chairman)
on behalf of the
BirdLife International Aquatic Warbler Conservation Team

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**AWCT Senegal Expedition 2007**

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**February 2008**

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# 1. Executive Summary

The wintering sites of the globally threatened Aquatic Warbler (AW) were unknown until January 2007. According to the AW Species Action Plan, which is annexed to a Memorandum of Understanding under the Convention on Migratory Species of Wild Animals (Bonn Convention, CMS), the knowledge of the wintering sites was given highest priority at the conference of signatory parties in June 2006 at Criewen, Germany.

Thanks to substantial support from the British government (DEFRA), the CMS Secretariat in Bonn and from the RSPB, it was possible to perform an expedition to W-Africa in January/February 2007 in order to identify the AW wintering sites. This expedition was organised by the BirdLife International Aquatic Warbler Conservation Team (AWCT). The local organisation in Senegal was perfectly done by the administration of the 'Parc National des Oiseaux du Djoudj' (Ibrahima Diop, Direvtor of the Biological Station). The necessary ringing work was organised by the French AWCT partner 'Bretagne Vivante' (Bruno Bargain).

Previous to the expedition, five years of preparatory studies have been undertaken by several AWCT partners in order to narrow down the possible AW wintering grounds: a desk study on all AW records in Africa (RSPB, SCHÄFFER *et al.* 2006), a study on stable isotopes in AW feathers of different breeding populations and comparison with values of feathers of the African surrogate species Winding Cisticola (RSPB, PAIN et al. 2004 and unpublished), and a computer simulation using vegetation and climate data to identify suitable zones in Subsahelian Africa (WALTHER et al. 2007). Combining the results of all preparatory studies resulted in the conclusion, that a major AW wintering site could be situated in the Senegal River estuary.

During the expedition big effort was put in mist-netting and cage-trapping of birds in potentially suitable habitat types. More than 2,000 birds of European species wintering in the Djoudj area were captured and ringed. Finally, AW were found in large open saline grass marshes of *Scirpus* species and *Sporobulus robustus*. In total, 56 AW were captured, including one bird with a ring from Spain. In order to link the AW in Djoudj with breeding populations, feathers and DNA samples from all AW have been taken. The AW wintering habitat, vegetation types, water conditions and habitat structures were described, as well as the whole assemblage of European wintering birds in the grass marshes.

The total area of suitable AW habitats at the Senegalese side of the river (within and outside the National Park) is estimated at 13,000 hectares, out of which 10,000 hectares might have been suitable in late January/early February (the remaining area was already dry). The density of AW in this habitat type was estimated at 0.5-1 (-1.5) birds per hectare (but in a small area AW was much more abundant), so that the population estimate is not less than 5,000-10,000 birds, and probably the same number at the Mauretanian side (concluded from satellite images, habitat maps and description from Mauritanian colleagues – has to be verified in the field). Since the global population actually is estimated at 25,000-30,000 birds, the Senegal delta probably holds at least 20 %, eventually up to 70 % of the global population and is thus a major or even the most important wintering site of the species.

Another discovery was the frequent occurrence of Baillon's Crakes in the same habitat type and at high densities. The Senegal delta is the first known big wintering site of (presumably) European Baillon's Crakes in Africa.

Potential threats arise from the ongoing change of the whole hydrological regime, since the Senegal River was enclosed with dikes in 1964 and dammed by the Diama dam upstreams of

St. Louis in 1986 (begin of the works) -1992. The flooding of the National Park and surroundings is now managed artificially. It is thus of prime importance to carry out further detailed studies on these potential or ongoing habitat changes and to elaborate a thorough threat status analysis. Another threat for grass marshes outside the National Park is the transformation in hydro-agriculture, mainly sugar cane and rice fields. At Lac de Guiers east of Djoudj NP, large areas of grass marshes have been transformed in sugar cane fields in the past two decades. We assume that other important wintering sites of AWE in subsahelian W-Africa could be under serious threat.

# 2. Participants of the expedition

**Table 1:** Participants of the expedition, details of stay and responsibilities
***Please note for all photos in this report: the photographer is always mentioned by the initials of his name, e.g.*** [VF] = Viktar Fenchuk.

| Country | Name | Special function, responsibilities | Duration of stay |
|---|---|---|---|
| **Belarus** | Viktar Fenchuk | | 19/01 - 02/02 |
| **France** | Bruno Bargain | *Head of bird ringing* | 18/01 - 10/02 |
| | Gaétan Guyot | *Ringing data, GPS coordinates* | 18/01 - 10/02 |
| | Arnaud Le Nevé | *Species list; organisation* | 18/01 - 10/02 |
| **Germany** | Stefan Bräger | | 21/01 - 10/02 |
| | Martin Flade | *Head of expedition, chairman AWCT* | 19/01 - 02/02 |
| | Benedikt Giessing | *DNA blood sampling* | 19/01 - 02/02 |
| | Angela Helmecke | | 21/01 - 10/02 |
| | Wolfgang Mädlow | *Inventory of rare species* | 19/01 - 02/02 |
| | Torsten Ryslavy | *Financial matters* | 28/01 - 10/02 |
| | Volker Salewski | | 25/01 - 10/02 |
| | Klemens Steiof | | 27/01 - 10/02 |
| **Hungary** | Zsolt Végváry | *Habitat description, GPS transects* | 19/01 - 10/02 |
| **Latvia** | Oskars Keiss | | 19/01 - 10/02 |
| **Lithuania** | Zydrunas Preiksa | | 19/01 - 10/02 |
| **Portugal** | Julio Manuel Neto | | 18/01 - 10/02 |
| **Spain** | Carlos Z. Martínez | | 19/01 - 10/02 |
| **Ukraine** | Anatoly Poluda | | 19/01 - 02/02 |
| **United Kingdom** | Lars Lachmann | *Photo collection, habitat description* | 18/01 - 04/02 |
| **Sénégal** | **Scientific staff:** Mamadou Banora, Indega Bindia, Amadou Diouldé Diallo, Khalifa Ababacar Cissé, Paul Moïse Diedhiou, Ibrahima Diop (*Directeur de la Station Biologique du Djoudj*), Yarack Diop, Abdoulaye Faye, Ibrahima Gueye (*Conservateur du Parc du Djoudj*), Ibrahima Kamara, Efolomé Manga, Valentin Mansaly, Souleymane Mansaly, Sassy N'Diaye, Mamadou Seck, Maguette Seck, Bakary Sonko, Daouda Sylla (IRD)**.**<br><br>**Technical staff** *(„les femmes de las cuisine", cook, drivers)*: Souleymane Ba, Elisa Bindia, Marie Bindia, Aïcha Dia, Alyma Diop, Dah Diop, Juda Diop, Mass Diop, Racine Diop, Mba Fall, Aminata Gueye, Fatou Mbaye, Niania Sow. | |
| **Mauritania** | **Scientific staff:** Ousmane Coulibaly, Traoré Housseynou | | |

**Plate 1:** The participants of the expedition [VS].

# 3. Schedule

**Table 2:** Schedule of the expedition.

| Date | Activities |
|---|---|
| **17/01+ 18/01** | Arrival of the first 5 participants, transfer Dakar - Djoudj;<br>exploration trip in the Djoudj NP;<br>first experimental mist-netting near the Biol. Station (trapping site TS 0) |
| **19/01** | main arrival day, transfer Dakar - Djoudj;<br>exploration trips in the Djoudj NP;<br>preparation for the first mist-netting activities at trapping sites TS 1, 2 , and 3. |
| **20/01** | mist-netting at TS 1 (near Djoudj Marigot), TS 2 (Mirador Tantal), TS 3 (Poste de Gainthe);<br>joint boat trip at Djoudj Marigot for bird watching |
| **21/01** | mist netting at TS 1, 2, 3; cage traps at TS 2; start at TS 5 (Typha 2)<br>arrival of Stefan/Angela; |
| **22/01** | mist netting at TS 2 (+ cage traps), TS 3, TS 4 (Typha 1), TS 5 (Typha 2), TS 6 (Typha 3) |
| **23/01** | mist netting in Typha (TS 4-7); cage traps at TS 6;<br>exploration of *Scirpus* habitats S of Tiguet and at Grand Lac |
| **24/01** | morning: mist-netting in Typha;<br>afternoon: start of mist-netting in *Scirpus* marshes at TS 8 (Tiguet), 9A+B (Mirador President)<br>start with cage traps at TS 9A |
| **25/01** | mist-netting at TS 8, 9A+B, 10A+B;<br>Captures of first 2 AW at Grand Lac;<br>arrival Volker; |
| **26/01** | mist-netting at TS 8, 9A+B, 10B |
| **27/01** | mist-netting, morning: TS 9A+B;<br>afternoon: start at 9C+D; 10A+B; cage traps at 9C |
| **28/01** | mist-netting at TS 9C+D, first attempt with long rope; TS 10A+B;<br>1 group trip to Langue de Barbarie NP and Guembeul NP near St. Louis |
| **29/01** | mist-netting at 9C+D, second attempt with long rope; TS 10B |
| **30/01** | start mist-netting E Tiguet (Canale de Crocodile), TS 12A+B; 10B; 11; cage traps at 12A+B |
| **31/01** | exploration trip of a small group to Lac de Guiers/Richard Toll;<br>mist-netting TS 10B;<br>no other mist-netting because of sand storm |
| **01/02** | mist-netting at TS 10B; 11; 12A+B; again use of the long rope;<br>transfer of Viktar, Martin, Benedikt, Wolfgang & Anatoly to Dakar;<br>netting near Biol. Station TS 15 |
| **02/02** | TS 2A; 11; 12A+B; 15; |
| **03/02** | TS 2A; mobile net at Grand Lac TS 14;<br>One group birdwatching trip to Lac de Guiers and Richard Toll; |
| **04/02** | TS 2A;<br>trip to Langue de Barbarie NP and Guembeul NP near St. Louis |
| **05/02** | TS 2A; 11; 12A+B; |
| **06/02** | TS 2B; 13; |
| **07/02** | TS 2B; 10B; 11; 13; TS 16 (Bango) |
| **08/02** | TS 2B; 11; 12B; 13;<br>first group transfer to Dakar for departure |
| **09/02** | travel back to Dakar; stop-over at Thiès Technological University;<br>visit of Madeleine Islands NP |
| **10/02** | Madeleine Islands NP; Departures |

# 4. Introduction

## 4.1. The Aquatic Warbler – global situation and range

The Aquatic Warbler *Acrocephalus paludicola* is the rarest and the only globally threatened passerine bird found in mainland Europe. The species is classified as Vulnerable at global level and is listed as Vulnerable in the IUCN Red List of Threatened Species. At the European level it is classified as Endangered. It is also included into Annex I of the EU Wild Birds Directive, in Appendix II of the Bern Convention and in Appendix I of the Bonn Convention.

Once widespread and numerous in fen mires and wet meadows throughout Europe, the Aquatic Warbler has disappeared from most of its former range. Nowadays, its world population of only 10,500-14,200 vocalising males is confined to fewer than 40 regular sites in only six countries, with four sites supporting over 80 % of the global population.

The Aquatic Warbler regularly breeds in Belarus, Germany, Hungary, Lithuania, Poland and Ukraine (irregularly in Russia and Latvia), with major populations in Belarus, Ukraine, and Poland. The breeding distribution is fragmented because of habitat constraints.

The species became extinct in Western Europe during the 20$^{th}$ century and has declined dramatically in central Europe. It formerly bred in France, Belgium, Netherlands, former West Germany, former Czechoslovakia, former Yugoslavia, Austria and Italy.

Two small geographically isolated and genetically separate subpopulations of the Aquatic Warbler exist in Germany/northwest Poland and West Siberia (Russia). These populations are most likely facing extinction in the near future.

On migration the Aquatic Warbler has been recorded in 13 European countries, mainly in the west and southwest of the continent. The species winters in West Africa south of the Sahara but little more was known about the species during winter.

## 4.2. The Aquatic Warbler Conservation Team (AWCT)

The Aquatic Warbler Conservation Team was officially founded in 1998 at Brodowin/ Germany. The AWCT acts under the auspices of BirdLife International and is an informal association of researchers and conservationists working on the Aquatic Warbler, coming from all breeding range states and some stopover countries. Currently, colleagues from Russia, Belarus, Ukraine, Latvia, Lithuania, Poland, Hungary, Germany, United Kingdom, France, Spain and Senegal are actively working in the Team. The chairman is Martin Flade, Germany.

The AWCT has at least one annual meeting and has undertaken 14 field expeditions to different parts of W-Siberia (1999-2005), Belarus, Ukraine, Latvia, Lithuania, European Russia (Smolensk, Tver and Ryazan Regions, W-Ural, Kaliningrad Region), Poland, and Hungary. In course of this expeditions, the AWCT has explored nearly the entire former central and East-European as well as Siberian range of the AW in search for remaining breeding populations and fen mires, has exchanged knowledge among people and countries, has taken DNA and feather samples of most of the AW subpopulations, developed joint standard methods for monitoring, habitat description and field research, and has initiated the Aquatic Warbler Memorandum of Understanding under the CMS (2003, Minsk) and a running LIFE-Nature Project in Poland and Germany.

The AWCT gets regular financial support from the RSPB (as the British BirdLife partner) for it's annual meetings. Some expeditions where supported by the German Ornithological Society (DO-G) and the Michael Otto Foundation for Environmental Protection. Single research projects (mostly connected with doctor theses) were supported e.g. by the Deutsche Forschungsgemeinschaft (DFG; study on population genetics, BENEDIKT GIEßING), by the RSPB and the British Government (stable isotopes studies, DEBORAH PAIN), and the Deutsche Bundesstiftung Umwelt (DBU; study of key habitat factors of AW in Pomerania, FRANZISKA TANNEBERGER).

## 4.3. The CMS Memorandum of Understanding for the Conservation of AW

A Memorandum of Understanding Concerning Conservation Measures for the Aquatic Warbler was concluded on April 30, 2003 in Minsk (Belarus), under the auspices of the Convention on Migratory Species of Wild Animals (Bonn Convention, CMS). Annexed to the Memorandum is the detailed **Aquatic Warbler Species Action Plan**, which identifies threats faced by the species and ways to address these threats.

In line with Minsk declaration, the first meeting of the Range States of the MoU took place on June 24-27, 2006 at Criewen (Germany). A Scientific Symposium that discussed contemporary issues in conservation of the Aquatic Warbler preceded the meeting and provided significant input to the conference.

As of July 2006, the Memorandum has been signed by 12 Aquatic Warbler Range Countries and two International Organisations: Belarus, Belgium, Bulgaria, Germany, Hungary, Latvia, Lithuania, Poland, Senegal, Spain, Ukraine and United Kingdom as well as BirdLife International and CMS. Three countries originally identified as Aquatic Warbler Range States - France, the Netherlands, Russian Federation - haven't yet joined the MoU.

## 4.4. Wintering of AW in Africa: state of knowledge

Very likely the major wintering sites are situated in Senegal, Mauritania and Mali. BirdLife International through its National Partners and the BirdLife International Aquatic Warbler Conservation Team members in all countries of the Aquatic Warbler breeding range has run several desk-studies aimed at narrowing down the potential wintering range of the species. Previous to the expedition, five years of preparatory studies have been undertaken by several AWCT partners: a desk study on all AW records in Africa (RSPB, SCHÄFFER *et al.* 2006; see Fig. 1), a study on stable isotopes in AW feathers of different breeding populations and comparison with values of feathers of the African surrogate species Winding Cisticola and Grey-backed Camaroptera (RSPB, funded by the Department for Environment, Food and Rural Affairs in the UK; PAIN et al. 2004 and unpublished), and a computer simulation using vegetation and climate data to identify suitable zones in Subsahelian Africa (WALTHER et al. 2007). Combining the results of all preparatory studies resulted in the conclusion, that a major AW wintering site could be situated in the Senegal River estuary.

On-the-ground confirmation and a standardised methodology to identify and confirm wintering habitats was now required and planned for the beginning of 2007 in line with the strategy for further work of the BirdLife International Aquatic Warbler Conservation Team (initially presented during the Aquatic Warbler Conference in Palencia/Spain 17-20 August 2005). - An expedition to find Aquatic Warbler wintering grounds in Mali has been initiated independently by ornithologists from Spain in winter 2005/2006, but without success.

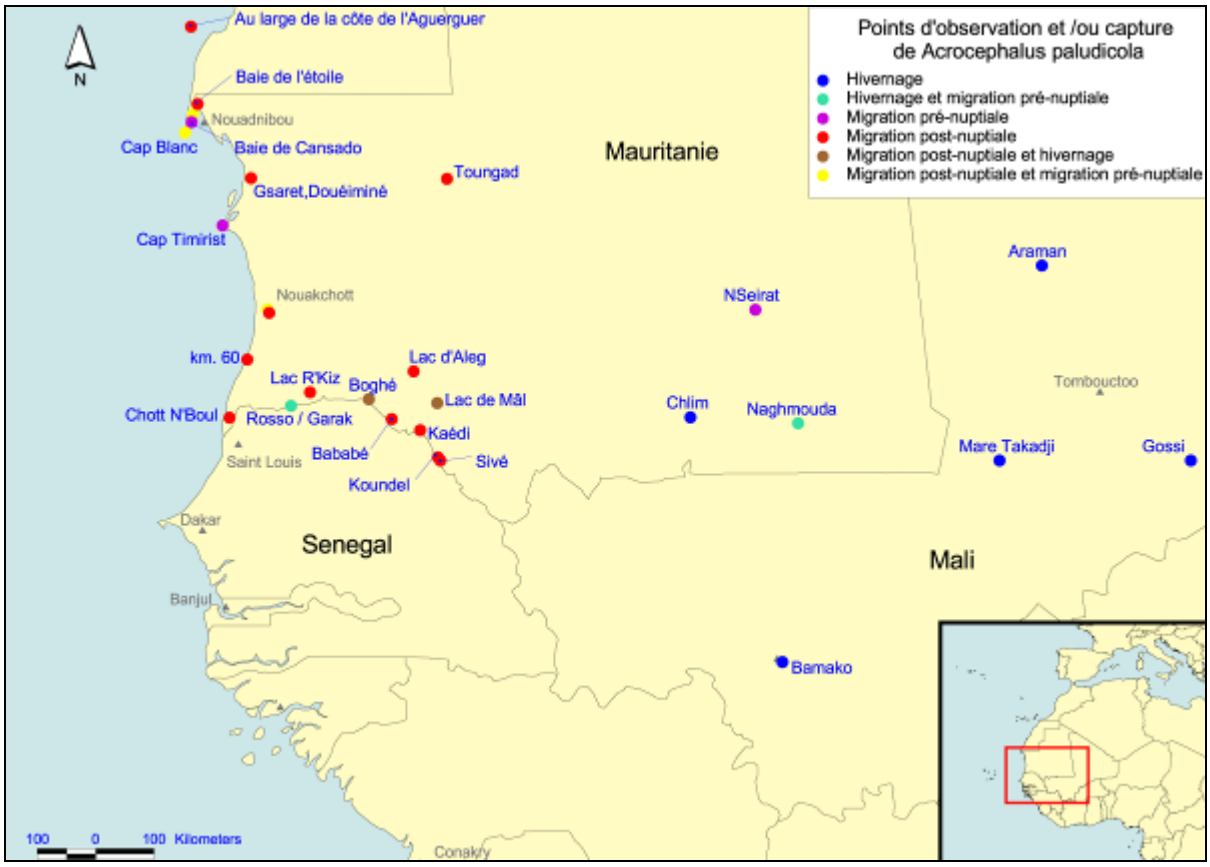


**Fig. 1:** Locations of AW records in W-Africa (from BARGAIN & GUYOT 2007).

## 4.5. Prospective and targets of the expedition

The aim of the scientific expedition was to catch the maximum number of AW, using standard methodologies (catching effort, tape recorders...) and to develop a methodology that could be used in future by Senegalese colleagues. Local technical people and guides were to go with ringers in order to receive training about techniques to identify, to handle and to take measurements of birds.

The other aim of the expedition was to gain maximum information on favourable habitats and locations for AW. This should allow giving advice for favourable management for AW in Senegal and Mauritania.

So, the **targets** of the expedition have been:

1. Confirmation of the regular wintering and moulting occurrence of the species in the Senegal delta.
2. Standard method developed and tested to search and detect AW in it's African wintering grounds.
3. Senegalese and Mauritanian colleagues are trained to search for AW and to catch, to identify, to handle and to take measurements of AW.
4. General Description of the AW wintering habitats.
5. Clearer picture of the extend of the occupied wintering area.
6. At least a rough estimate how many birds winter in the area.
7. Assessment of the threat status of the sites in the area.

8. Precise wintering habitat description that allows to be used for satellite image research to find similar suitable habitats in W-Africa.
9. Strontium samples of occupied AW sites taken.
10. GPS locations with accompanying photos and short descriptions of habitat taken at various places to support African remote sensing IBA monitoring programme.

**Planned activities** have been:
1. To check potential AW wintering habitats in the Senegal delta by analysis of maps, aerial photos, satellite images, and site visits on the ground.
2. To form mixed teams of AWCT experts and local staff from Senegal and Mauritania.
3. Extensive mist-netting and use of cage traps in the most suitable habitats with the support of tape replays of AW song.
4. Catching and ringing of wintering AW.
5. Catch-recatch studies, in case larger numbers of birds can be caught at one site.
6. To take measurements, feather and DNA samples from the birds captured.
7. Description and documentation of occupied and other apparently suitable habitats (vegetation, habitat structure, water level and dynamics, photos).

## 4.6. Co-operating parties and supporters

**Cooperating partners and responsibilities:**

- **BirdLife International Aquatic Warbler Conservation Team (AWCT),** chair: MARTIN FLADE (Landesumweltamt Brandenburg) - lead partner; global coordination of AW research and conservation.

- **Djoudj National Park administration**, IBRAHIMA DIOP (Director of the Djoudj Biological Station) – inviting authority, local organisation, accommodation, coordination of Senegalese and Mauretanian scientific and technical staff.

- **Bretagne Vivante (SEPNB)**, BRUNO BARGAIN, ARNAUD LE NEVÉ – responsible for all ringing activities; organisation and coordination between European and Senegalese partners.

- **Royal Society for the Protection of Birds (RSPB),** NORBERT SCHÄFFER, LARS LACHMANN – major financial supporter; scientific advice; conservation advice; stable isotope analyses.

**Financial supporters:**

The following main supporters made the expedition possible:

- **Royal Society for the Protection of Birds – RSPB**: Main supporter of the AWCT since 1998; provides basic funding by an annual ‘Small Grant Agreement’.

- **Department of Environment, Food, and Rural Affairs of the UK – DEFRA**: supported the activities of the AWCT by a substantial donation to the CMS Secretariat.

- **Secretariat of the Convention on the Conservation of Migratory Species of Wild Animals – CMS:** delivered the DEFRA funding for the first AWCT Africa expedition.

- **Djoudj National Park administration**: supported accommodation and local transport.

- **Bretagne Vivante**: supported the technical ringing work and participation of French staff.

- **German Ornithological Society - DO-G:** supported the participation of German staff.

- **Michael Otto Foundation for Environmental Protection** (Germany): supported the participation of the AW CMS officer (Viktar Fenchuk from Belarus).

# 5. The Senegal delta and the 'Parc National des Oiseaux du Djoudj'

The following site description is based on the paper from WOIKE (2001).

The 'Parc National des Oiseaux du Djoudj' (PNOD) is located in the northwestern part of the Senegal delta, just at the southern edge of the Sahara. The Senegal floodplain is the first large and green wetland south of the Western Sahara and thus of tremendous importance for migrating birds. The National Park comprises an area of 16,000 ha and is surrounded by six villages (Débi, Tiguet, Diadiem I, II and III, Djoudj village). The river Senegal, which origins from the Guinea mountains and has a total length 1,700 km, borders the area in the north and the west, where it forms the border to Mauritania.

The climate is characterised by a long drought from October or November to July and a short raining period with around 200 mm precipitation from late July to mid-October. There was a clear tendency to lower precipitation during the past decades: mean annual precipitation at St. Louis was 392 mm in the period 1920-1970, but only 200 mm in the 1970s and 1980s (VAN LAVIEREN & VAN WETTEN 1988). Since the early 1990s there was a slight increase in the mean annual precipitation.

The PNOD is situated in a large depression with clay soil, which is covered by an extended network of former river arms. These old river arms connect a diverse variety of flood basins of different size. Low ridges of sand dunes structure the periodically flooded shallow water system.

Under natural conditions, up to the mid-1960s, the whole delta was flooded from the beginning of the raining season. During the dry season, the saline seawater was intruding the land up to 200 km from the Atlantic Sea coast, because the transpiration was much bigger than the run-off. This saline water body was washed out through the delta at the beginning of the raining period. The high salinity of the water avoided the development of dense fresh-water vegetation. Only salt-resistant plants could grow at the margins of open water bodies (e.g. *Scirpus littoralis, Sporobulus robustus*).This situation has changed completely: In 1964 the whole Senegalese part of the delta was enclosed by dikes. Since then, the PNOD receives water from the Senegal River only through two regulated sluices (upstream in the NE: Canal de Crocodile, downstream in the SW: Djoudj). The water supply is thus artificially today. The whole dammed area has no outflow, and the water level depends exclusively on transpiration.

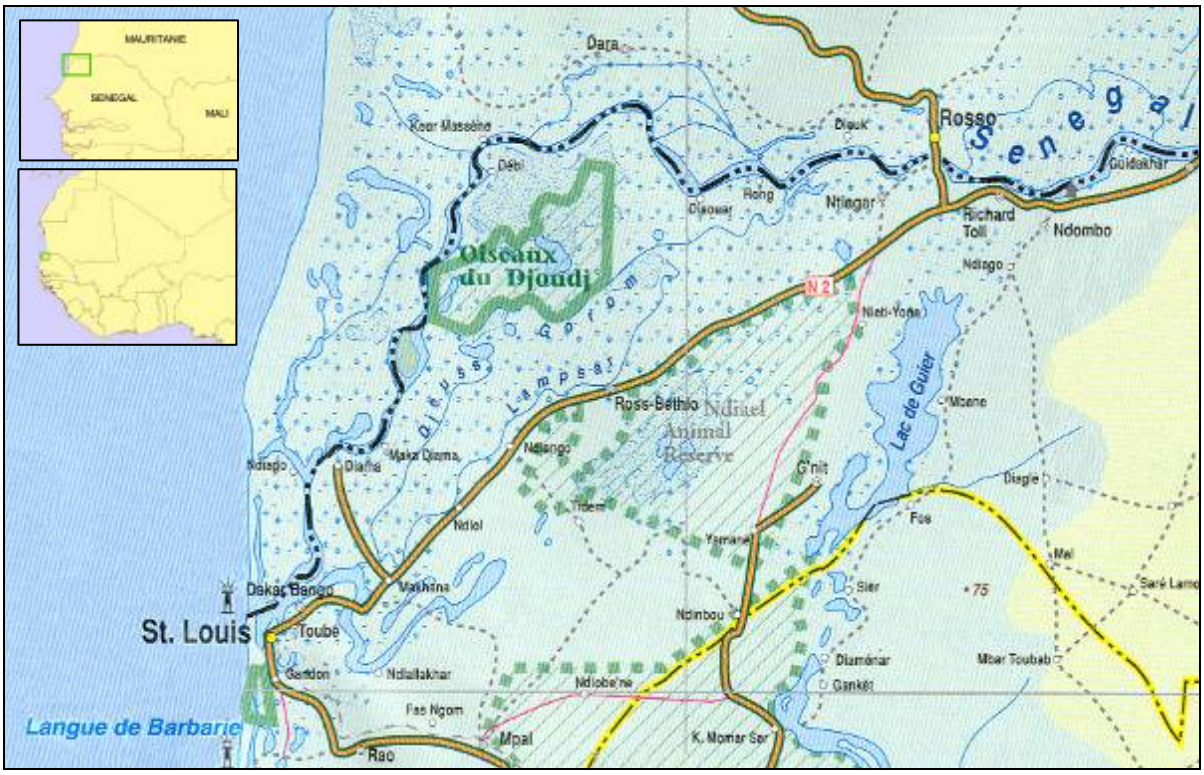


**Fig. 2:** Map of the Senegal delta and PNOD (from BARGAIN & GUYOT 2007).

In 1992, the two large Diama dams at the Senegal River 20 km from the coast and 800 km to the east in Mali have been completed, and *Typha* stands were completely developed in the whole reservoir after two years (before 1992, the banks of the Senegal river were still coverd by *Sporobulus*). Since the early 1990s the Senegal River is regulated in a way that allows permanent supply of irrigation water for hydro-agriculture (rice and sugar cane plantations). Today, in the enclosed Diama basin (areas along the Senegal river between the dikes) the water level is kept constantly at 1.5 m a.s.l. Through this, natural dynamics of floods and droughts and of saline and fresh water is avoided.

Since 1992, also the Mauritanian part of the Diama basin is completely enclosed by dams, so that also in the Mauritanian part natural floods are supressed. Mauritania is planning to regenerate the area of the Diawling National Park also through controlled flooding.

Through the lacking water salinity, the permanent water bodies and especially the whole area of the Diama basin between the dikes is increasingly overgrown with cattail, reeds, and floating vegetation, such as *Pistia stratiotes* (invasive species, first occurrence 1989), the invasive cattail *Typha australis*, and reed *Phragmites australis*. Around 1995, *Pistia stratiotes* covered large parts of the permanent water bodies of the National Park, affecting the whole limnic ecosystems and the habitat conditions for many resting water bird species (e.g. pelicans). However, the further spreading of *Pistia* was controlled after 1999 by the artificial introduction of the central- and south-American monophagous beetle *Neohydronomus affinis.*

Today, the Djoudj area (PNOD and adjacent areas in the Northwest around Tiguet and Débi) is divided in three clearly different sections:

- The permanently flooded areas of the Diama reservoir between the dikes along the Senegal river in the west and – as a narrow belt – in the north; these areas are almost overgrown with dense and high cattail stands;

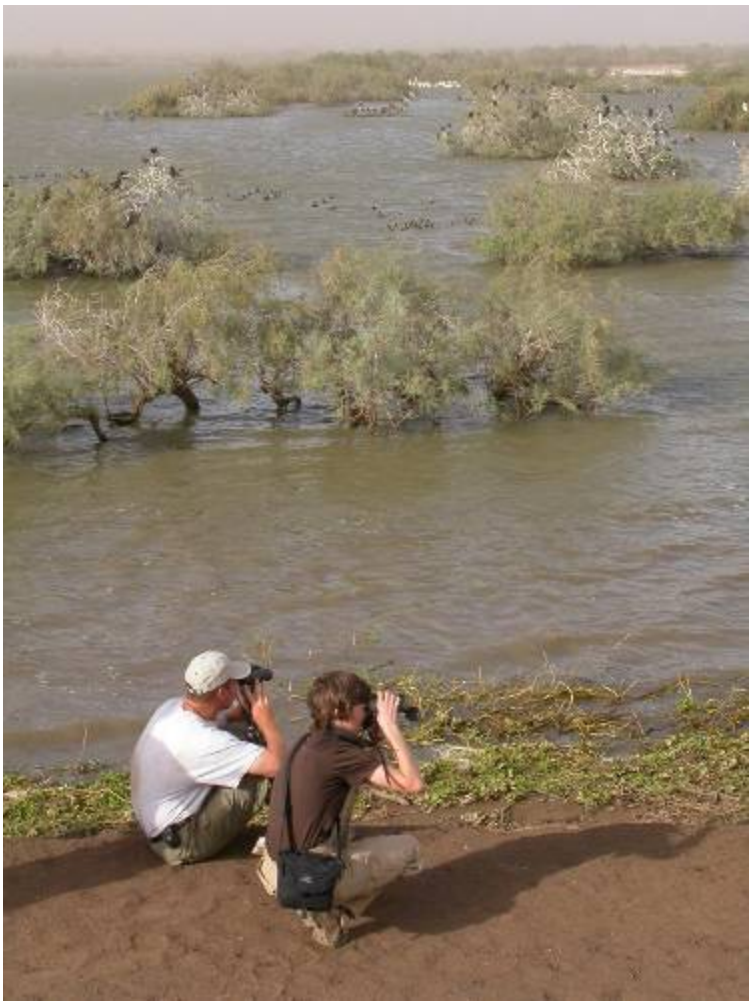

**Plate 2:** Flooded part of the Djoudj NP at Djoudj Marigot, with resting cormorants and egrets [TR]

**Plate 3:** Djoudj Biological Station, surrounded by drying-up shallow waters [LL]

**Plate 4:** Satellite image of the Senegal delta with the Djoudj NP in the lower centre; the permanent flooded area between the dikes (Diama reservoir) is dark.

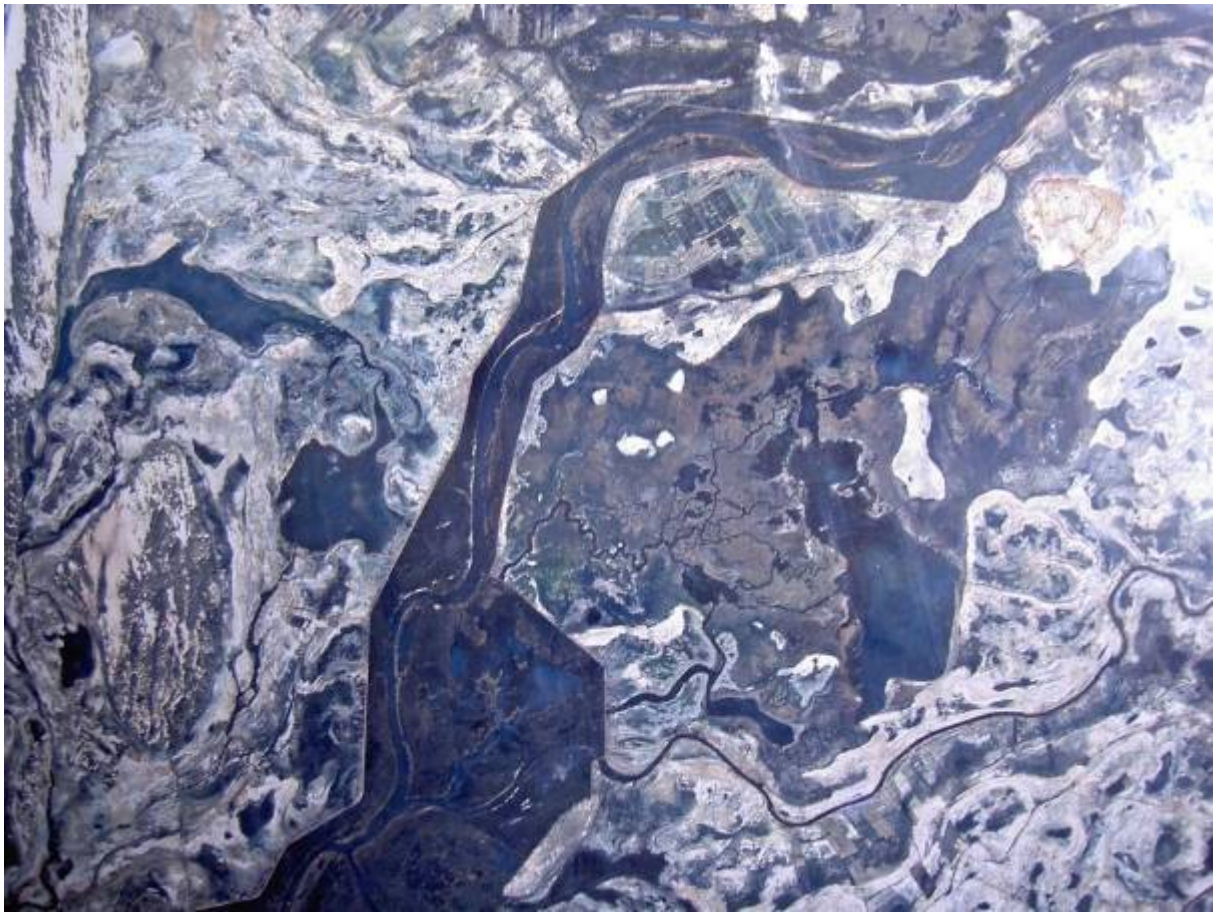

**Plate 5:** Satellite image of the Djoudj NP, for details see Plate 4.

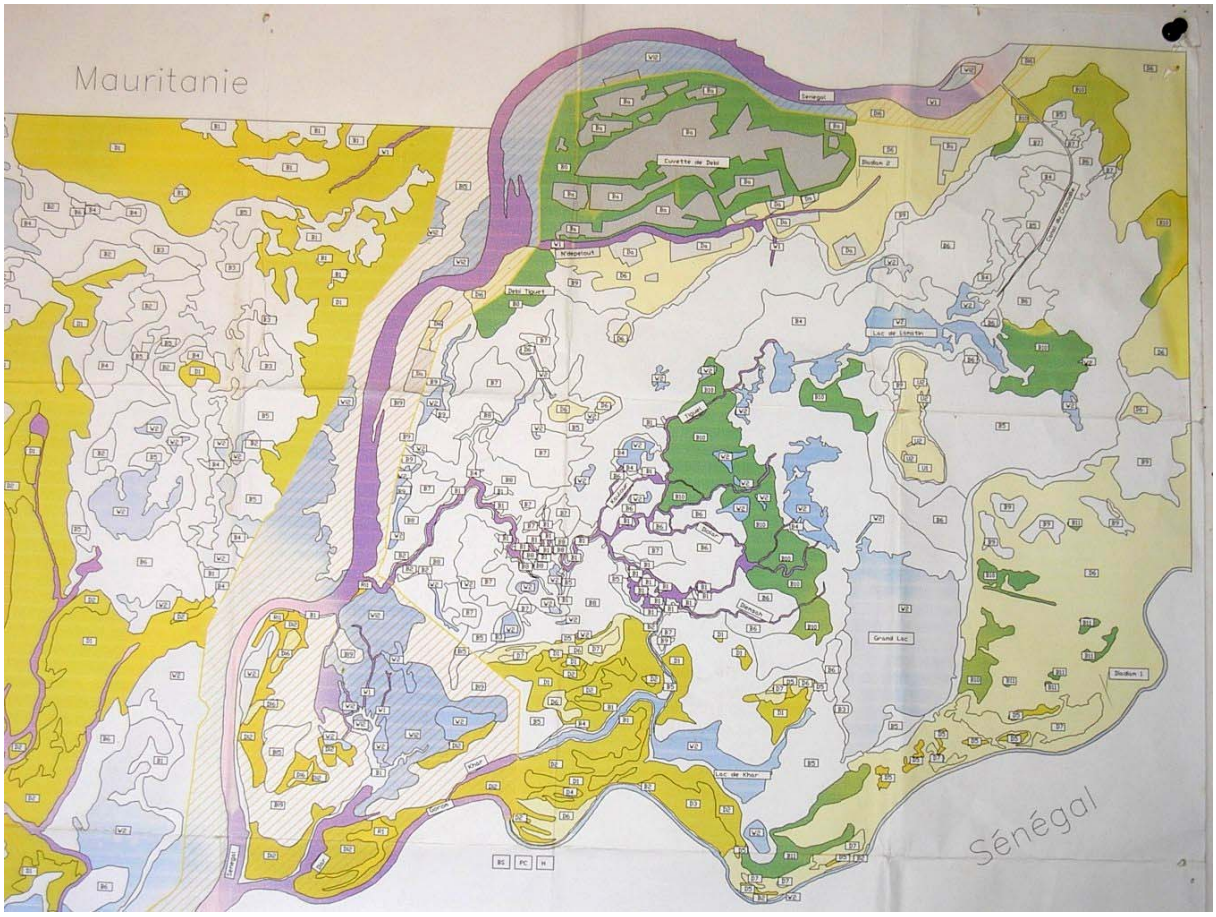


**Plate 6:** Vegetation map of the Djoudj National Park (from SCHWÖPPE 1994).

**Plate 7:** Shallow lake with resting ducks and flamingos in the Djoudj NP [VS].





**Plates 8-11:** Signboards of the Djoudj National Park [LL, MF, WM, MF]

**Plates 12-15:** Djoudj Biological Station [AH, MF, LL, MF]

- The large inner basin between Tiguet, Djoudj Biological Station and the Crocodile sluice, including the Grand Lac (3,000 ha) and several other smaller lakes; these large area of c. 16,000 ha is artificially flooded during the raining season and then drying out during the winter months; it consists of shallow lakes, river arms with gallery forests, and muddy areas and large grassy marshes of *Scirpus littoralis*, *Scirpus maritimus* and *Sporobulus robustus* (partly with small *Typha* islands), which are drying out completely in late winter (late January to mid-March); approximately 4,000 ha of grassy marshes SE of Tiguet are located outside of the National Park.
- The cultivated rice fields NE of Débi (c. 2,500 ha), in the northern part of the area.

An extremely valuable source of information is the detailed, excellent vegetation map of the whole area elaborated by SCHWÖPPE (1994) in the early 1990s. This map is still valid and was the major basis for the determination of bird trapping sites and for estimates of habitat area sizes.

The PNOD is of outstanding importance as breeding, resting and wintering site for water birds, especially (examples):

- >4,000 breeding pairs of Great White Pelican;
- >5,000 Black-crowned Night Herons,
- up to >20,000 Greater Flamingos, >4,000 Lesser Flamingos;
- >300,000 Garganeys, >30,000 White-faced Whistling Ducks;
- 0.5-1 million Ruffs, 20,000 Black-tailed Godwits.

These huge numbers of water birds and waders make the PNOD an attraction for c. 13,000 annual visitors, especially birdwatchers.

Designated a national bird sanctuary in 1971, the area was listed as a Ramsar site in 1977, and as a World Heritage Site by the UNESCO in 1981 (FALL *et al.* 2003). Direct negative influences affecting the habitats are alterations in the water management of the region (damming of the Senegal river for fresh water storage and irrigation purposes), water pollution by nearby agriculture and the conversion of grass swamps into rice and sugar cane plantations. In addition, the park is threatened by the southward advance of the Sahara, which is possibly enhanced by climate change and potentially limiting the water supply for the national park in the future. The National Park administration is convinced that priority conservation actions should be the identification and thorough description of Aquatic Warbler habitats, including seasonal movements and diet. Unfortunately, neither funds nor sufficiently educated staff is available at present to realise these urgent tasks.

**Plate 16:** Resting ducks and flamingos at Grand Lac, Djoudj NP [WM]

# 6. The Trapping sites (for details see annex I)

The strategy was to sample by intensive mist-netting and cage-trapping all vegetation types that could be inhabited by AW. During the first days, trapping sites were chosen by suitability assessment of areas visible from the main roads in the PNOD, and by advice from the PNOD ornithologist Indega Bindia. In the second stage, the large *Typha australis* stands along the Senegal river (Diama fresh water reservoir) were sampled, from where Dutch ornithologists had reported singing AW in late winter. Later, trapping sites were selected after extensive exploration trips of small explorer teams in the wider surroundings.

- TS 1 (near Djoudj-Marigot/barrage) was visible from the main road. It was a *Scirpus* marsh with rather deep water, ponds and nearby small woods, trees and bushes ('B7', 'B2' and 'W2' in the vegetation map). Vegetation structure was rather similar to some breeding and stopover sites, although rather high and very wet.

- TS 2 (Mirador Tantal) was chosen, because it was thought to have a bottleneck function, so that migrating birds might concentrate here. It was a rather narrow *Scirpus* belt (partly with deep water) between Lake Tantal and the adjacent semi-desert (steep gradient from 'B3' = wet to 'B5/B8' = dry in the vegetation map). The mist net fence was established from the dry bushes in the south (at the Mirador Tantal) to the open water of the lake. Here, also cage traps were used (= TS 2AT).

**Plate 17:** Example of a trapping-site: mist-net fence S of Tiguet (TS 10A) – wide, open *Scirpus* marsh with small *Typha* islands and some Tamarix bushes [CM]

- TS 3 (Poste de Gainthe) was recommended by Indega Bindia, because British ornithologists caught two AW there in the early 1990s. It was a dry, relatively wide *Scirpus* marsh with scattered Tamarix bushes and acacia trees. It represents the driest and most woody habitat of all trapping sites ('B8' in the vegetation map).

- TS 4-7 and 15 consisted of very dense *Typha australis* stands of various heights in deep water ('B9' in the vegetation map). Theses sites were assessed as unsuitable for AW, because the lowest vegetation layer was very light and almost without litter layer near the water surface. Despite this evaluation, intensive mist-netting and cage-trapping (TS 6T) was performed in order to proof the reporting by Dutch ornithologists of singing AW in that habitat type. According to vegetation map and satellite images, this habitat type covers more than 120 km² within the artificially flooded freshwater reservoir along the Senegal river.

- TS 8, 10-12 (near Tiguet and Diadiem II) were discovered during exploration trips on 22nd –24th January and are represented by wide, open *Scirpus/Sporobulus* marshes with shallow water and scattered small Typha islands (very few bushes; vegetation type 'B7' and 'B6'). Theses habitats were spontaneously recognised as suitable for AW and became focus of mist-netting activities. During the last week of expedition also cage traps were used. – Towards the end of the study period, the area became increasingly dry; water table sank rapidly.

- TS 9, 13 and 14 (N Grand Lac, Mirador President) were also discovered on 23rd January and spontaneously recognised as suitable for AW. After capturing the first AW at TS 9A, this area became the second focus of ringing work. The habitat type is rather similar to the previous near Tiguet and Diadiem II, but more open, more wet, with much more ponds and mostly without *Typha* islands (type 'B5' and 'B6'). Towards the end of the study period, the area dried up rapidly. Wet habitats became increasingly concentrated at the lakeshores.

After exploring large areas N, NE and W of the Grand Lac and S of Tiguet, analyses of vegetation map and satellite images, we estimate the total area of suitable *Scirpus* marshes similar to TS 8-14 at 130 km² at the Senegalese side (left hand) of the river. At the Mauritanian side, 80-100 km² more could occur (to be checked in follow-up expeditions). In the vegetation map (SCHWÖPPE 1994), these habitats are indicated as B5, B6 and B7. In late January, we estimated that c. 100 km² were still flooded with shallow water, 30 km² were dry. Around the 8th February, the proportions might have been vice versa.

*For details of habitat description see Annex I.1 and photo documentation Annex I.3. For location see maps in annex I.4.*

**Table 3:** Trapping sites and trapping effort.

| site no. | site name | habitat characteristics | coordinates | first day | last day | number of days | hours (total) | maximum length of mist nets (m) | use of mobile nets | total effort units (100 m net/8 h) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| **1** | Near Barrage | wet Scirpus with ponds + bushes/trees | 16.24.174 N, 16.17.421 W | 20.01. | 21.01. | 2 | 15 | 180 | no | **2.66** |
| **2A** | Lake Tantal | Scirpus at lake shore, deep water, bushes | 16.23.575 N, 16.16.325 W | 20.01. | 05.02. | 7 | 39 | 84 | partly (3./5.2.) | **3.08** |
| **2B** | Tantal - new site | Scirpus at lake shore, deep water, bushes | no data, close to 2A | 06.02. | 08.02. | 3 | 15 | 60 | no | **1.06** |
| **3** | Poste de Gainthe | dry Scirpus with bushes | 16.40.408 N, 16.26.125 W | 20.01. | 22.01. | 3 | 15.5 | 222 | no | **3.83** |
| **4** | Typha 1 | low Typha, very deep water | 16.25.192 N, 16.18.121 W | 22.01. | 24.01. | 3 | 16.5 | 108 | no | **2.06** |
| **5** | Typha 2 | rather low Typha, deep water | 16.25.379 N, 16.18.097 W | 21.01. | 24.01. | 4 | 19.3 | 120 | no | **2.48** |
| **6** | Typha 3 | high and dense Typha, deep water | 16.26.043 N, 16.18.043 W | 22.01. | 24.01. | 3 | 11.2 | 72 | no | **1.01** |
| **7** | Typha 4 | high and dense Typha | 16.26.094 N, 16.18.032 W | 23.01. | 24.01. | 2 | 10.3 | 84 | no | **1.08** |
| **8** | Tiguet 1 | Sporobulus, very dense, wet | 16.26.459 N, 16.17.276 W | 24.01. | 26.01. | 3 | 12.5 | 336 | no | **5.01** |
| **9A** | Mirador President 1 | Scirpus/Sporobulus moist/dry, partly water | 16.25.192 N, 16.10.481 W | 24.01. | 27.01. | 4 | 19.3 | 168 | no | **3.87** |
| **9B** | Mirador President 2 | Scirpus/Sporobulus wet | 16.25.611 N, 16.11.027 W | 24.01. | 27.01. | 4 | 19.3 | 150 | no | **3.53** |
| **9C** | Mirador President 3 | Scirpus/Sporobulus, deep water | 16.25.215 N, 16.11.006 W | 27.01. | 29.01. | 3 | 12.8 | 180 | no | **2.75** |
| **9D** | Mirador President 4 | Scirpus/Sporobulus, deep water | 16.25.894 N, 16.10.977 W | 27.01. | 29.01. | 3 | 13.1 | 160 | no | **2.62** |
| **10A** | Tiguet 2 | Scirpus/Sporobulus wet with Typha islands | 16.27.267 N, 16.16.563 W | 26.01. | 28.01. | 3 | 12.8 | 228 | no | **3.17** |
| **10B** | Tiguet 3 | Scirpus/Sporobulus wet with Typha islands | 16.27.090 N, 16.17.058 W | 26.01. | 07.02. | 9 | 37 | 72 | **yes, only** | **1.56** |
| **11** | E Tiguet | Scirpus/Sporobulus dense carpet, channel | 16.27.366 N, 16.14.577 W | 30.01. | 08.02. | 6 | 31.2 | 153 | no | **5.7** |
| **12A** | Diadiem II a | wet Scirpus/Sporobulus ponds, Typha islands | 16.28.304 N, 16.12.407 W | 30.01. | 05.02. | 4 | 14.3 | 168 | no | **2.64** |
| **12B** | Diadiem II b | wet Scirpus/Sporobulus ponds, Typha islands | 16.28.321 N, 16.12.340 W | 30.01. | 08.02. | 5 | 17.8 | 156 | yes, 1-3 nets | **2.91** |
| **13** | | wet Scirpus marsh | 16.26.037 N, 16.10.856 W | 06.02. | 08.02. | 3 | 14.5 | 180 | no | **3.26** |
| **14** | N Grand Lac | Scirpus/Sporobulus drying up | 16.26.124 N, 16.10.46 W | 03.02. | 03.02. | 1 | 3.5 | 48 | **yes, only** | **0,18** |
| **15** | Typha 5 near Biol. Station | Typha high & dense, wet, with Phragmites | 16.21.584 N, 16.16.267 W | 01.02. | 02.02. | 2 | 4.5 | 72 | no | **0,41** |
| | | | | | | | | | | |
| **21 sites** | | | | 20.01. | 08.02. | **77** | **354** | **3001** | | **54,87** |

# 7. Methods of investigation

### 7.1. Method of habitat description of trapping sites

The habitats around the mist net fences were recorded by means of a RSPB standard form for the description of IBAs. All descriptions were prepared by the same person (Zsolt Végváry) to minimise individual bias. The considered area encompassed a maximum distance of 50-75 m from the mist nets (according to our assessment the approximate main catchment area of the nets).

The relevant parameters recorded were (vegetation form and results see Annex I.1):

- Vegetated – unvegetated – mixed;
- Dominant layer: bare – forbs – grasses – shrubs – trees;
- State: green – senescent – dry – burnt;

- Water regime: terrestrial – regularly flooded – mixed;
- Water seasonality: flooded <4 months/year - >4 months/year - daily variations – permanent – waterlogged - unknown;
- Water quality: brackish – fresh – saline – unknown;

- Bare soil: rocks – salt hardpans – sands – stony – urban – gravel and sand;

- Tree cover: 0 % - 1-4% - 4-15% - 15-65% - >65%;
- Tree height: 3-7m – 7-14m - >14m – 3->14m;
- Leaf type: broadleaved – needleleaved – mixed – aphyllous – spiny;

- Shrub cover: 0 % - 1-4% - 4-15% - 15-65% - >65%;
- Shrub height: <0.5m – 0.5-3m – 3-5m;
- Leaf type: broadleaved – needleleaved – mixed – aphyllous – spiny - succulent;

- Forbs cover: 0 % - 1-4% - 4-15% - 15-65% - >65%;
- Forbs height: 0.03-0.3m – 0.3-0.8m – 0.8-3m – 0.03-3m;
- Forb leave type: broadleaved – needleleaved – mixed – aphyllous – spiny - unknown;
- Moss cover in %; lichen cover in %;

- Grass cover: 0 % - 1-4% - 4-15% - 15-65% - >65%;
- Grass height: 0.03-0.3m – 0.3-1m – 1-3m – 0.03-1m;
- Grass phenology: deciduous – evergreen – mixed – unknown;
- Grass texture: all flat – all tussocks (>75%) – mixed;

- Details on fire and burning (not relevant here);

- Agricultural cycle: annual – perennial – 2 crops/year;
- Agricultural water: rainfed – postfloodings – irrigated – unknown;
- Details on agricultural pattern and agriculture intensity (not relevant here)

### 7.2. Mist-netting

Main objective of mist-netting was to test presence or absence of AW and to catch/ investigate/ring as many AW as possible. All other European birds were also measured and ringed. African species were identified and roughly counted, but not ringed.

**Catching intensity, mist-netting units**

Main method used was to establish long mist net fences of mostly 72-336 m total length in order to get a complete sample of the studied habitat type. Main catching period were the morning hours (sunrise to noon) and 2-3 hours before and maximum 1 hour after sunset. During noon and early afternoon the nets were kept closed. A total duration of 8 hours (5 at morning, 3 at afternoon/evening) was regarded as a full catching day. Mist-netting of 8 h duration and a net length of 100 m was defined as '**1 catching unit'**.

In total, a distance of 3,000 m at 21 trapping sites has been covered with mist nets, and a total effort of 354 hours with 55 catching units (100 m net/8 h) was spent (for details see Table 3; the catching effort per TS is shown at Fig. 1).

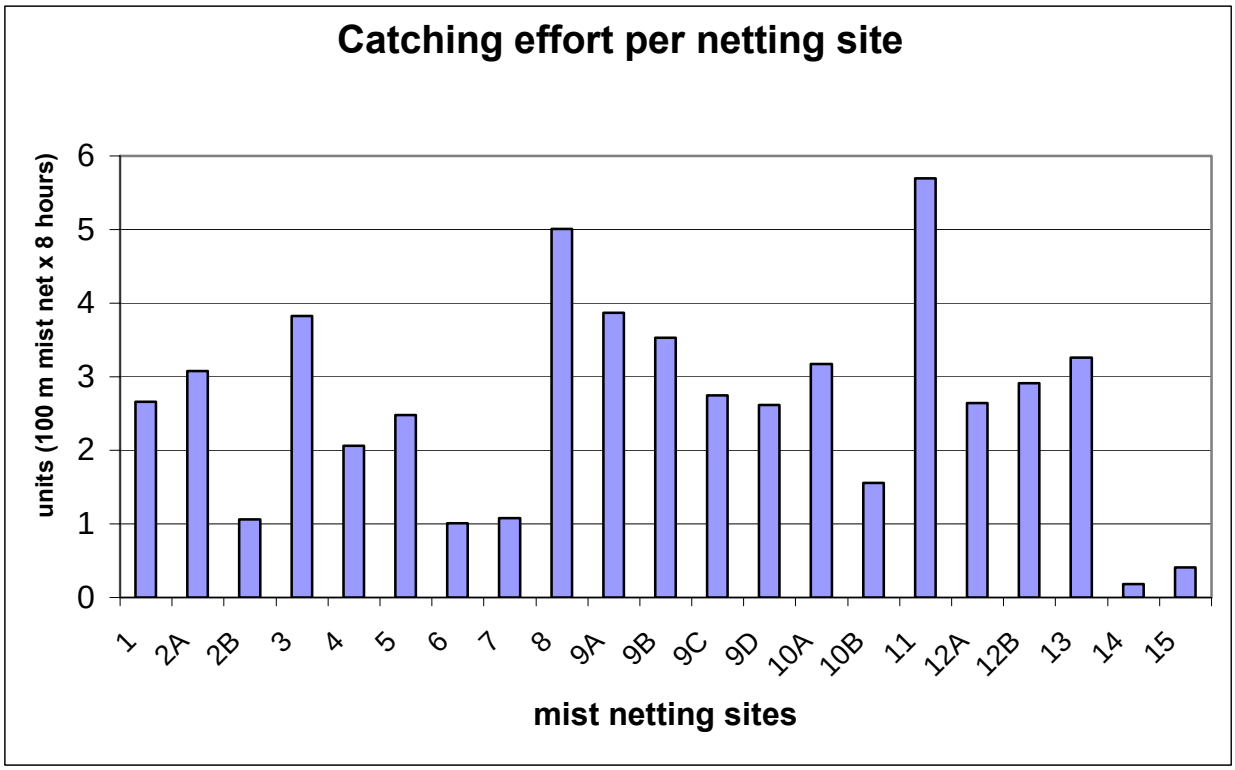


**Fig. 3:** Mist-netting effort per trapping site (TS).

**Tape lures**

During the first 10 days of fieldwork, tape lures with song recordings of AW were placed at most of the nets. Since no effect was observed, this practice was then dropped. Later, experimental netting with tape lures with alarm calls ("tchack –tchack –tchack – trerrr") was performed at TS 12B.

**Rope method**

In order to estimate the density of birds, especially AW, in the grass marshes, we started to pull a long rope over a defined area of 1 + 1 ha. A rope of 135 m length was placed in parallel to a mist-net fence (length 150-180 m) at a distance of 75 m, and then pulled by 4-6 people over the vegetation towards the net, covering an area of 1 ha. This was performed from both sides of the net (1 + 1 ha) and only at suitable weather conditions (weak or no wind) at morning or evening. That way, at least the Passerine birds (especially warblers like Grasshopper, Sedge and Aquatic Warbler, and Winding and Zitting Cisticolas) were chased into the mist-net. Only very few birds passed the net fence, nearly all have been captured.

**Plate 18:** Pulling a 135 m rope towards the mist net at TS 9C [LL].

**Mobile nets**

At one site (TS 10) S of Tiguet AW occurred at such a high density, that they were conspicuous through alarm calls, high activity (sitting at visible positions on high stems, flying) and even short song elements. Under these special conditions, another mist-netting technique was performed: birds were chased into single mobile nets, or a single net was placed at an observed bird or a single net was placed between small *Typha* islands or across a narrow *Typha* strip, and then birds were regularly chased towards the net (Plate 18). The AW often flew off firstly in the grassy vegetation and moved into the *Typha* strips. There they were chased along the strip into the net. This was a very efficient method to catch many AW. It was exclusively used at TS 10B, 14, and additionally used at TS 2A and 12B. At TS 10B, 34 AW have been caught with mobile nets within a total area of c. 20 hectares (up to 6 AW in one net at one morning). The disadvantage is, that results achieved with mobile nets cannot be standardised and thus not compared with fixed net fences of a defined length.

**Plate 19:** Working with a mobile net at TS 10B [KS].

### 7.3. Cage traps

Fifteen cage traps were used at 6 trapping sites in order to catch bird moving at the ground. The idea was, that AW might be not so flight active in the wintering grounds, especially when they are moulting the primaries. According to experience from European breeding and stop-over sites, other *Locustella* and *Acrcocephalus* Warblers as well as Wagtails and Bluethroats can easily be captured with cage traps.

The 15 traps were distributed along a path in parallel to the mist net (at a distance of 50-100 m) or apart from the mist nets (TS 2T and 6T), but in the same habitat type, forming a loop. The traps were positioned on small mud banks near water (Plate 20), or at the water surface on swimming platforms build from *Scirpus, Typha* and other plant material (Plate 21). Swimming platforms were covered with rotten submerse plant material if possible. Mealworms were fixed at the contact wire as bait.

Birds captured in cage traps were counted separately and data were analysed in a separate data set.

**Plate 20:** Establishing a cage trap on muddy ground [VF].

**Plate 21:** Cage trap in operation on a swimming platform in deep water [VF].

### 7.4. Exploration walks, GPS use

A small group of people (mainly Zsolt Végváry and Lars Lachmann) performed long systematic exploration walks to assess habitat quality and water level of as large as possible areas. They especially checked the borderlines of suitable habitats and took GPS coordinates of the margins. This was done in order to compare these data with the vegetation map from SCHWÖPPE (1994) and to estimate the area size of suitable AW habitat. Additionally, from all TS the GPS coordinates were taken.

### 7.5. Sampling for stable isotopes (feathers), DNA (blood) and Strontium studies

From all captured AW and Winding Cisticolas, a fresh tail feather was taken, to compare the stable isotopes proportions with those from different breeding populations (AW) and other African sampling areas (Winding Cisticola, which was taken as surrogate species to narrow down the AW wintering area). That way it should be possible to connect the AW wintering in the Djoudj area with certain breeding populations. The RSPB Research Unit has offered to perform the stable isotope analyses.

From all captured AW blood samples for DNA analyses were taken. Since we have detailed study on the genetic variation of nearly all AW breeding populations (GIEßING 2002) it will most likely be possible to link the AW captured in Djoudj with one or more of the breeding populations. Benedikt Gießing has offered to perform the DNA analysis.

For the same purpose, several items (bones, snail shells etc.) were taken by Lars Lachmann for Strontium analyses.

**Plate 22:** Julio Manuel Neto taking a blood sample from AW wing vein [GG].

**Plate 23:** What remains after AW release: ringing form with AW data, small tube with blood sample and plastic bag with feather sample [WM].

### 7.6. Analyses of catching and ringing data

Ringing data were instantly typed into a digital form of the French ringing database. This was done by Gaetan Guyot and Bruno Bargain at Djoudj Biological Station using a laptop. Ringing data were submitted as xls file immediately after finish of the expedition. If possible, captures were calculated not only for trapping sites, but also for standardised catching units (100 m net/8 h). For more detailed data analysis (cluster analyses, principal component and canonical correspondence analyses) the Multi-Variate Statistical Package MVSP 3.1 was used.

### 7.7. Satellite image analysis

Habitat descriptions and coordinates were taken as a basis for satellite images, which was performed by Graeme Buchanan (RSPB) and Andrew Nelson (Institute for Environment and Sustainability, Joint Research Centre of the European Commission). The full report with description of methods of analyses and results is presented as Annex VII.

# 8. Training and education

Senegal has no own ringing centre and no bird ringing schemes yet. Ringing work was mainly performed by foreigners and was focused on waders in the past years. According to Director Ibrahima Diop, the PNOD administration has a strong interest to establish a permanent ringing scheme on Passerine birds in Djoudj. From the AWCT side it would be welcomed, if Senegalese ornithologists could continue the studies on AW independently in a medium term.

Thus, an important objective of the expedition was to train Senegalese and Mauritanian ornithologists and national park rangers in catching, ringing and measuring passerine birds, and in identification of AW and similar species. Sixteen Senegalese colleagues permanently joined the expedition and were trained in mist-netting, cage-trapping, identification, ageing and sexing of European migrants, taking measurements (wing, body weight, fat score, moult etc.), ringing and related items. The Senegalese colleagues not only brought strong interest and enthusiasm, but also learned very quickly. The intensive joint work in the field was also an ideal tool to improve mutual understanding and exchange on information among experts of AW breeding, migration and wintering sites.




**Plate 24-27:** Impressions from training and education in bird ringing [ZP, VF, WM, VF]

# 9. Results

## 9.1. Mist-netting

### 9.1.1. Aquatic Warbler

Aquatic Warblers were only found in the large, open *Scirpus* and *Sporobulus* grass marshes of vegetation type B5, B6, and B7 (TS 9A-D, 10A-B, 11, 12A-B) (Fig. 4). They were absent in dry grass marshes with bushes and trees (TS 3), in the narrow Scirpus belt at the lake shore (TS 2, Lake Tantal), in the wet and half-open habitat near Barrage (TS 1) and especially in all high *Typha* habitats (TS 4-7, 15) (Fig. 4).

In total, 56 AW were captured and measurements, feathers and DNA samples were taken; 55 AW have been ringed, one was a control of a bird with Spanish ring. Within such open and wet grass marshes, AW were caught at all trapping sites but one (TS 13). Their occurrence was restricted to water-logged areas. At the standard mist-netting sites (stable net fence without mobile net), 1-5 AW per trapping site were captured (see Annex III.1). Higher numbers have been only achieved with use of mobile nets: 6 AW at TS 12 B (additional use of a mobile net) and 34 AW at TS 10B (exclusively use of mobile nets). The exceptional high result of TS 10 B was only possible, because AW were present at a very high density. Birds were visible and audible there (alarm calls and song fragments), especially in the small cattail islands. The mobile mist-nets could be established very targeted to maximise netting success.

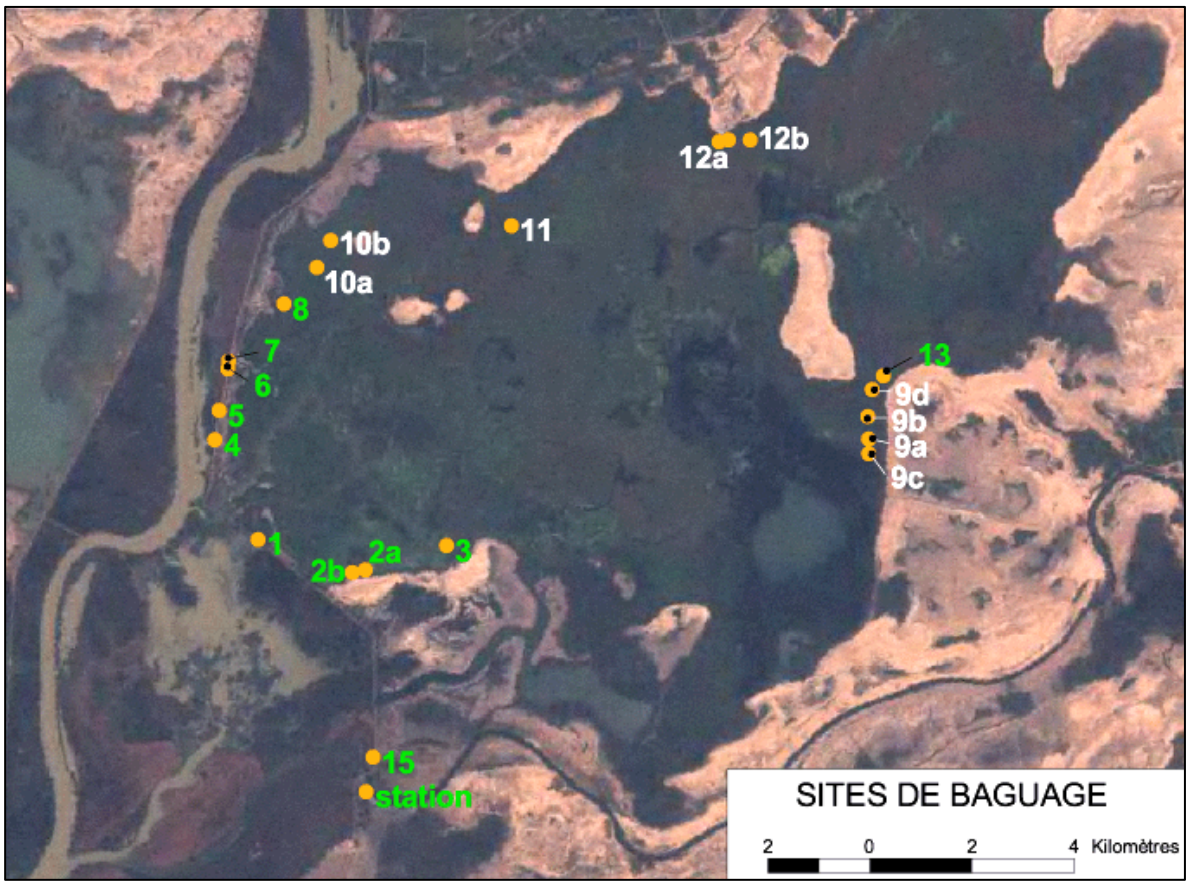


**Fig. 4:** Trapping sites. For TS were AW have been captured, numbers are white, the others in green (from BARGAIN & GUYOT 2007)

**Tape lures**

We used tape lures of AW song at nearly all TS, but could not observe any effects. There was no AW caught very close to a tape lure, which would indicate a bait effect. On the Basis of this experience, G. Guyot prepared a tape lure with alarm calls only ("tchack – tchack – tchack"; "trerrr"). At TS 12A and B we tested the tape lure on 1st February at morning. Both mist-net fences were established in the same habitat type at a distance of 200-500 m. At 12A we used a tape lure with song, at 12B the new tape lure with alarm calls. At TS 12A, two AW were captured apart from the tape lure, at 12B two birds were captured directly beside the tape lure with alarm calls. We conclude that a tape with alarm calls most likely has a positive effect in luring the birds.

**Rope method**

The use of the 'rope method' (description see chapter 7.2) seems to be successful, because we had the feeling that under optimal weather conditions (no wind) almost all warblers in the area of 1 + 1 ha flew into the mist net fence, and only very few birds succeeded in passing without being captured. Evidence for the reliability of the method was that we recaptured several birds that were previously ringed in the same area. Based the assumption that we did not omit birds and that our TS were representative for this habitat type, we conclude that the mean density of AW in the *Scirpus* grass marshes is 0.5-1.0 (-1.5) birds per hectare (1-3 per 2 hectares, see Annex III.1). Exceptionally, the abundance might be more than 10 birds/ha (TS 10B near Tiguet).

**Mobile net**

The targeted catching of AW with mobile nets in habitats where AW occur at a high density was very effective in order to capture and measure as many birds as possible, to get a high number of feather and DNA samples, and to try to get controls of ringend birds. The disadvantage is that density values can not be derived at all, because there is no possibility of standardisation.

### 9.1.2. General mist-netting results

In total, 1,963 birds of 22 European species wintering in the Djoudj area were captured in mist nets – 1,938 birds ringed and 25 ring recoveries. Dominant European species were Sedge Warbler (859), Yellow Wagtail (493), Chiffchaff (204), and Reed Warbler (105), followed by Bluethroat (62) and Aquatic Warbler (56) (see Annex III.1). Among the controls, most birds came from France (9) and Great Britain (9), but also from Belgium, Spain and Iceland (Table 4). The most recaptures were from Sedge Warblers (17).

The number of captures of African bird species is estimated at twice as high (c. 4,000). But since African birds have not been ringed, this figure can only be a rough guess. Among the 32 African species captured, the weaver species (Red-billed Quelea, Black-headed Weaver, Yellow-crowned Bishop) were the most numerous (more than 50 % of all African birds) but also Winding Cisticola and Zitting Cisticola were fairly common.

The number of species per mist-netting site was mostly between 8 and 26, two thirds of the species were African (see Fig. 5). The highest species numbers were observed at the lakeshore

('bottleneck') trapping sites at Lake Tantal (TS 2A+B) and in the dry *Scirpus* marsh with bushes at Poste de Gainthe (TS 3) (Fig. 5).

| Species \ Origin of ring | France | Great Britain | Belgium | Spain | Iceland | subtotal |
|---|---|---|---|---|---|---|
| *Acrocephalus schoenobaenus* | 8 | 6 | 3 | | | **17** |
| *Acrocephalus scirpaceus* | 1 | | | 1 | | **2** |
| *Riparia riparia* | | | | 1 | | **1** |
| *Motacilla flava flava* | | 1 | | | | **1** |
| *Motacilla alba* | | | | | 1 | **1** |
| *Locustella naevia* | | 1 | | | | **1** |
| *Acrocephalus paludicola* | | | | 1 | | **1** |
| *Phylloscopus collybita* | | 1 | | | | **1** |
| **subtotal** | **9** | **9** | **3** | **3** | **1** | |
| | | | | | **total** | **25** |

**Table 4:** Foreign controls among the mist-netted birds

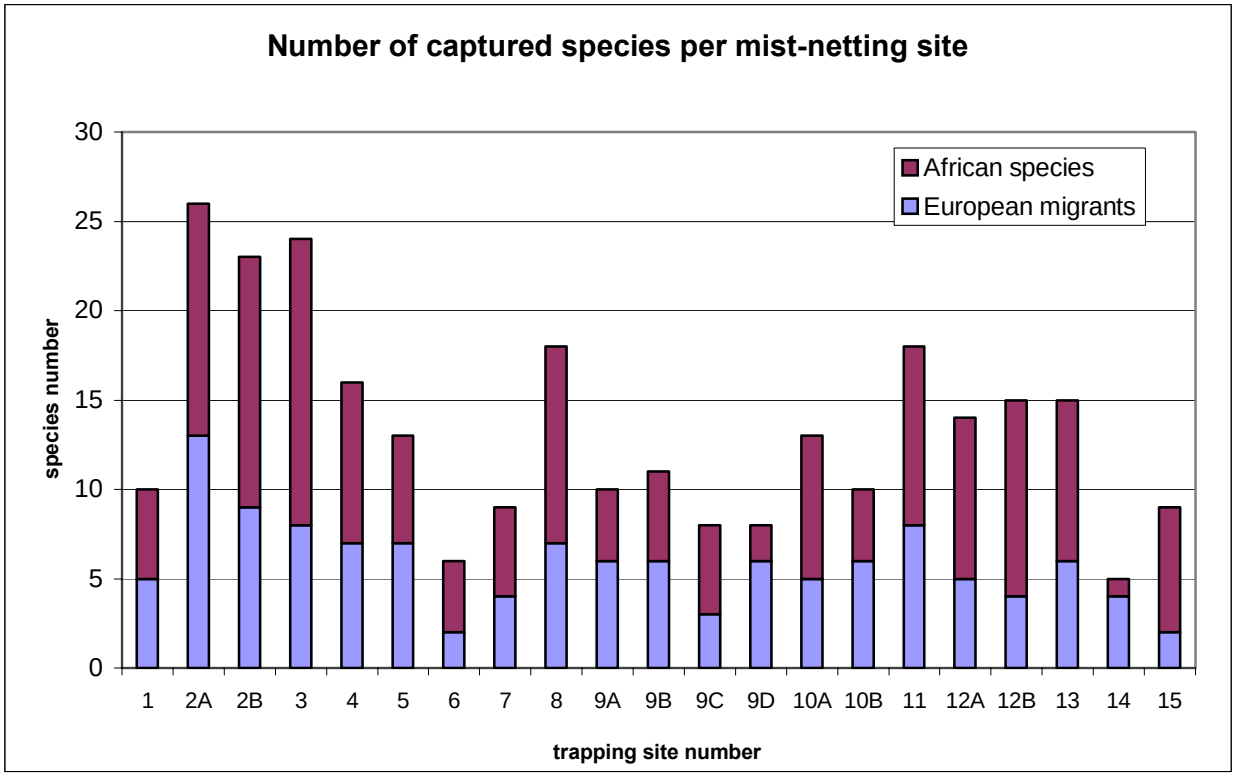


**Fig. 5:** Number of captured bird species at the 21 trapping sites

The density of European birds was different: excluding the captures in mobile nets (TS 10B and 14), the highest numbers of captures per mist-netting unit (100 m net/8 h) occurred also at the lake shore habitat (TS2A+B), but were lowest in the dry *Scirpus* marsh of TS 3 (Fig. 6). In the open, wet grass marshes with occurrence of Aquatic Warbler (TS 8-13) the density of birds was the lowest (around 20 European birds per mist-neting unit), and was even higher in the *Typha* stands (TS 4-7, 15) (Fig. 6).

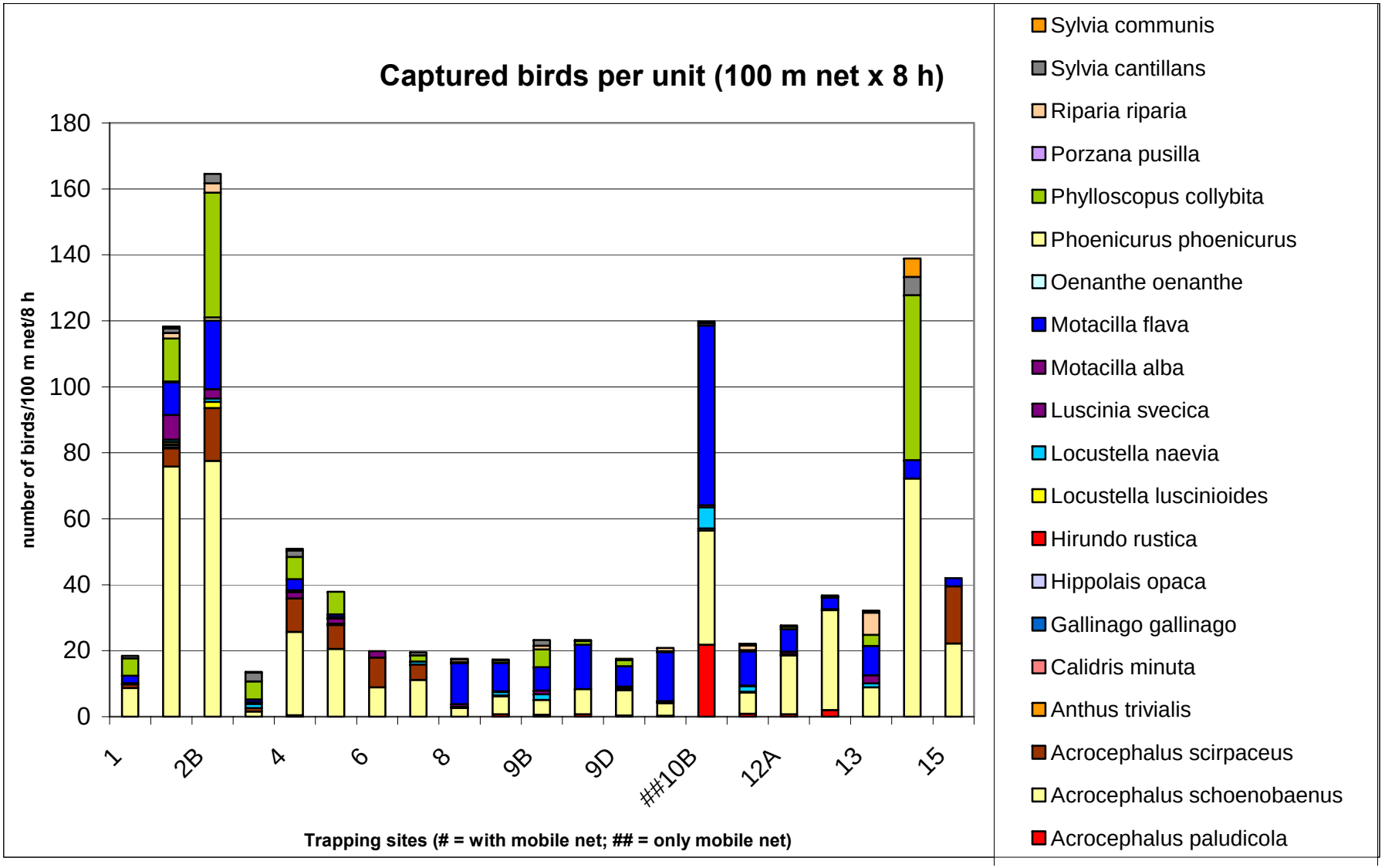


**Fig. 6:** Captures of individuals of European bird species at the 21 trapping sites (n = 1,962), calculated per mist-netting unit (100 m/8 h).

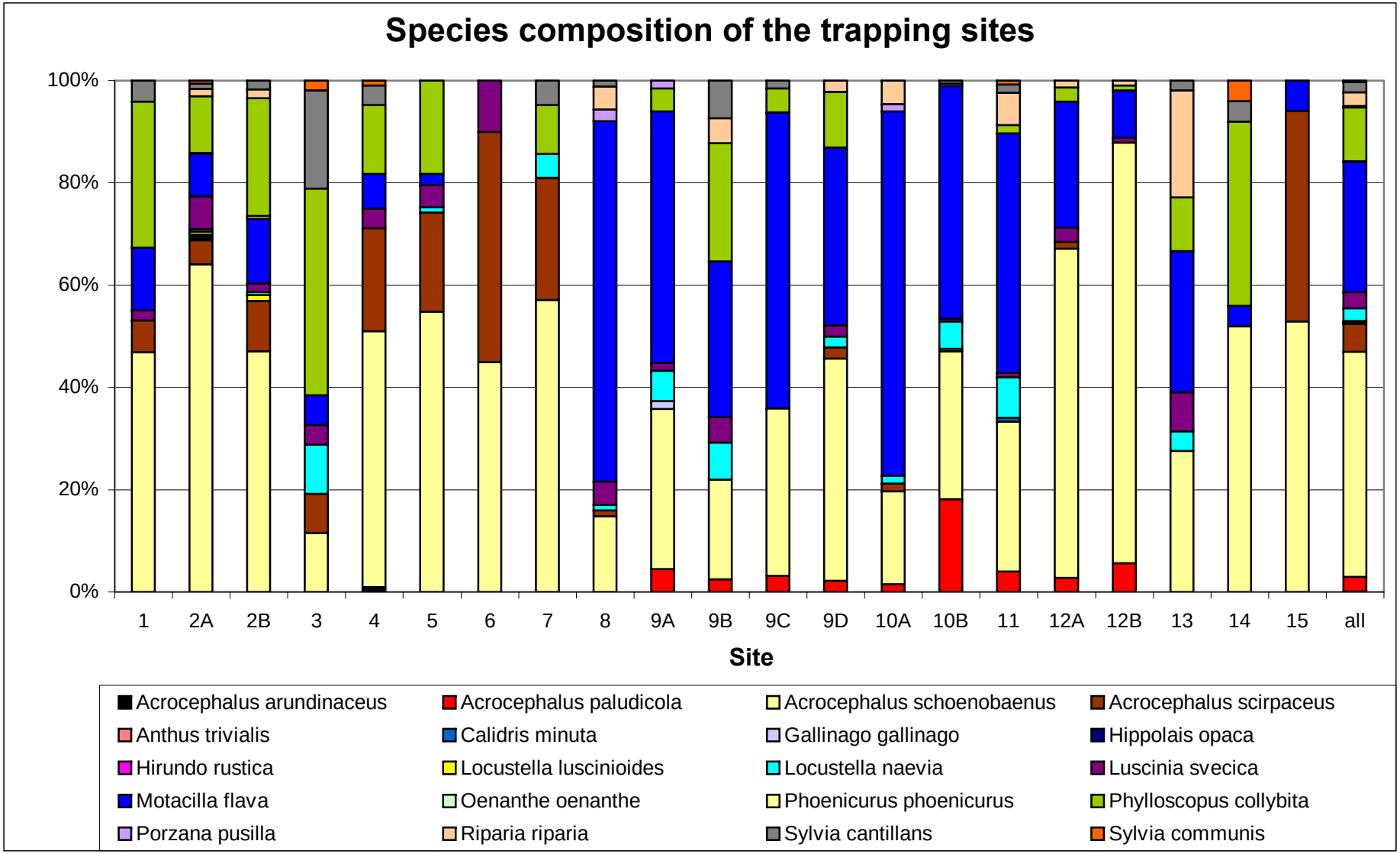


**Fig. 7:** Percentage of individuals per European bird species at the 21 trapping sites (n = 1,938 ringings + 24 first foreign controls)

### 9.1.3. Habitat types and European wintering bird communities

The occurring habitat types of grassy marshes were clearly characterised by specific bird assemblages of wintering European species. Regarding the proportions of individuals per species at the different trapping sites (Fig. 7), the Typha (TS 4-7, 15) and lake shore habitats (TS 2A,B) are characterised by a relatively high proportion of European Reed Warbler, which is almost absent in the low *Scirpus* grass marshes. Sedge Warbler occurs also at a fairly high density. Including the cage-trapping results, also the Little Crake is typical for these cattail stands. Among the African species, Black Crake and African Reed Warbler are most typical for cattail stands.

The *Scirpus*/*Sporobulus* grass marshes are marked by a high proportion of Yellow Wagtails, being the dominant species together with Sedge Warbler, and the regular occurrence of Aquatic Warbler and Grasshopper Warbler. This species set is also associated with the abundant occurrence of Common Snipe and Baillon's Crake (see cage traps, Chapter 9.2.). In the same habitat type, also numerous herons, waders (Wood Sandpiper!), and especially the European Bittern were requently seen (see 9.3.). The number of Sand Martins foraging over the grass marshes at grand Lac was estimated at two millions (9.3.). Among the African passerine species, Winding and Zitting Cisticolas are most characteristic.

The dry and bushy *Scirpus* marsh (TS 3) is characterised by a high evenness of European species (Fig. 7) with a relatively high proportion of Chiffchaff, Subalpine Warbler and Grasshopper Warbler. - It is astonishing, that Chiffchaff and Sedge Warbler occur in all habitat types and at (nearly) all trapping sites. Chiffchaffs, as well as Subalpine Warblers, were even caught within the monotonous open wet *Scirpus* marshes without any bushes.

A cluster analysis (Pearson coefficient) of trapping sites according to the captures of European species shows all open wet *Scirpus* grass marshes grouped together and clearly separated from all other habitats (Fig. 8). The dry *Scirpus* with bushes (TS 3) is also clearly separated from all wet habitats. *Typha* stands, lake shore habitats and the very wet *Scirpus* marsh with ponds and bushes (TS 1) were merged in the cluster analysis (Fig. 8). A principal component analysis (Fig. 10) groups the wet open *Scirpus/Sporobulus* marshes together and clearly apart from the *Typha* marshes. The wet and dry *Scirpus* marshes with bushes are located between, and the lakeshore habitat is isolated.

Clustering the European species according to their occurrence at the trapping sites (Fig. 9), there is a small group of three characteristic species clearly separated at the top: Aquatic Warbler, Baillon's Crake and Common Snipe. At the next level, they are grouped with Yellow Wagtail, Sand Martin, Grasshopper Warbler, and Little Stint (but only 1 bird captured).

Putting the bird captures data in a canonical correspondence analysis (Fig. 11) together with habitat variables (see Annex I.1.), the Aquatic Warbler is in the centre of a small species group together with Baillon's Crake, Common Snipe, Sand Martin and Yellow Wagtail, and this habitat is characterised by a high coverage of *Scirpus littoralis* and *Sporobulus robustus* along with moderate salinity. In contrast, the European Reed Warbler is isolated and associated with *Phragmites* and *Typha*, and the Great Reed Warbler is associated with a high water level and high coverage of *Typha* (Fig.11).

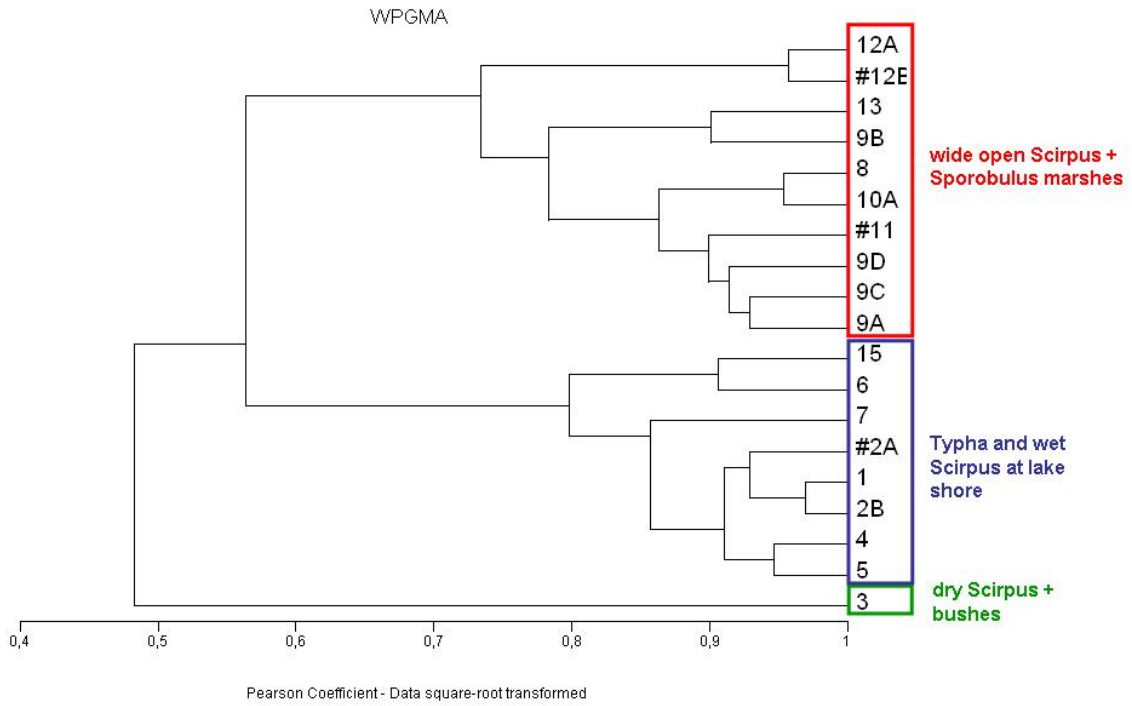


**Fig. 8:** Cluster analysis (Pearson Coefficient) of trapping sites according to captures of European species (number of birds per unit); # = incl. use of a mobile net.

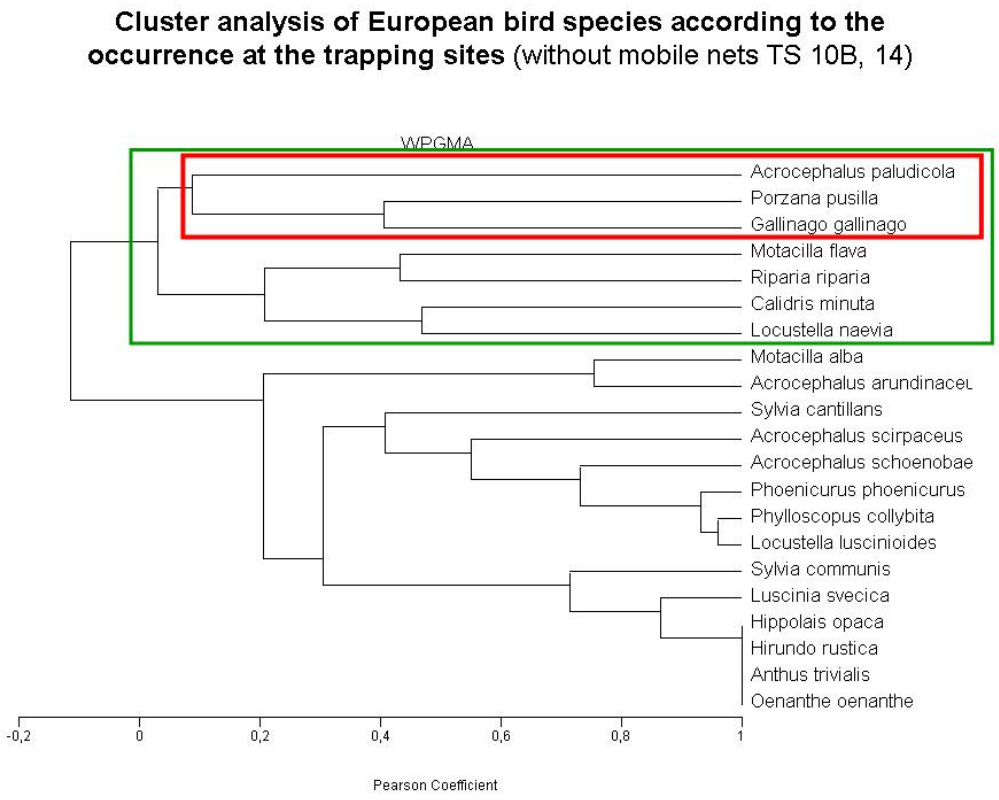


**Fig. 9:** Cluster analysis of European bird species according to the occurrence at the trapping sites (Pearson Coefficient).

**Prinipal Component Analysis: trapping sites according to captures of European bird species** (without sites with mobile nets TS 10B, 11, 12B, 14)

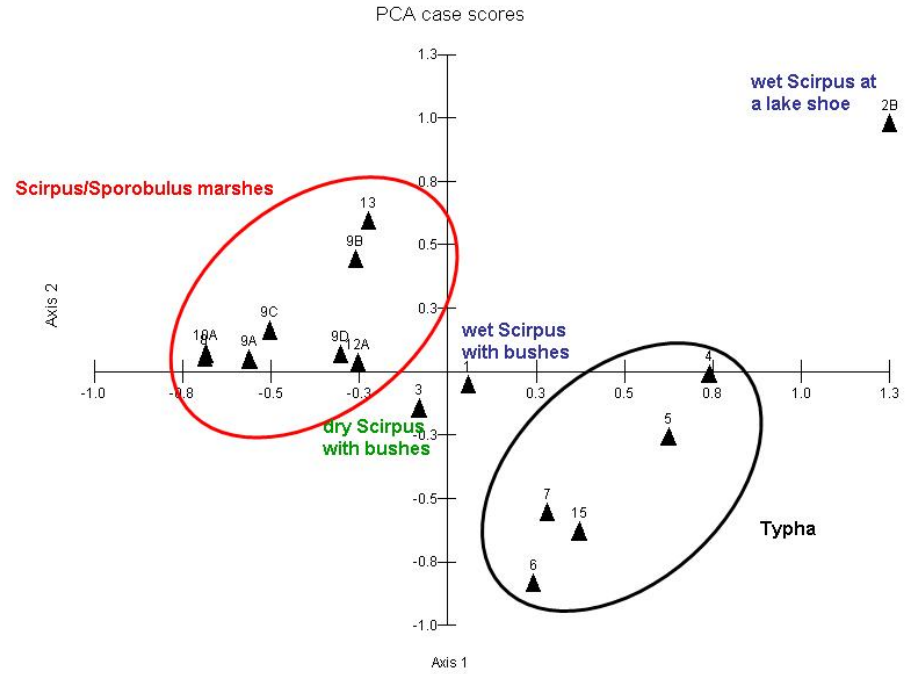


**Fig. 10:** Principal component analysis of trapping sites according to bird captures.

**Canonical Correspondence Analysis: European species according to captures at the trapping sites, and habitat variables (= vectors)**
(without sites with mobile nets TS 10B, 11, 12B, 14)

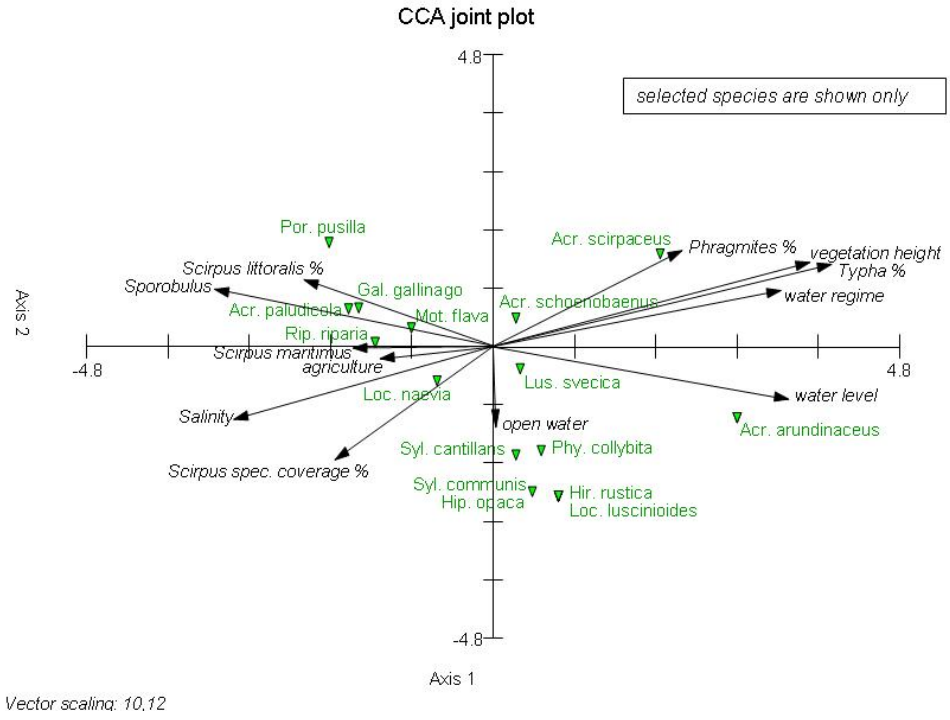


**Fig. 11:** Canonical correspondence analyses: European species and habitat variables

## 9.2. Cage traps

At the six cage-trapping sites, in total 75 individuals of nine European species were captured (Annex III.3, Fig. 12). Among the Afican species, Black Crake and Painted Snipe were most frequent; at TS 13T, also two Button Quails were caught (Annex III.2).

There is a clear difference between *Scirpus/Sporobulus* and *Typha habitats*: the wet *Scirpus* habitats are characterised by regular occurrence of Baillon's Crake (present in all the five TS) and high numbers of Yellow Wagtails. In contrast, the *Typha* habitat (TS 6T) has only few species at low densities, and is charcterised by the occurrence of Little Crake (the Little Crake at TS 12T was also captured in a dense and high *Typha* island). There was no difference between the wet, narrow *Scirpus* habitat at the lakeshore and the large open *Scirpus* marshes in the cage-trapping results (in contrast to mist-nets). The difference in habitat choice of Baillion's and Little Crake is similar to that of Aquatic Warbler and Great Reed Warbler.

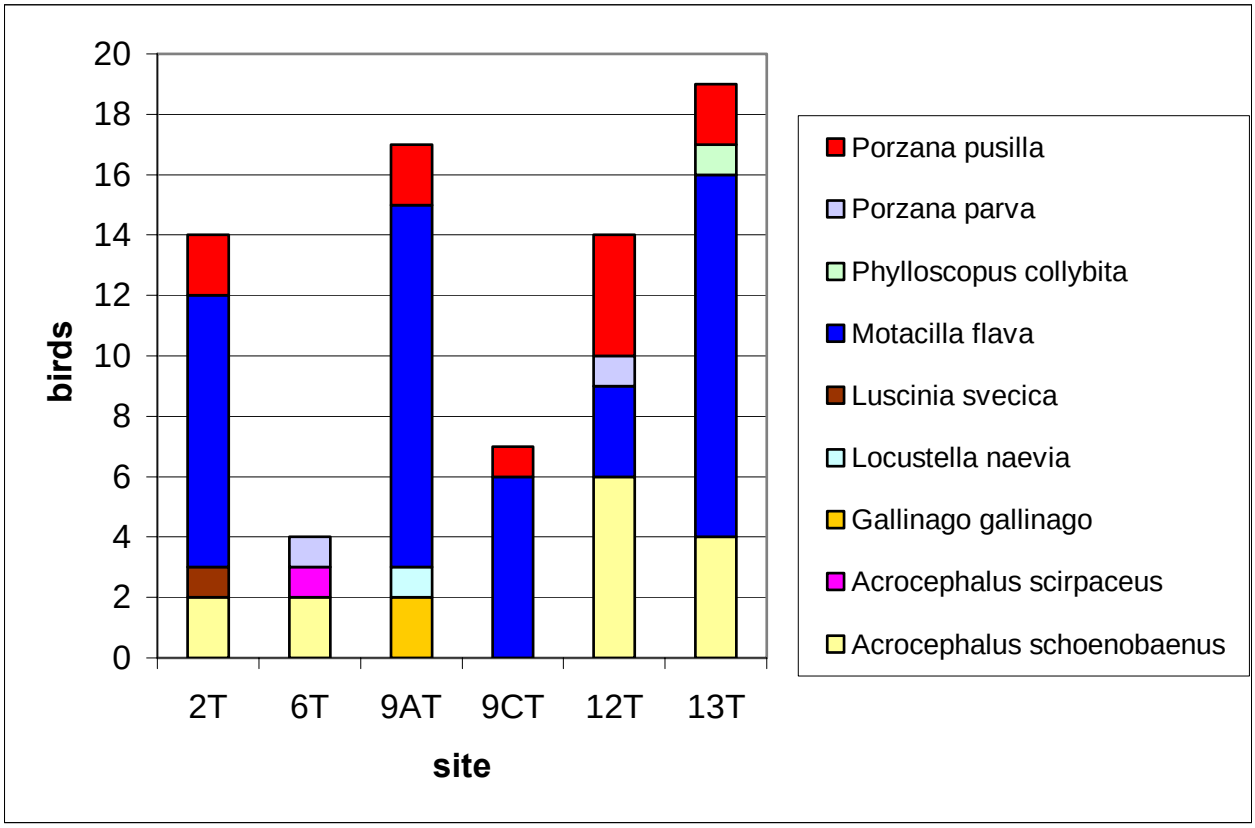


**Fig. 12:** Captures of European bird species in cage traps of the six cage-trapping sites (n = 75 first captures).

**Baillon's Crake**: the regular occurrence in the wet *Scirpus/Sprorobulus* marshes is a novum. Since these habitats are dry from February or March to July it is unlikely that the species is breeding in Djoudj. Presumably, these Baillon's Crakes origin from European breeding grounds, most likely from Spain (Spain holds 3,000-5,000 breeding paris, that is >70 % of the total European breeding population; BIJLSMA 1997). The measurements taken in Djoudj (wing, culmen, tarsus, weight) were rather diverse and below as well as above the range given in FEINDT & BECKER (1973); they allow no conclusion concerning subspecies or origin. Assuming, that Baillon's Crake occurs at a density of not less than 1 bird per hectare (captures of 1-4 birds per TS with 15 traps) and a total area of suitable (wet) *Scirpus* marshes of 15,000-

20,000 hectares in the Senegal delta (Senegal and Mauritania), the whole European or at least the whole Spanish breeding population could overwinter here.

A new and most interesting result was that 4 out of the 16 captured Baillon's Crakes were still unmoulted in immature plumage (see Annex III.4., column 'age': 2A). Up to now it was fairly unknown whether young Baillon's Crakes could also moult in the wintering sites. According to FEINDT & BECKER (1973), the post-juvenile moult can start in August in the breeding sites, but sometimes only in the wintering quarters, but according to NOLL (1917, 1924, studies in aviaries) not later than between Christmas and mid-January. However, four of our immature birds were still unmoulted in late January!

We expected also the regular occurrence of Spotted Crake *Porzana porzana* in the *Scirpus* grass marshes, but that was not the case. We therefore assume that the wintering sites of the Spotted Crake are located more in the south of West Africa.

Aquatic Warblers were not captured in cage traps. The density is too low, even in optimal grass marshes, so that the likelihood to capture it in a small number of cage traps is too low.

## 9.3. Field observations

In total, 271 bird species have been recorded by at least two participants; three more species (Grasshopper Buzzard, Black-winged Pratincole, Heuglin's Wheatear) were only observed by single persons (details see Annex IV.1.).

The huge numbers of wintering waterbirds (e.g. 450,000 ducks), flamingos (>20,000 Greater, >4,000 Lesser Flamingos) and waders at Grand Lac and surrounding smaller lakes are wellknown (RODWELL et al. 1996, WOIKE 2001, FALL et al. 2003). Most important among the European species are **Garganey** (> 300,000)**, Pintail, Shoveler, Common Snipe, Black-tailed Godwit** (20,000), **Wood Sandpiper, Ruff** (>500,000) and **Little Stint**. Also very important are the relatively large numbers of **Black Storks** (>100 in the PNOD, own estimate), **Ospreys** (>50 in the PNOD, own estimate) and **Marsh Harrier**.

Along with the daily fieldwork a number of 'rare species' have been recorded. The classification as 'rare' refers to the paper of RODWELL et al. (1996): "An annotated check-list of birds occuring at the Parc National des Oiseaux du Djoudj in Senegal, 1984-1994". This inventory might be more or less out of date, and some of these species may be rather data deficient than rare. We give more detailed information on these species in Annex IV.1. and below. The status in brackets refers to RODWELL et al. (1996).

**Eurasian Bittern *Botaurus stellaris*** (one record):
The Bittern obviously was abundant in the wet grassy marshes around Grand Lac. It was observed there at the many shallow ponds and was flushed off several times (up to 4 birds together near Mirador President) during exploration walks and ringing work. There must be Tens or even Hundreds wintering in the whole area.

**Swallow-tailed Kite *Chelictinia riocourii*** (9 records):
Was regularly seen foraging (also two birds together) on the pastoral land along the *Scirpus* marshes near Tiguet-Débi and also near Diadiem II (3 birds) and near Poste de Gainthe.
At least 34 birds together (photo!) were seen on 07/02/2007 near Diadiem II, resting in an *Acacia* tree.

**Rüppell's Griffon Vulture *Gyps rueppellii*** (2 records):
Two birds were seen soaring SE of Mirador President (TS 9C). Notes (from Martin Flade):
"28/01/2007 – during the late morning, two different immaturus birds appeared soaring SE Mirador President at Grand Lac, TS 9C (seen together with Oskars & Volker). The first we initially noticed through thousands of ducks and flamingos flying off from the nearby Grand Lac. The Vulture was first seen very low and then soaring higher and higher, coming directly over us for several times. We could see all characteristics of big vultures (distance only 100 m), but especially the light barrs on the dark underwings. The second bird occurred ca. 1 hour later in the same way, but it was clearly a different bird, because the underwing patterns were different (much broader and lighter barrs)."

**Bonelli's Eagle *Hieraaetus fasciatus*** (several records Djoudj, but very rare in Senegal elsewhere): Several seen flying over, see Annex IV.1.

**Grasshopper Buzzard** *Butastur rufipennis* (new to Djoudj):
01/02/2007 – one bird seen near Diadiem II by Klemens Steiof: "The bird was gliding. Narrow, long, and (in the primary region) pointed wings, long narrow tail. Large lighter patch in the primaries and outer secondaries (no colours seen in light against me), dark trailing edge of wing, no dark carpal patches. Torsten Ryslavy could still see the bird, but could not confirm the identification."

**Baillon's Crake** *Porzana pusilla* (new to Djoudj, two records from Richard-Toll):
Captured birds: see table and graphs. 16 birds caught:
Trapping sites cage traps: 2T (2), 9AT (2), 9CT (1), 12T (4), 13T (2);
Mist nets: 8 (2) 9A (1), 10A (1), 10B (1).
Despite we used 15 cage traps only, the species was captured at all trapping sites of the moist to wet *Scirpus* habitat type, also along the narrow vegetation belt of the lake shore of Lake Tantal. The Baillon's was only absent in pure *Typha* stands (TS 6T). Considering the area size of wet grass marshes there could be thousands of Baillon's wintering in the Senegal delta.
Observations (notes from Martin Flade):
"27/01/07 – 2-3 Baillon's were heard alarming in the wet *Scirpus* marshes SW Mirador President, at Trapping Site 9 C, at morning and during sunset. They called several times the alarm calls (quick, accelerating „wae-wae-wae-wae-wae..."), which I also know from breeding sites. Just after sunset, one bird started even singing („krrrrrrrr..."), ca. 5 verses.
Nearby, also 1 adult bird was caught in a cage trap.
28/01/07 – in the early morning, at least 2 birds were calling (alarm calls) at the place were the male was singing in the previous evening.
01/02/07 – at morning, several Baillon's were heard (alarm calls) at TS 12 A, near Canale de Crocodile."

**Allen's Gallinule *Porphyrio alleni*** (2 records):
21/01/07 - 2 individuals and 05/02/07 – 1 ind. seen and also photographed near the Biological Station (see Annex IV.2.).

**Black-winged Pratincole *Glareola nordmanni*** (new to Djoudj and possibly Senegal):
26/01/07 – 2 ind. at Mirador President, flying to the NNE (Martin Flade).
Notes: "During the evening, I stayed on the Mirador President and observed foraging Collared Pratincoles above the *Scirpus* marshes. The sun was already very low (30 minutes before sunset) and shining from behind. This way, I could see the chestnut-brown underwings of all the Collared Pratincoles (>60) very well. Suddenly there appeared a Pratincole at a distance of ca.

200 m, coming from the Grand Lac, with completely black underwings. This was a very clear contrast to all the Collared Pratincoles around. It flew to the NNE, ca. 30 m above the ground. It was a perfect light, so that the underwings were seen very well. Approximately 100 m behind the first Black Pratincole a second bird followed at the same distance and flying in the same direction."

**Great Snipe *Gallinago media*** (new to Djoudj):
25/01/07 – at least 2 ind. flushed off SW Mirador President (wet Scirpus marshes with mud patches and ponds; Martin Flade & Arnaud Le Nevé). Notes from Martin: "They flew off very straight (Ruff-like), not zick-zack like Common Snipe, and landet after 200-300 m. Observation distance was 40-300 m. I could see the pronounced white edges of the tail, at one bird I saw the dark, densily barred belly. I know the bird quite well from the Central and East-European breeding sites."

**African Marsh Owl *Asio capensis*** (2 records):
01/02/07 – 1 bird near TS 11, observed by the whole group.

**Egyptian Nightjar *Caprimulgus aegyptius*** (one record):
01/02/07 – 1 sitting on the sandy ground near TS 12 A; seen and photographed by many of us (see Annex IV.2.).

**Vieillot's Barbet *Lybius vieilloti*** (2 records) :
Up to 5 birds seen by many of us and also photographed near the Biological Station and in Diadiem III (see Annex IV.2.).

**Brubru Shrike *Nilaus afer*** (9 records) :
24/01/07 – 1 bird in Diadiem III.

**Yellow-crowned Gonolek *Laniarius barbarus*** (new to Djoudj) :
Single birds were frequently seen near the Biological Station and in Diadiem III (see IV.1.).

**Whinchat *Saxicola rubetra*** (16 records) :
Single birds were see near the Biological Station.

**Isabelline Wheatear *Oenanthe isabellina*** (6 records):
25/01 and 26/01/07 – one bird near Mirador President.

**Heuglin's Wheatear *Oenanthe heuglini*** (new to Djoudj and possibly Senegal):
18/01/07 – one bird seen near Poste de Gainthe by Arnaud Le Nevé:
"Global jizz close to *Oenanthe oenanthe* but very dark above and orange-buff below.
Above: dark brown median and greater covers and secondaries with very thin yellowish edge; median and greater covers are very dark uniform and the yellowish edge is quite indistinct (worn or fresh feathers?). Also there is no contrast between dark brown covers and the dark brown back; secondaries seem clearer because of closest yellowish edges. Same colour dark brown for the back, the nape, the crown and the forehead. White supercilium, but narrow and more constrated than *Oenanthe oenanthe* between dark brown crown and blackish eye-stripe. Black lores. Well marked blackish eye-stripe even behind the eye maybe stress by quite dark cheeks; no or small contrast between the eye-stripe and the nape, as the nape is dark brown. Brown-orange cheeks getting clearer and clearer until whitish throat. Primary projection not described. From the back, the tail appears all black, no white visible on the sides. The primary projection is not specified but whatever the base of the tail is covered by quill feathers.

Below: whitish throat; orange-buff breast indistinctly demarcated from paler throat; orange flanks with whitish belly reminding descriptions of *Oenanthe bottae*. But the whitish belly is not uniform and shows some scattered little buff feathers (moulting feathers worn or fresh ?).

Running on a very open and dry ground, 10-15 metres away from the Gainthe station, always under *Acacia* trees, although we were in the morning and it was not hot. Not seen flying, so no description of the tail.

Seen during 10 minutes.

After three weeks in Djoudj until the 8th February, and a second trip from the 13rd to the 26th January 2008 in Djoudj and south-west Mauritania at Diawling National Park and around Rosso, I never saw again such bird despite the checking of tens *Oenanthe oenanthe.*"

**Greater Swamp Warbler *Acrocephalus rufescens*** (new to Djoudj):
19.01.2007 – 3-4 ind. heard (relatively deep reed warbler voice, but different to Great Reed Warbler), 1 ind. seen, in the high Typha stands near the Djoudj Biological Station. One bird was mist-netted and measurements and a DNA sample taken by Benedikt Gießing near TS 4 (*Typha australis* stands) on 23/01/07.

**Yellow Penduline Tit *Anthoscopus parvulus*** (new to Djoudj):
25/01/07 – one bird at the Biological Station.

**Desert Cisticola *Cisticola aridula*** (one record):
25/01/2007 – one bird seen in dry grasses of semi-desert NE of Mirador President.

**Village Weaver *Ploceus cucullatus*** (5 records):
Seen near Tiguet-Débi (feeding into goat droppings) and at Diadiem II. Caught in mist-nets at TS 2A, 2B,12A, 13, and 15.
Notes from Martin Flade: "01/02/07 – 2 birds caught TS 12A; larger than Black-headed Weaver and with dark-reddish eyes."

**Little Weaver *Ploceus luteolus*** (13 records):
24/01/07 – 20 birds at Poste Ndoute.

## 9.4. Summarising description of suitable (and unsuitable) AW habitats

AW were exclusively found in very wide, open, wet and low *Scirpus* grass marshes of several hundred hectares size.

Most AW were caught and observed S and SE of Tiguet in the vegetation units B6 and B7 (at TS 10-12). B6 consists of wet *Scirpus littoralis* and *S. maritimus* marshes with *Eleocharis mutata*, B7 with *Oryza barthii*. The optimal site with 34 AW caught within <5 hectares (with mobile net) was characterised also by small *Typha* islands. The habitat structure was wide and open; bushes (with the exception of very few *Tamarix senegalensis* bushes) were almost absend.

The habitats at the eastern bank of Grand Lac (near Mirador president) were more wet, with many ponds, and part of the vegetation was laying (as dense litter layer) or even floating. The vegetation is described as pure *Scirpus littoralis* and *S. maritimus* marsh (vegetation unit B5, very wet) or *Scirpus* marsh with *Eleocharis mutata* (B6). Bushes and *Typha* islands were to-

tally absend. AW were also caught at the edge of patches with high water and scarce vegetation.

AW were absent (not observed or mist-netted) in large *Typha australis* stands (in contrast to small *Typha* islands within the wide open *Scirpus* marshes, see above), in dry *Scirpus/Sporobulus* habitats and in bushy areas. They were also absent in the wet and very well structured, but relatively narrow *Scirpus* belt of Lake Tantal.

## 9.5. Assessment of area size of suitable AW habitats

Zsolt Végváry and Lars Lachmann walked long distances to check the extension of suitable habitats and to outline the borders of suitable habitats by means of a GPS. The results are shown in Annex I.4. (maps 4 and 5). According to these data, the vegetation map from SCHWÖPPE (1994) and the satellite images present in the Djoudj Biological Station (Plates 4 and 5), such *Scirpus* grass marshes cover 13,000 hectares at the Senegalese side and 10,000 hectares at the Mauritanian side of the Senegal delta.

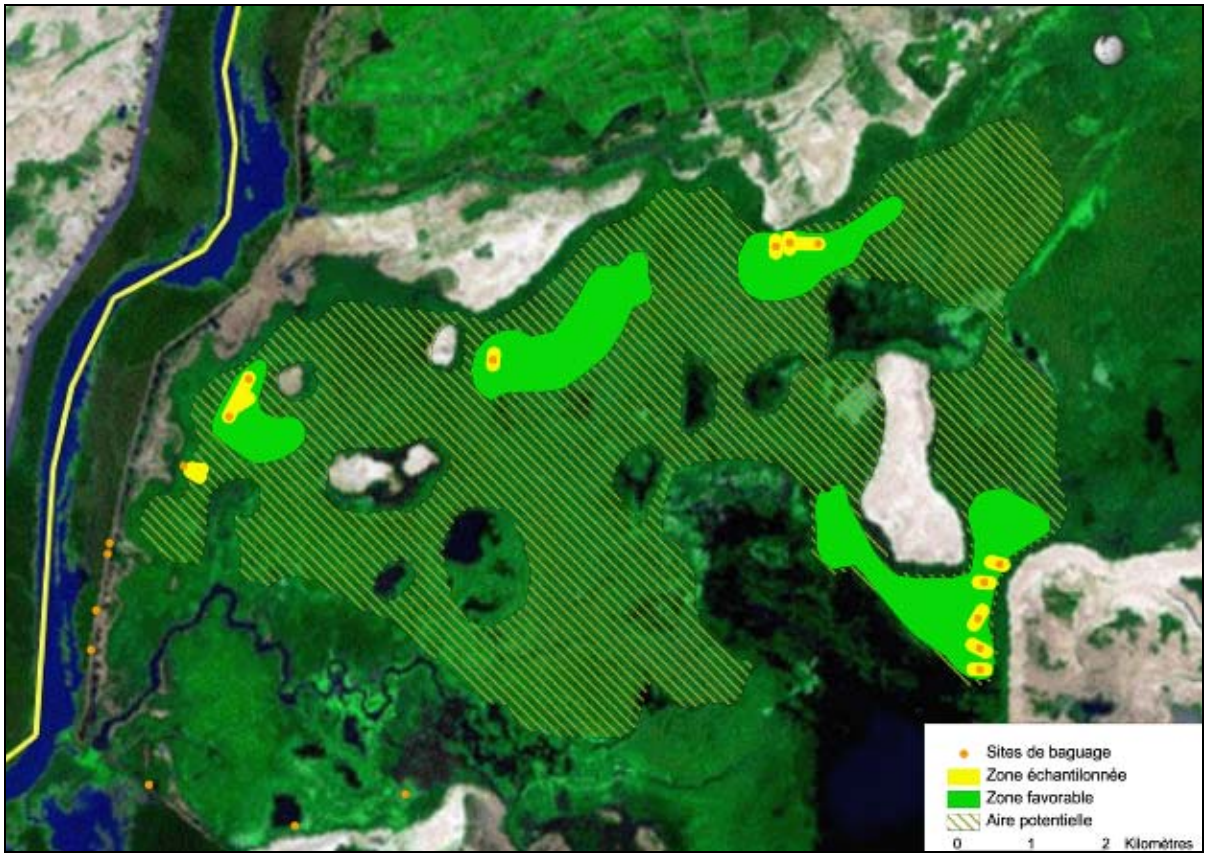


**Fig. 13:** AW trapping sites and area of potential habitat in the Djoudj area (from BARGAIN & GUYOT 2007). Green: occurrence of suitable habitat confirmed; hatched: potentially suitable according to the vegetation map and satellite images.

An important factor is the water level, since we found AW only in water-logged or flooded grass marshes. The area of suitable habitats is changing rapidly during the winter season. Just after arrival of AW in late October/November, large areas might be unsuitable because of too high flooding. During our stay in late January, at least 75 % of the *Scirpus* marshes (10,000 ha at the Senegalese side) were in suitable conditions for AW, only 25 % were already dry

(mainly the marginal parts). This was changing rapidly during the first half of February. The water level was sinking day by day – sometimes several cm within one day. At the end of February, the major part of the Scirpus marshes should be dried out.

## 9.6. Extrapolation of number of wintering AW in the Senegal delta

As explained in 9.5., the total area of suitable AW habitats at the Senegalese side of the river (within and outside the National Park) is estimated at 13,000 hectares, out of which 10,000 hectares might have been suitable in late January/early February (see Fig. 13). The density of AW in this habitat type was estimated at 0.5-1 (-1.5) birds per hectare (in a small area AW was much more abundant, >5 birds/ha at TS 10B), so that the population estimate is not less than 5,000-10,000 birds for the Senegalese side, and eventually the same number at the Mauritanian side. Since the global population actually is estimated at 25,000-30,000 birds, the Senegal delta probably holds at least 20 %, eventually up to 70 % of the global population and is thus a major or even the most important wintering site of the species.

## 9.7. Importance of grassy marshes (*Scirpus/Sporobulus*) and cattail stands (*Typha*) of the Senegal delta for other European migratory species

Besides the discovery of the wintering grounds of a substantial part of the **Aquatic Warbler**, another important discovery was the frequent occurrence of **Baillon's Crakes** in the same habitat type and also at high densities. The Senegal delta is the first known big wintering site of (presumably) European Baillon's Crakes in Africa.

The importance of the wintering populations of the following other species especially in the *Scirpus* marshes was also not that clear until present:

- **Sand Martin** (we estimated >2 millon birds over the *Scirpus* marshes),
- **Grasshopper Warbler** (also in dry *Scirpus* habitats),
- **Great Bittern** (frequently seen, up to 4 flying, in the wet Scirpus marshes at Grand Lac).

The high densities of wintering **Yellow Wagtails, Sedge Warblers** and **Bluethroats** were also very remarkable. The recorded relation Sedge : Aquatic Warbler = 15 : 1 or Yellow Wagtail : AW = 9 : 1 leeds to the rough estimate, that the *Scirpus* marshes of the Senegal delta only could harbour e.g. 75,000–300,000 Sedge Warblers and 50,000-200,000 Yellow Wagtails – excluding the considerable numbers in other habitat types (Sedge Warbler: *Typha* stands; Yellow Wagtail: open salt hardpans and semidesert near lakes). For Grasshopper Warbler and Bluethroat, the number of wintering birds in the Senegal delta can be estimated at >10,000.

Some of these figures are in good accordance with RODWELL et al. (1996), who mentioned also 2 millions Sand Martins and a night roost of 250.000 Yellow Wagtails.

In contrast to the *Scirpus* marshes, species numbers and abundances in the **high *Typha australis* stands** were low – as already stated by BRUINZEEL et al. (2005), but on the basis of a much smaller material (32 birds captured only, 29-49 m mist net length, total mist-netting duration 11.5 hours = <0.4 mist-netting units of 100 m net/8 h, compared to 7.04 units in *Typha* in our expedition). There are three European species, for which the vast *Typha* stands of

the Diama reservoir (>10,000 hectares) could be of substantial importance: **European Reed Warbler, Great Reed Warbler**, and **Little Crake**. The **Savi's Warbler** was not found in *Typha* (only in the lake shore habitat) and is generally scarce in W-Africa.

According to BRUNO LAAMARCHE (pers. comm..), **Sand Martins** find excellent night roosts into *Typha* stands. Before the spreading of *Typha*, Sand Martins slept in *Tamarix*, but it was much more difficult for them to find secure sites.

## 9.8. Potential threats to the AW and its habitats

Potential threats could arise from the ongoing change of the whole hydrological regime, since the Senegal River was enclosed with dikes in 1964 and dammed by the Diama dam upstreams of St. Louis in 1989. The flooding of the National Park and surroundings is now managed artificially. There could be a longterm change in salinity, in the trophic level and in the duration of floodings, with more or less important effects on vegetation types and structure. It is thus of prime importance to carry out further detailed studies on these potential or ongoing habitat changes and to elaborate a thorough threat status analysis.

Another threat for grass marshes outside the National Park is the transformation in hydro-agriculture, mainly sugar cane and rice fields. At Lac de Guiers east of Djoudj NP large areas of grass marshes have been transformed in sugar cane fields in the past two decades. We assume that other important wintering sites of AW in Subsahelian W-Africa could be under serious threat.

The influence of climate change to the AW wintering habitats is hard to assess. Potentially, the decline in annual precipitation in the Sahel zone and the growth of the Sahara could have a negative longterm effect e.g. through lesser and shorter floodings of the grass marshes.

# 10. Discussion

## 10.1. General results

According to a tradition of the AWCT, some quantitative results of the expedition had to be forecasted by the members at the beginning of the expedition. This was also done at the arrival day at Djoudj. Compared to the median forecasts, the expedition was very successful: There were much more observed species in the field (271 to 219) and much more AW observed (>50 to 5) and captured (56 to 10) than forecasted (Fig. 13). Interestingly, the numbers of captured species and AW recaptures (controls) met exactly the estimates.

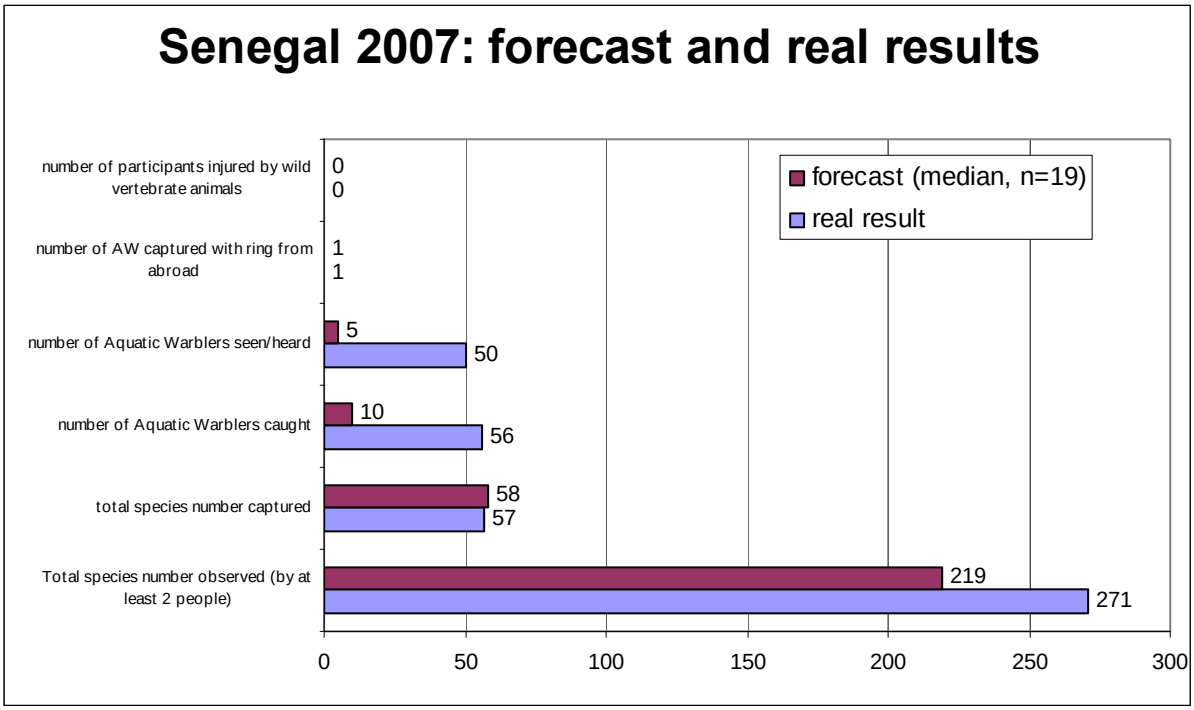


**Fig. 13:** Results of the expedition: forecast by the 19 European participants and real results.

## 10.2. Importance of the wintering bird assemblages of the *Scirpus* marshes

Former studies and counts in Djoudj focused mainly on waterbirds and waders (MOREL & ROUX 1966, RODWELL et al. 1996, WOIKE 2001). Mist-netting of passerines for ringing purposes was obviously mainly performed in bushy habitats or high cattail and reeds (MOREL & ROUX 1966, RODWELL et al. 1996, SAUVAGE 2001). BRUINZEEL et al. (2005) studied the bird assemblages in the large stands of the invasive cattail *Typha australis* in the Diama reservoir in a targeted approach.

The outstanding importance of the large monotonous *Scirpus* marshes N and NE of the Grand Lac and outside the PNOD near Tiguet-Débi for some European migratory species has previously been overlooked or – at least – underestimated. So, the discovery of major wintering sites of Aquatic Warbler and Baillon's Crake, and substantial wintering populations of species such as Bittern and Grasshopper Warbler as well as the probably regular occurrence of rare species like Great Snipe and African Marsh Owl was unknown until our expedition.

The discovery of a major, probably even the most important wintering site of AW confirmed the modelling results of WALTHER et al. (2007) and the forecast resulted from the stable isotope analyses of PAIN et al. (2004) in an impressive way. The Djoudj area is located just in the centre (16°30' N) of the band between 13° and 20° N forecasted by D. PAIN (unpublished) on the basis of the stable Carbon isotope $\delta^{13}C$ concentration in AW feathers compared to values of feathers from Winding Cisticola (3 sites), a sedentary African species living in the same habitat type, and from Grey-backed Cameroptera (7 sites).

So far as we know, there have been no records of the Baillon's Crake in the PNOD previous to our expedition (the only two records from the lower Senegal are from Richard Toll, MOREL & ROUX 1966). The discovery of an obviously large wintering site in Djoudj is as more important, as there was no regular wintering site of the species in Western Africa known before.

## 10.3. Open questions

The discoveries of the 2007 expedition can only be the starting point for further, more targeted research. The following questions are still to be answered:

1. From where orgin the AW and Baillon's Crakes wintering in Djoudj? - For AW, this question can be analysed by means of the DNA samples and stable isotope values in the obtained feather samples in comparison to the known values of at least 10 breeding populations. For Baillon's Crake such a study should be initiated.
2. Are there other important AW wintering sites in West-Africa, e.g. along the Senegal River upstreams of Djoudj (Senegal, Mauritania), in Mali (inner Niger delta) or along the Mauritanian Atlantic Sea coast? - The satellite image analysis (Annex VII) indicates regions with a high probability of occurrence of suitable habitats, which have to be checked on the ground.
3. Where are the wintering quarters of the critically endangerd Pomeranian AW population? Accoring to PAIN et al (2004) they are likely to be located north of the Senegal delta (coastal wetlands in Mauritania?).
4. How reliable are the rough population estimates for AW and BC? To answer this question, we need more density values from a bigger number of localities, and more information about the borders and extend of suitable habitat at both sides of the Senegal River.
5. Do the birds occupy more or less stable winter home ranges?
6. Are there regular seasonal movements? How do the birds cope with the changing (declining) water table during the dry season?
7. What are the key habitat factors? Which structures, water conditions and food supply are essential for the wintering and moulting AW and BC?
8. Are there threats through habitat change? Are remaining habitats threatened by transformation (e.g. for hydro-agriculture) or changing environmental conditions (water supply, salinity, trophic level etc.)?
9. Could climate change effect extent and quality of the wintering habitats?

## 10.4. Recommendations for future research

Highest priority has the investigation of other potentially suitable sites in West-Africa in order to find further AW wintering sites. The occurrence of suitable habitats and wintering AW at the Mauritanian side of the Senegal River (Diawling National Park, wetlands north of the Senegal River bow in the north of Djoudj NP) needs still confirmation on the ground. Area

size of suitable habitats should be analysed quickly in order to initiate conservation measures, if necessary.

Of special importance is the quick search for the wintering sites of the Pomeranian AW population. Target areas of highest priority are potential wetlands near the Atlantic coast line of Mauritania.

Since the AW migrates along the Atlantic Sea coast and is obviously not able to cross the Sahara, the probability of wintering occurrence declines from the Atlantic Ocean toward the inland. Thus it is recommended to start searching for habitats and AW from Richard Toll/Rosso upstreams to the East. The satellite image analysis shows a broad band of sites with high likelihood of occurrence of AW habitats along the whole Senegal floodplain and also along the upper river Ferlo (IBA ‘Ferlo North’). These sites should be checked on the ground. The inner Niger delta in Mali is so far from the coast and so large that it should only be visited when the occurrence of AW along the upper Senegal River can be confirmed.

For the AW and BC wintering site in Djoudj, a thorough threat status analysis is urgently needed. That requires detailed studies on habitat conditions, diet, winter home ranges and seasonal movements including radio-tracking studies. We suggest initiating doctor theses projects for both species.

# 11. Financial Report

## (A) Table of planned and real expenses

| planned expenses | | Real expenses | |
|---|---|---|---|
| **Purpose** | **total(€)** | **total (€)** | **Purpose** |
| Flights and visa for European participants | **10,841** | **13,251** | Flight tickets, train tickets, visa, overnight stays in Dakar (see table) |
| Field accommodation, local staff | **6,250** | | Local accommodation and transport inclusive mist net sticks and rope |
| Car rent and petrol | **4,380** | **10,690** | |
| Field equipment, desk materials | **1,000** | **1,173** | 44 € field guide for Ibrahima, 1,129 € for mist nets, waders, lights, map |
| | | **345** | Bank transfers and credits |
| **total** | **22,471** | **25,459** | |
| | | | |
| **planned contributions** | | **real contributions** | |
| from DEFRA via CMS Secretariat | **12,600** | **12,600** | from DEFRA via CMS Secretariat |
| from the RSPB - Small Grant | **5,000** | **5,000** | from the RSPB - Small Grant |
| from RSPB (surplus 2006 budget) | **567** | **567** | from RSPB (surplus 2006 budget) |
| from DO-G | **2,000** | **2,000** | from DO-G |
| from Otto Foundation (CMS officer) | **686** | **686** | from Otto Foundation (CMS officer) |
| private contributions of W-Europ. | **1618** | **4,606** | **private contributions of W-Europ.** |
| **total** | **22,471** | **25,459** | |

## (B) Table of travelling expenses

| Participant | Flight tickets incl. insurance | Train tickets + [overnight] | Visa | Total | Comments |
|---|---|---|---|---|---|
| Viktar Fenchuk | 581.00 | 70.00 | 35.00 | **686.00** | covered by CMS officer budget from Michael Otto Foundation |
| Bruno Bargain | 709.44 | 50.00 | | **759.44** | |
| Gaétan Guyot | 709.44 | 50.00 | | **759.44** | |
| Arnaud Le Nevé | 709.44 | 50.00 | | **759.44** | |
| Stefan Bräger | 581.00 | 156.20 | | **737.20** | |
| Martin Flade | 581.00 | 11.00 | | **592.00** | |
| Benedikt Giessing | 581.00 | | | **581.00** | |
| Angela Helmecke | 581.00 | | | **581.00** | |
| Wolfgang Mädlow | 556.43 | | | **556.43** | |
| Torsten Ryslavy | 595.43 | [25.00] | | **620.43** | 25 € overnight stay in Dakar |
| Volker Salewski | 648.05 | 44.00 + [130.00] | | **822.05** | 130 € overnight stay in Dakar and transport to Djoudj |
| Klemens Steiof | 794.76 | | | **794.76** | |
| Zsolt Végváry | 581.00 | 220.00 | | **801.00** | |
| Oskars | 581.00 | 115.00 | 35.00 | **731.00** | |
| Zydrunas Preiksa | 581.00 | 110.00 | 35.00 | **726.00** | |
| Julio Manuel Neto | 506.00 | [115.00] | | **621.00** | 115 € for overnight stays in Dakar |
| Carlos Martínez | 553.41 | 39.00 | | **592.41** | |
| Anatoly Poluda | 935.00 | | | **935.00** | |
| Lars Lachmann | | | | | *(expenses covered by RSPB)* |
| Jarek Krogulec | 595.43 | | | **595.43** | *(Jarek could not participate, because he got no visa in time)* |
| **Total:** | **11,960.93** | **1,185.20** | **105.00** | **13,251.13** | |

## (C) Table of cash flow

| Date | Sum (€) | from | to | Purpose, comments |
|---|---|---|---|---|
| **Expenses** | | | | |
| 08/01/2007 | 2,040 | Martin | Ibrahima | Bank transfer prior to the expedition |
| 19/01 | 50 | Martin | driver | For car transport Dakar-St. Louis |
| 19/01 | 2,900 | Martin | Ibrahima | Accommodation, cars |
| 29/01 | 5,670 | Martin | Ibrahima | Accommodation, cars, sticks for mist nets, rope |
| 01/02 | 30 | Martin | La cuisine | For excellent service |
| 01/02 | 145 | Martin | Zydrunas | Travel (110) and visa (35) |
| 01/02 | 2,698 | Martin | Torsten | Bank transfer, reimbursement of flight tickets |
| 11/02 | 150 | Martin | Oskars | Flight Riga – Berlin – Riga (115), and visa (35) |
| 19/02 | 1,500 | Martin | Torsten | Bank transfer, reimbursement of flight tickets |
| 21/06 | 935 | Martin | Viktar | Travel cost reimbursement for Anatoly Poluda |
| **Subtotal1** | **10,690** | | | **Accommodation, cars, local transport** |
| **Subtotal2** | **1,230** | | | **Reimbursement flight tickets E-Europeans** |
| **Subtotal3** | **3,617** | | | **Flight ticket reimbursement to Torsten** (*minus* 581 € for Martins ticket) |
| **Total** | **15,537** | | | |
| | | | | |
| *pending* | 200 | Martin | Zsolt | Train tickets in Hungary |
| *pending* | 44 | Martin | Angela | Book (field guide) for Ibrahima |
| *pending* | 45 | Martin | Torsten | Bank credit interests and bank transfer costs |
| *pending* | 300 | Martin | Martin | Bank credit interests |
| *pending* | 1,129 | Martin | Bruno/Arnaud | Mist nets, waders, frontal lights, map, incl. airport bus (9 €) |
| **Total** | **1,718** | | | |
| | | | | |
| *pending* | **3,598** | Martin | W-Europeans | Partial reimbursement of travel costs to Volker, Stefan, Benedikt, Martin, Torsten, Angela, Wolfgang, Julio, Carlos, Arnaud, Bruno, Gaetan, and Klemens |
| **Total expenses** | **20,853** | | | **Total delivered by Martin** |
| | | | | |
| **Internal transfers** | | | | |
| 19/01 | 580 | Viktar | Martin | Internal transfer: for flight ticket Berlin – Dakar |
| 29/01 | 5,905 | Torsten | Martin | Internal cash transfer from Germany (from Martins account) |
| **Funding** | | | | |
| 2006 | 567 | RSPB | Martin | Surplus from the Russia Small Grant |
| 10/01/2007 | 2,000 | DO-G | Martin | Funding from German Ornithol. Society |
| 01/2007 | 686 | Otto Fund | Viktar | Funding for Viktar as CMS officer |
| 26/01/2007 | 9,848 | RSPB | Martin | DEFRA funding (via CMS Secretariat) |
| 18/09/2007 | 4,500 | RSPB | Martin | Small Grant agreement |
| *pending* | 2,752 | RSPB | Martin | Second part DEFRA funding (via CMS) |
| *pending* | 500 | RSPB | Martin | Second part Small Grant agreement |
| **Total** | **20,853** | **Supporters** | **Martin** | **Total funding received by Martin** |

As shown in the Tables A and B, the expenses for travel (especially train tickets and overnight stays in Dakar) and for bank transfers and credits were clearly higher than expected. The difference amounted to nearly 3,000 €, which had to be carried by the 13 W-European participants. They contributed in average 367 € instead of 124 € per person (plus vaccinations).

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# ANNEXES

**I - Trapping sites**

- I.1 - Table of habitat parameters of TS and vegetation form
- I.2 - Table on details of mist-netting sites and trapping activities
- I.3 - Photo documentation of TS
- I.4 – Location of TS, borders of suitable habitat (maps)

**II - Mist-netting work** (Photo documentation)

**III - Trapping results**

- III.1 - Trapped birds in mist nets (European species)
- III.2 – Trapped birds – African species and waders (not ringed)
- III.3 – Cage traps (European species)
- III.4 - Ring list
- III.3 - Photo documentation ‘birds in the hand’

**IV - Bird observations**

- IV.1 - Systematic list of bird records
- IV.2 - Photo documentation ‘birds in the wild’

**V – Wild animals** (Photo documentation)

**VI - AWCT People** (Photo documentation)

**VII - Satellite image analysis** (Report of Graeme Buchanan)

**VIII - Public relations: articles in newspapers and journals**

# Annex I - Trapping sites

# Vegetation/habitat description form used

| In/Out of IBA | IBA name | | Site ID | |
|---|---|---|---|---|
| **Date** | **Observer** | **Latitude** | **Longitude** | |
| / / 200 | | | | |

Site Description

| Vegetated | | Artificial | | Dominant layer | | State | |
|---|---|---|---|---|---|---|---|
| Vegetated | | Managed | | Bare | | green | |
| Unvegetated | | Natural | | Forbs | | senescent | |
| Mixed | | Mixed | | Grasses | | dry | |
| | | | | Shrubs | | burnt | |
| | | | | Trees | | | |

| Water regime | | Water seasonality | | Water quality | | Bare soil | |
|---|---|---|---|---|---|---|---|
| Terrestrial | | <4 months/year | | Brackish | | Ice/snow | |
| Regularly flooded | | > 4 months/year | | Fresh | | Rocks | |
| Mixed | | Daily variations | | Saline | | Salt hardpans | |
| | | Permanent | | Unknown | | Sands | |
| | | Waterlogged | | | | Stony | |
| | | Unknown | | | | Urban | |
| | | | | | | Gravel and sand | |
| | | | | | | Unknown | |

| Tree cover | | Tree height | | Leaf type | |
|---|---|---|---|---|---|
| 0% | | 3-7m | | Broadleaved | |
| 1-4 % | | 7-14m | | Needleleaved | |
| 4-15% | | >14m | | Mixed | |
| 15-65% | | 3 ->14 m | | Aphyllous | |
| >65% | | | | Spiny | |

| Shrub cover | | Shrub height | | Leaf type | |
|---|---|---|---|---|---|
| 0% | | < 0.5m | | Broadleaved | |
| 1-4 % | | 0.5 -3 m | | Needleleaved | |
| 4-15% | | 3-5m | | Mixed | |
| 15-65% | | 3 - 5 m | | Aphyllous | |
| >65% | | | | Spiny | |
| | | | | Succulent | |

| Forbs cover | | Forbs height | | Leaf type | | Other | |
|---|---|---|---|---|---|---|---|
| 0% | | 0.03 - 0.3 m | | Broadleaved | | Moss | |
| 1-4 % | | 0.3 - 0.8 m | | Needleleaved | | Lichen | |
| 4-15% | | 0.8 - 3 m | | Mixed | | % cover | |
| 15-65% | | 0.03 - 3 m | | Aphyllous | | | |
| >65% | | | | Spiny | | | |
| | | | | Unknown | | | |

| Grass cover | | Grass height | | Grass phenology | | Grass texture | |
|---|---|---|---|---|---|---|---|
| 0% | | 0.03-0.3m | | Deciduous | | | |
| 1-4 % | | 0.3-1m | | Evergreen | | all flat | |
| 4-15% | | 1-3m | | Mixed | | all tussocks (>75 %) | |
| 15-65% | | 0.03 - 1 m | | Unknown | | | |
| >65% | | | | | | mixed | |

| Burning period | | Strata burnt | | Burnt vegetation | | Fire severity | |
|---|---|---|---|---|---|---|---|
| this fire season | | trees | | <10% | | light | |
| previous season | | shrub | | 10-40% | | medium | |
| | | grass | | 40-70% | | severe | |
| | | | | 70-100% | | very severe | |

| Agriculture cycle | | Agriculture water | | Agriculture pattern | | Agriculture intensity | |
|---|---|---|---|---|---|---|---|
| Annual | | Rainfed | | Contiguous fields | | Permanent high intensity | |
| Perennial | | Postfloodings | | Scattered fields | | Permanent low intensity | |
| 2 crops / year | | Irrigated | | Sparse fields | | Shifting cultivation | |
| | | Unknown | | Grouped fields | | Fallows | |
| | | | | | | Unknown | |

**When unsure of vegetation type leave blank or make a note of type - e.g. reeds**
**Observations should be made in an area of reasonably homogeneous vegetation**

**Samples should be collected by the observer assessing vegetation within a 25-50 m radius**

# Annex I.1 - Table of habitat parameters of TS

| Site no. | general vegetation classification, main layer | water regime | Salinity | bare soil | trees | shrubs (%) | height of shrubs | type of shrubs | forbs % | grass cover | vege-tation height |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | NB: The plant species names are provisional, but are consistent within the list. | | | | | | | | | | |
| | | | | | | | | | | | |
| **1** | green grasses, natural | mixed, flooded >4 month/year | saline | gravel and sands | 0 | 1-4 | 0,3-1 | broad-leaved | 0 | >65 | 0,8 |
| **2A** | green grasses, natural | regularly flooded <4 month/year | saline | salt hardpans | 0 | 3 | 0,5-3 | mixed | 1-4 | >65 | 1,1 |
| **2B** | green grasses, natural | regularly flooded <4 month/year | saline | salt hardpans | 0 | 3 | 0,5-3 | mixed | 1-4 | >65 | 1,1 |
| **3** | low-intensity grazed green grasses | regularly flooded <4 month/year | saline | salt hardpans | 0 | 1-4 | 0,5-3 | mixed | 1-4 | >65 | 0,8 |
| **4** | grasses green and dry and burnt | permanently flooded | fresh water | no bare soil | 0 | 0 | | | 0 | >65 | 2,0 |
| **5** | green grasses, natural | permanently flooded | fresh water | no bare soil | 0 | 0 | | | 0 | >65 | 2 |
| **6** | green grasses, natural | permanently flooded | fresh water | no bare soil | 0 | 0 | | | 0 | >65 | >3 |
| **7** | green grasses, natural | permanently flooded | fresh water | no bare soil | 0 | 0 | | | 0 | >65 | 3 |
| **8** | green grasses, natural, very dense | regularly flooded >4 month/year | fresh water | no bare soil | 0 | 0 | | | 0 | >65 | 0,8 |
| **9A** | green grasses, natural | regularly flooded <4 month/year | saline | salt hardpans | 0 | 1-4 | 0,5-3 | broad-leaved | 0 | >65 | 1,3 |
| **9B** | green grasses, natural | regularly flooded <4 month/year | saline | salt hardpans | 0 | 0 | | | 0 | >65 | 1,5 |
| **9C** | green grasses, natural | regularly flooded <4 months/year | saline | salt hardpans | 0 | 0 | | | 0 | >65 | 0,5 |
| **9D** | green grasses, natural | regularly flooded <4 months/year | saline | salt hardpans | 0 | 0 | | | 0 | >65 | 1,6 |
| **10A** | green grasses, natural | regularly flooded <4 months/year | saline | salt hardpans | 0 | 0 | | | 0 | >65 | 0,6 |
| **10B** | green grasses, natural | regularly flooded <4 months/year | saline | salt hardpans | 0 | 0 | | | 0 | >65 | 0,6 |
| **11** | green grasses, natural, dense carpet | regularly flooded >4 month/year | saline | salt hardpans | 0 | 0 | | | 0 | >65 | 0,8 |
| **12A** | green grasses, natural | regularly flooded <4 month/year | saline | salt hardpans | 0 | 0 | | | 0 | >65 | 0,5 |
| **12B** | green grasses, natural | regularly flooded <4 month/year | saline | salt hardpans | 0 | 0 | | | 0 | >65 | 0,9 |
| **13** | green grasses, natural | regularly flooded <4 month/year | saline | salt hardpans | 0 | 0 | | | 0 | >65 | 1,2 |
| **14** | green grasses, natural | regularly flooded <4 month/year | saline | salt hardpans | 0 | 0 | | | 0 | >65 | no data |
| **15** | green grasses, natural | regularly flooded >4 month/year | mixed | unknown | 0 | 0 | | | 0 | >65 | 3 |

| Site no. | burnt (%) | agri-culture | open water (%), ponds | water level (cm) | Sporo-bulus % | Scirpus spec. coverage % | Scirpus maritimus % | Scirpus littoralis % | Typha % | Phrag-mites % | other plants, comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| **1** | 0 | 0 | 25 | 50 | 0 | 73 | 73 | 0 | 2 | 0 | |
| **2A** | 0 | 0 | 12 | 40 | 0 | 85 | | | 0 | 0 | |
| **2B** | 0 | 0 | 12 | 40 | 0 | 85 | | | 0 | 0 | |
| **3** | 0 | low-intensity grazing | 20 | 30 | 20 | 60 | | | 0 | 0 | |
| **4** | <10 | 0 | 0 | 50 | 0 | 0 | | | 99 | 1 | Salvinia molesta, Utricularia spec. |
| **5** | 0 | 0 | 0 | 50 | 0 | 0 | | | 99 | 1 | |
| **6** | 0 | 0 | 2 | 60 | 0 | 0 | | | 98 | 0 | Salvinia molesta, Utricularia spec. |
| **7** | 0 | 0 | 1 | 50 | 0 | 0 | | | 99 | 0 | |
| **8** | 0 | 0 | 5 | 20 | 95 | 0 | | | 0 | 0 | described as "yellow grass" |
| **9A** | 0 | 0 | 10 | 10 | 10 | 80 | | | 0 | 0 | |
| **9B** | 0 | 0 | 0 | 25 | 0 | 100 | | | 0 | 0 | |
| **9C** | 0 | 0 | 10 | 40 | 30 | 70 | 60 | 10 | 0 | 0 | |
| **9D** | 0 | 0 | 5 | 40 | 0 | 95 | 95 | | 0 | 0 | |
| **10A** | 0 | low-intensity grazing | 5 | 20 | 70 | 20 | 10 | 10 | 5 | 0 | Typha up to 2 m high |
| **10B** | 0 | low-intensity grazing | 5 | 20 | 70 | 20 | 10 | 10 | 5 | 0 | Typha up to 2 m high; catchment of mobile netting 4.4 ha |
| **11** | 0 | 0 | 1 | 10 | 50 | 39 | 39 | | 10 | 0 | |
| **12A** | 0 | 0 | 20 | 25 | 0-25 | 45-80 | 15-80 | 0-30 | 10 | 0 | Typha up to 2,5 m high |
| **12B** | 0 | 0 | 5 | 15 | 0 | 95 | 95 | | 0 | 0 | |
| **13** | 0 | 0 | 3 | 20 | 0 | 97 | 95 | 2 | 0 | 0 | |
| **14** | | | no data | no data | no data | no data | | | no data | 0 | data still missing |
| **15** | 0 | 0 | no data | no data | 0 | 0 | | | 95 | 5 | data still missing |

# Annex I.2 - Overview table on mist-netting sites and trapping activities

| No. of Trapping Site; # = with mobile net; ## only mobile net | Name | habitat characteristics | coordinate N | coordinate W | ringers | date | time | hours [total] | faktor 1/ (8h x 100m) | lenght of nets (m) | first 5-number | last 5-number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Biol. Station | little *Scirpus* pond surrounded by *Tamarix* and *Acacia*, near houses | 16.21.365 | 16.16.307 | Bruno | 18.01.2007 | | [0,5] | | 24 | 5487001 | 5487003 |
| | | | 16.21.366 | 16.16.308 | | | | | 0,015 | | | |
| 1 | | *Scirpus* marsh wet, ponds, surroundet by bushes/trees | 16.24.162 | 16.17.434 | Benedikt, Bruno, Anatoly… | 20.01.2007 | | 8 | | 108 | 5487004 | 5487012 |
| | | | | | | 21.01.2007 | | 7 | | 180 | 5487013 | 5487038 |
| | | | | | | | | [15,0] | 2,655 | | | |
| 2A | Lake Tantal | *Scirpus* marsh at lake shore, deep water, parts with bushes | 16.23.575 | 16.16.325 | Julio, Wolfgang, Carlos … | 20.01.2007 | 9:30-12:00 | 2,5 | | 84 | 5464001 | 5464025 |
| | | | | | Julio, Wolfgang, Carlos … | 21.01.2007 | 8:00-12:00 | 4 | | 84 | 5464026 | 5464071 |
| | | | | | Martin, Gaetan | 21.01.2007 | 16:30-19:00 | 2,5 | | 84 | 5480021 | 5480048 |
| | | | | | Martin, Gaetan | 22.01.2007 | 7:00-12:00 | 5 | | 84 | 5480049 | 5480080 |
| | | | | | Julio, Wolfgang | 02.02.2007 | 17:00-19:00 | 2 | | 72 | 5464298 | 5464311 |
| | | | | | Julio, Wolfgang | 03.02.2007 | 7:00-12:00 | 3 | | 72 | 5464312 | 5464365 |
| | | | | | Julio, Wolfgang | 03.02.2007 | 16:30-19:00 | 2,5 | | 72 | 5464366 | 5464371 |
| | | | | | Julio, Wolfgang | 04.02.2007 | 7:30-12:00 | 4,5 | | 72 | 5464372 | 5464422 |
| ##2A | Lake Tantal | *Scirpus* at lake shore, deep water, bushes | 16.23.575 | 16.16.325 | Julio, Wolfgang | 05.02.2007 | 7:00-12:00 | 5 | | 36 | 5464423 | 5464443 |
| | | | | | Julio, Wolfgang | 05.02.2007 | 16:30-19:30 | 3 | | 36 | 5464444 | 5464459 |
| | | | | | Oskars, Angela | 03.02.2007 | 17:00-19:30 | 2,5 | | 24 | 5475163 | 5475189 |
| | | | | | Julio | 03.02.2007 | 16:30-19:00 | 2,5 | | 24 | 5480371 | 5480375 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | [39,00] | 3,06 | | | |
| 2B | Tantal-New Site | *Scirpus* marsh at lake shore, deep water, parts with bushes | near 2A | near 2A | Julio, Gaetan, Carlos | 06.02.2007 | 7:00-12:00 | 5 | | 60 | 5464460 | 5464512 |
| | | | | | Julio, Sonko, Sussi | 07.02.2007 | 8:00-12:00 | 4 | | 60 | 5464513 | 5464544 |
| | | | | | Julio | 07.02.2007 | 16:30-18:00 | 1,5 | | 24 | 5464545 | 5464549 |
| | | | | | Julio, Carlos | 08.02.2007 | 7:30-12:00 | 4,5 | | 60 | 5464552 | 5464589 |
| | | | | | | | | [15,00] | 1,0575 | | | |
| 3 | Poste de Gainthe | *Scirpus*/*Sporobulus* dry, many bushes, 1 shallow pond | 16.24.245 | 16.15.675 | Martin, Oskars, Gaetan | 20.01.2007 | 9:00-12:00 | 3 | | 96 | 5480001 | 5480008 |
| | | | | | Martin, Oskars, Gaetan | 21.01.2007 | 7:30-12:00 | 4,5 | | 222 | 5480009 | 5480020 |
| | | | | | Julio, Wolfgang, Carlos | 21.01.2007 | 16:30-19:30 | 3 | | 222 | 5464073 | 5464073 |
| | | | | | Julio, Wolfgang, Carlos | 22.01.2007 | 7:00-12:00 | 5 | | 222 | 5464074 | 5464081 |
| | | | | | | | | [15,50] | 3,82875 | | | |
| 4 | Typha 1 | low *Typha*, very deep water | 16.25192 | 16.18.121 | Bruno, Benedict | 22.01.2007 | 7:00-11:30 | 4,5 | | 108 | 5487039 | 5487071 |
| | | | | | Anatoly, Benedikt | 22.01.2007 | 16:30-19:30 | 3 | | 84 | 5487072 | 5487075 |
| | | | | | Bruno, Anatoly, Benedikt | 23.01.2007 | 7:00-11:00 | 4 | | 108 | 5487076 | 5487108 |
| | | | | | Anatoly, Benedikt | 23.01.2007 | 16:30-19:00 | 2,5 | | 84 | 5487109 | 5487111 |
| | | | | | Bruno, Benedict | 24.01.2007 | 7:30-10:00 | 2,5 | | 108 | 5487112 | 5487126 |
| | | | | | | | | [16,50] | 2,0625 | | | |
| 5 | Typha 2 | rather low *Typha*, deep water | 16.25.379 | 16.18.097 | Stefan | 21.01.2007 | 18:00-18:45 | 0,75 | | 72 | 5511001 | 5511007 |
| | | | | | Stefan | 22.01.2007 | 7:00-12:00, 18:30-19:30 | 6 | | 72 | 5511008 | 5511033 |
| | | | | | Angela, Cisse | 23.01.2007 | 5:00-12:00, 17:00-19:00 | 9 | | 120 | 5511034 | 5511058 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Angela, Gaetan | 24.01.2007 | 7:15-10:45 | 3,5 | | 120 | 5511059 | 5511076 |
| | | | | | | | | [19,25] | 2,4825 | | | |
| 6 | Typha 3 | high and dense *Typha*, deep water | 16.26.043 | 16.18.043 | Martin, Zsolt | 22.01.2007 | 16:30-19:00 | 2,5 | | 72 | 5480081 | 5480088 |
| | | | | | Martin, Zsolt | 23.01.2007 | 8:30-11:30 | 3 | | 72 | 5480089 | 5480103 |
| | | | | | Oskars, Stefan | 23.01.2007 | 16:45-19:00 | 2,25 | | 72 | 5480104 | 5480107 |
| | | | | | Oskars, Stefan | 24.01.2007 | 7:20-10:45 | 3,42 | | 72 | 5480108 | 5480111 |
| | | | | | | | | [11,17] | 1,0053 | | | |
| 7 | Typha 4 | very high and dense *Typha*, deep water | 16.26.094 | 16.18.032 | Wolfgang, Julio, Carlos … | 23.01.2007 | 7:15-12:00, 17:00-19:00 | 6,75 | | 84 | 5464082 | 5464096 |
| | | | | | Wolfgang, Julio, Carlos… | 24.01.2007 | 07:30-11:00 | 3,5 | | 84 | 5464097 | 5464099 |
| | | | | | | | | [10,25] | 1,07625 | | | |
| 8 | Tiguet 1 | *Sporobulus* marsh, wet, very dense, 5 % open water | 16.26.459 | 16.17.276 | Bruno, Carlos, Stephan, Julio, Angela, Anatoly ... | 24.01.2007 | 16:30-19:30 | 3 | | 312 | 5487127 | 5487141 |
| | | | | | | 25.01.2007 | 7:00-12:00 | 5 | | 312 | 5487142 | 5487183 |
| | | | | | | 26.01.2007 | 7:30-12:00 | 4,5 | | 336 | 5487200 | 5487226 |
| | | | | | | | | [12,50] | 5,01 | | | |
| 9A | Mirador Le President, at the Mirador | *Scirpus/Sporobulus* marsh relatively dry, only parts with shallow water | 16.25.192 | 16.10.481 | Martin et al. | 24.01.2007 | 16:30-19:00 | 2,5 | | 108 | 5475001 | 5475014 |
| | | | | | Martin et al. | 25.01.2007 | 7:30-11:30 | 4 | | 168 | 5475016 | 5475047 |
| | | | | | Martin et al. | 25.01.2007 | 17:20-19:30 | 2,16 | | 168 | 5475048 | 5475068 |
| | | | | | Martin et al. | 26.01.2007 | 7:20-12:00 | 4,66 | | 168 | 5475071 | 5475091 |
| | | | | | Martin, Volker | 26.01.2007 | 17:10-19:00 | 1,8333 | | 168 | 5475092 | 5475100 |
| | | | | | Martin, Volker | 27.01.2007 | 7:50-12:00 | 4,16 | | 168 | 5480112 | 5480145 |
| | | | | | | | | [19,31] | 3,8683 | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9B | Mirador Le President, near sand island | *Scirpus/Sporobulus* marsh wet | 16.25.611 | 16.11.027 | Benedikt | 24.01.2007 | 16:30-19:00 | 2,5 | | 120 | 5475001 | 5475014 |
| | | | | | Benedikt | 25.01.2007 | 7:30-11:30 | 4 | | 150 | 5475016 | 5475047 |
| | | | | | Benedikt | 25.01.2007 | 17:20-19:30 | 2,16 | | 150 | 5475048 | 5475068 |
| | | | | | Gaetan, Benedikt | 26.01.2007 | 7:20-12:00 | 4,66 | | 150 | 5475071 | 5475091 |
| | | | | | Gaetan, Benedikt | 26.01.2007 | 17:10-19:00 | 1,8333 | | 150 | 5475092 | 5475100 |
| | | | | | Gaetan, Benedikt | 27.01.2007 | 7:50-12:00 | 4,16 | | 150 | 5480112 | 5480145 |
| | | | | | | | | [19,31] | 3,5275 | | | |
| 9C | Grand Lake south | *Scirpus/Sporobulus* marsh deep water, many ponds | 16.25.215 | 16.11.006 | Volker, Oskars | 27.01.2007 | 18:15-19:30 | 1,25 | | 168 | 5480201 | 5480214 |
| | | | | | Volker, Oskars | 28.01.2007 | 7:30-12:00 | 4,5 | | 168 | 5480215 | 5480241 |
| | | | | | Volker, Oskars | 28.01.2007 | 17:15-19:30 | 2,25 | | 168 | 5480242 | 5480249 |
| | | | | | Souleymane | 29.01.2007 | 7:15-12:00 | 4,75 | | 180 | 5480250 | 5480267 |
| | | | | | | | | [12,75] | 2,74875 | | | |
| 9D | Mirador Le President NE | *Scirpus/Sporobulus* marsh, deep water | 16.25.894 | 16.10.977 | Benedikt, Abdoulay | 27.01.2007 | 17:00-19:30 | 2,5 | | 160 | 5480146 | 5480149 |
| | | | | | Benedikt, Abdoulay | 28.01.2007 | 7:30-11:30 | 4 | | 160 | 5480150 | 5480169 |
| | | | | | Benedikt, Abdoulay | 28.01.2007 | 17:20-19:45 | 2,4167 | | 160 | 5480170 | 5480174 |
| | | | | | Benedikt, Abdoulay | 29.01.2007 | 7:20-11:30 | 4,17 | | 160 | 5480175 | 5480186 |
| | | | | | | | | [13,09] | 2,61733 | | | |
| 10A | Tiguet 2 | *Scirpus/Sporobulus* marsh with *Typha* islands | 16.27.267 | 16.16.563 | Anatoly, Angela, Viktar, Stefan, Wolfgang | 26.01.2007 | 11:30-12:30 | 1 | | 180 | 5487184 | 5487188 |
| | | | 16.27.267 | 16.16.563 | | 26.01.2007 | 16:45-19:45 | 3 | | 180 | 5487190 | 5487198 |
| | | | 16.27.267 | 16.16.563 | | 27.01.2007 | 8:00-12:00 | 3 | | 180 | 5464113 | 5464124 |
| | | | 16.27.267 | 16.16.563 | | 27.01.2007 | 18:00-19:30 | 1,5 | | 204 | 5464125 | 5464140 |
| | | | 16.27.213 | 16.16.976 | | 28.01.2007 | 7:45-12:00 | 4,25 | | 228 | 5464143 | 5464179 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | [12,75] | 3,16875 | | | |
| ##10B | Tiguet | *Scirpus*/*Sporobulus* marsh with *Typha* islands; surveyed (catchment) area from Angela et al.: 4.4 ha | 16.27.090 | 16.17.058 | Bruno, Julio, Carlos | 26.01.2007 | 11:30-12:30 | 1 | | 36 | 5487184 | 5487188 |
| | | | | | Bruno, Julio, Carlos | 26.01.2007 | 16:45-19:45 | 3 | | 36 | 5487189 | 5487199 |
| | | | | | Bruno, Carlos, Julio | 26.01.2007 | 11:00-12:00 | 1 | | 12 | 5487228 | 5487230 |
| | | | | | Bruno, Carlos, Julio | 26.01.2007 | 16:45-19:00 | 2,25 | | 12 | 5464100 | 5464111 |
| | | | | | Bruno, Julio, Carlos, Gaetan | 27.01.2007 | 7:30-18:30 | 5 | | 12 | 5464112, 5487231 | 5487246 |
| | | | | | Angela, Viktar, Anatoly, Oskars | 28.01.2007 | 7:45-12:00 | 4,25 | | 12 | 5464141 | 5464176 |
| | | | | | Angela, Wolfgang, Anatoly, Viktar | 28.01.2007 | 17:20-19:20 | 2 | | 12 | 5464180 | 5464186 |
| | | | | | Bruno, Carlos, Julio, Gaetan | 29.01.2007 | 7:30-12:00 | 4,5 | | 72 | 5487247 | 5487274 |
| | | | 16.27.274 | 16.17.078 | Angela, Victor, Anatoly, Wolfgang, Bruno, Julio, Carlos, Gaetan | 30.01.2007 | 8:30-12:00 | 3,5 | | 36 | 5464187 | 5464209 |
| | | | | | | 30.01.2007 | 9:30-11:00 | 1,5 | | 48 | 5487275 | 5487288 |
| | | | | | Anatoly, Victor | 31.01.2007 | 10:30-12:00 | 1,5 | | 24 | 5464241 | 5464249 |
| | | | | | Angela, Victor, Anatoly, Wolfgang, Bruno, Julio, Carlos, Gaetan | 01.02.2007 | 08:00-12:00 | 4 | | 72 | 5487289 | 5487327 |
| | | | | | Angela, Torsten, Zsolt | 07.02.2007 | 8:00-11:30 | 3,5 | | 24 | 5511077 | 5511088 |
| | | | | | | | | [37,00] | 1,56 | | | |
| 11 | E Tiguet near dune, not so suitable | *Scirpus*/*Sporobulus* marsh, more or less dense and laying vegetation (carpet) at some places; second net at a deep chanel 6 m large with *Typha* and *Scirpus* on the shallow banks; | 16.27.366 | 16.14.577 | Manga, Valentin | 30.01.2007 | 9:30-12:00 | 2,5 | | 144 | 5480187 | 5480191 |
| | | | | | Abdoulay | 30.01.2007 | 16:45-19:15 | 2,5 | | 144 | 5480192 | 5480196 |
| | | | | | Valentin, Benedikt | 01.02.2007 | 7:10-11:20 | 7,16 | | 153 | 5480197 5475101 | 5480200 5475138 |
| | | | | | Oskars | 01.02.2007 | 17:00-19:15 | 2,25 | | 144 | 5475139 | 5475140 |

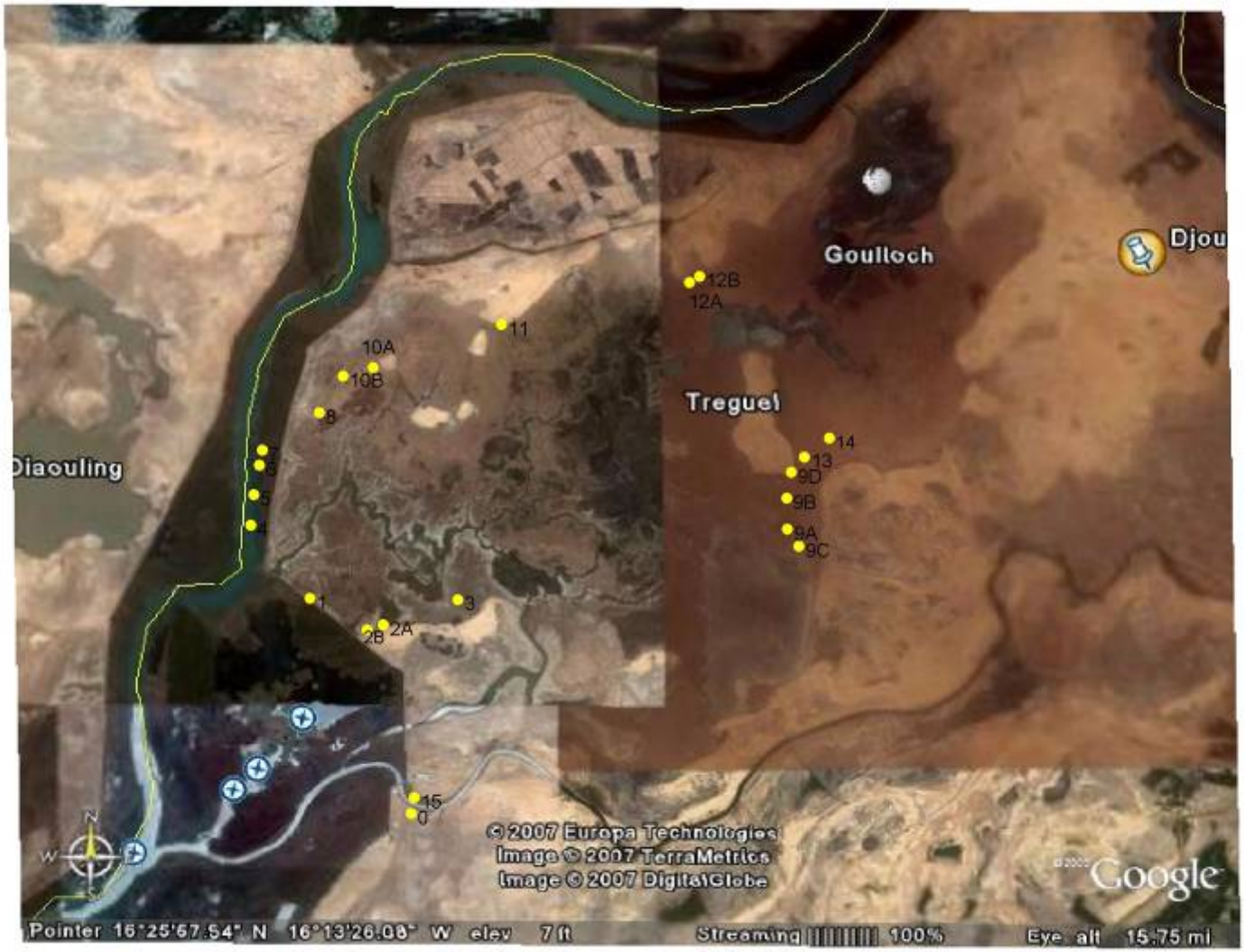
| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Oskars | 02.02.2007 | 7:15-11:45 | 4,5 | | 144 | 5475141 | 5475153 |
| | | third net: *Scipus/Sporobulus* marsh with ponds and *Typha* islands | 16.27.366 | 16.14.577 | Oskars | 05.02.2007 | 7:30-10:00 | 2,5 | | 144 | 5475190 | 5475195 |
| | | | | | Oskars | 07.02.2007 | 7:30-11:30 | 4 | | 144 | 5475196 | 5475217 |
| | | | | | Oskars | 07.02.2007 | 16:30-19:20 | 2,83 | | 144 | 5475218 | 5475230 |
| | | | | | Oskars | 08.02.2007 | 7:30-10:30 | 3 | | 144 | 5475231 | 5475245 |
| | | | | | | | | [31,24] | 5,70375 | | | |
| 12A | Diadiem II a | *Scirpus/Sporobulus* marsh wet with ponds and *Typha* islands | 16.28.304 | 16.12.407 | Volker, Martin | 30.01.2007 | 17:30-19:30 | 2 | | 48 | 5480268 | 5480281 |
| | | | | | Volker, Martin | 01.02.2007 | 7:30-11:00 | 3,5 | | 168 | 5480281 | 5480314 |
| | | | | | Stefan, Volker | 01.02.2007 | 17:00-19:00 | 2 | | 168 | 5480315 | 5480333 |
| | | | | | Stefan, Volker | 02.02.2007 | 7:30-12:00 | 4,5 | | 168 | 5480340 | 5480363 |
| | | | | | Stefan, Volker | 05.02.2007 | 7:40-10:00 | 2,33 | | 144 | 5480375 | 5480384 |
| | | | | | | | | [14,33] | 2,6394 | | | |
| #12B | Diadiem II b | *Scirpus/Sporobulus* marsh wet with ponds and *Typha* islands | 16.28.321 | 16.12.340 | Wolfgang, Angela, Anatoly | 30.01.2007 | 17:15-19:30 | 2,25 | | 156 | 5464210 | 5464240 |
| | | | | | Wolfgang, Angela, Anatoly | 01.02.2007 | 7:40-12:00 | 4,33 | | 156 | 5464250 | 5464280 |
| | | | | | Angela, Torsten | 01.02.2007 | 17:00-19:00 | 2 | | 156 | 5480321 | 5480339 |
| | | | | | Angela, Torsten | 02.02.2007 | 07:45-11:00 | 3,25 | | 156 | 5480344 | 5480362 |
| | | | | | Bruno | 02.02.2007 | 07:30-9:00 | 1,5 | | 30 | 5487328 | 5487342 |
| | | | | | Angela, Torsten | 05.02.2007 | 8:00-10:30 | 2,5 | | 156 | 5480378 | 5480386 |
| | | | | | Angela, Torsten | 08.02.2007 | 8:30-10:30 | 2 | | 24 | 5511089 | 5511092 |
| | | | | | | | | [17,83] | 2,9106 | | | |
| 13 | N Grand Lac | *Scirpus/Sporobulus* marsh wet, drying up | 16.26.037 | 16.10.856 | Volker | 06.02.2007 | 7:30-11:00 | 3,5 | | 180 | 5480387 | 5480409 |
| | | | | | Volker | 06.02.2007 | 17:00-19:00 | 2 | | 180 | 5480410 | 5480428 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Volker, Stefan | 07.02.2007 | 7:30-12:00 | 4,5 | | 180 | 5480429 | 5480464 |
| | | | | | | 07.02.2007 | 17:00-19:00 | 2 | | 180 | 5480465 | 5480475 |
| | | | | | Stefan | 08.02.2007 | 7:30-10:00 | 2,5 | | 180 | 5480476 | 5480495 |
| | | | | | | | | [14,50] | 3,2625 | | | |
| ##14A | Grand Lac N TS 9 | *Scirpus/Sporobulus* marsh wet, drying up | 16.26.124 | 16.10.43 | Oskars, Angela | 03.02.2007 | 8:30-9:00 | 1,5 | | 24 | 5475154 | 5475158 |
| | | | | | Oskars, Angela | 03.02.2007 | 9:15-10:15 | 1 | | 24 | 5475159 | 5475162 |
| | | | | | | | | [2,50] | 0,075 | | | |
| ##14B | Grand Lac, 300-400 m S von 14A | *Scirpus/Sporobulus* marsh wet, drying up | near 13 | near 13 | Volker, Zsolt | 03.02.2007 | 7:30-11:00 | 3,5 | + | 24 | 5480364 | 5480367 |
| | | | | | | | | [3,50] | 0,105 | | | |
| | | | | | | | | [6,00] | 0,18 | | | |
| 15 | Typha near Biol. Station | high and dense *Typha/ Phragmites*, wet | 16.21.584 | 16.16.267 | Julio | 01.02.2007 | 17:00-19:30 | 2,5 | | 72 | 5464281 | 5464284 |
| | | | | | Julio | 02.02.2007 | 8:30-10:30 | 2 | | 72 | 5464285 | 5464297 |
| | | | | | | | | [4,50] | 0,405 | | | |
| 16 | Bango | | 16.05.137 | 16.25.055 | Bruno | 07.02.2007 | 8:00-9:00 | 1 | | 36 | 5487343 | 5487345 |
| | | | | | | | | [1,00] | 0,045 | | | |

# I.3 - Photo documentation of trapping sites

# I.4 - Location of trapping sites, borders of suitable habitat (maps)

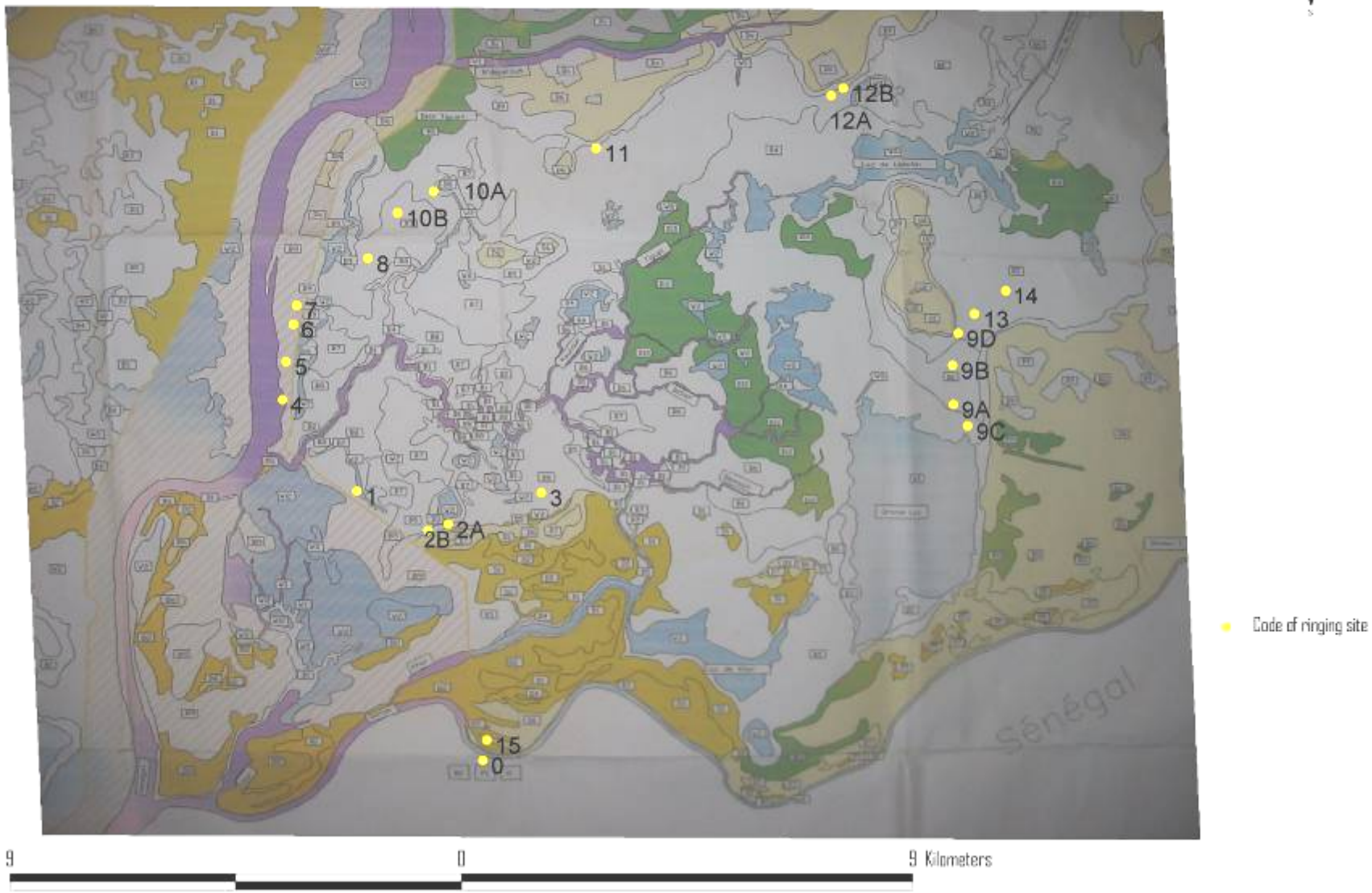
# Ringing sites in the Djoudj National Park



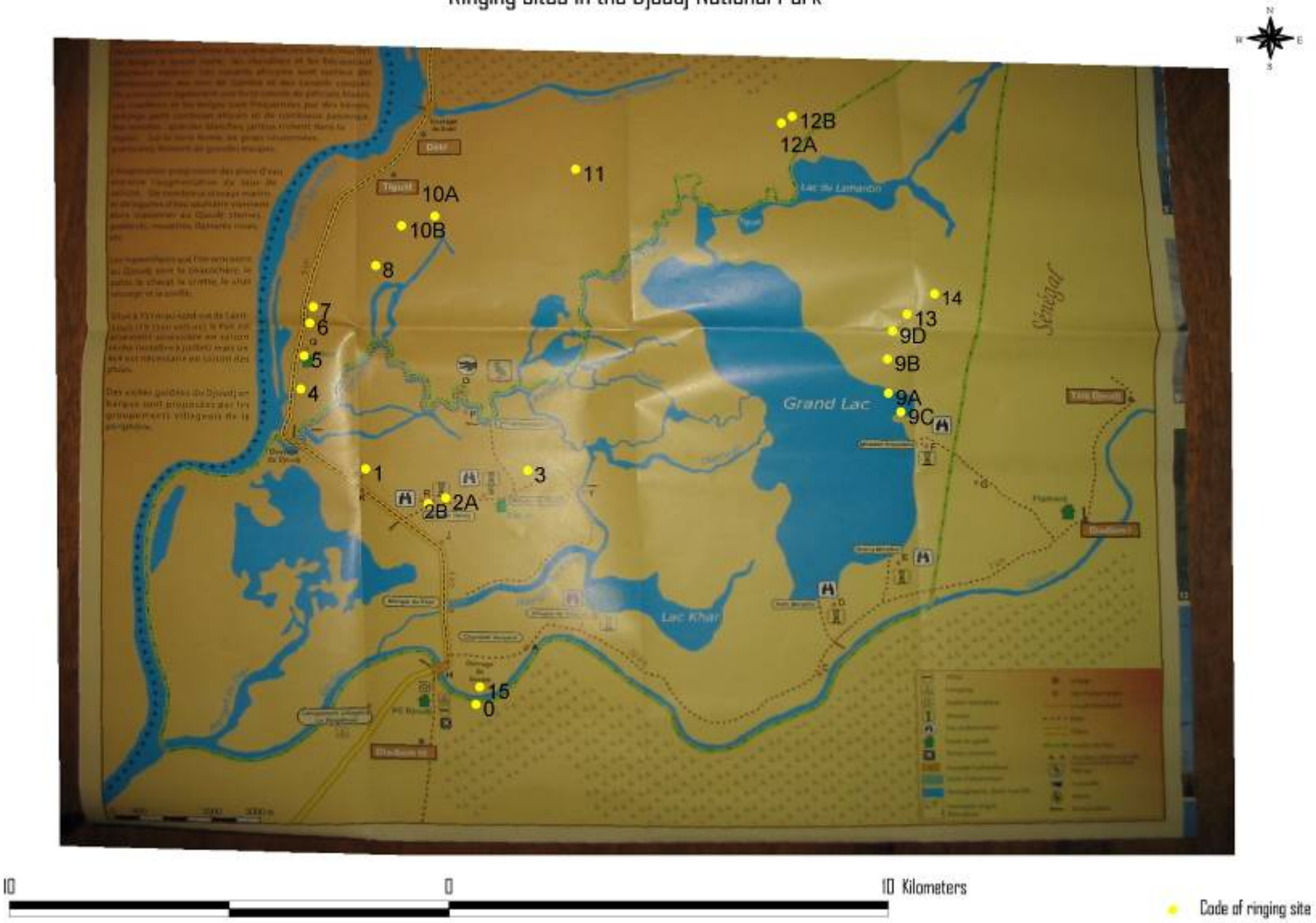

Code of ringing site

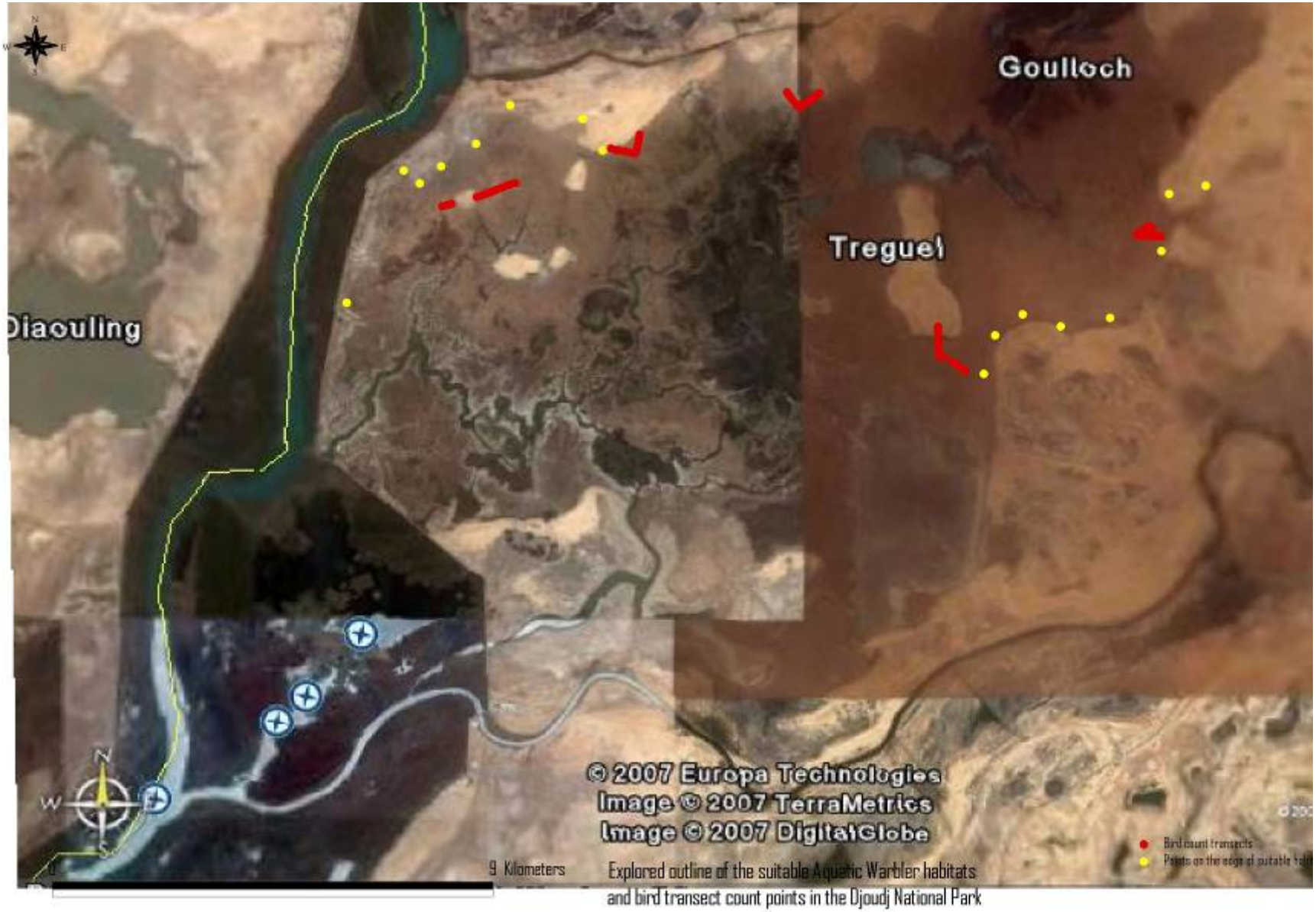
10 0 10 Kilometers

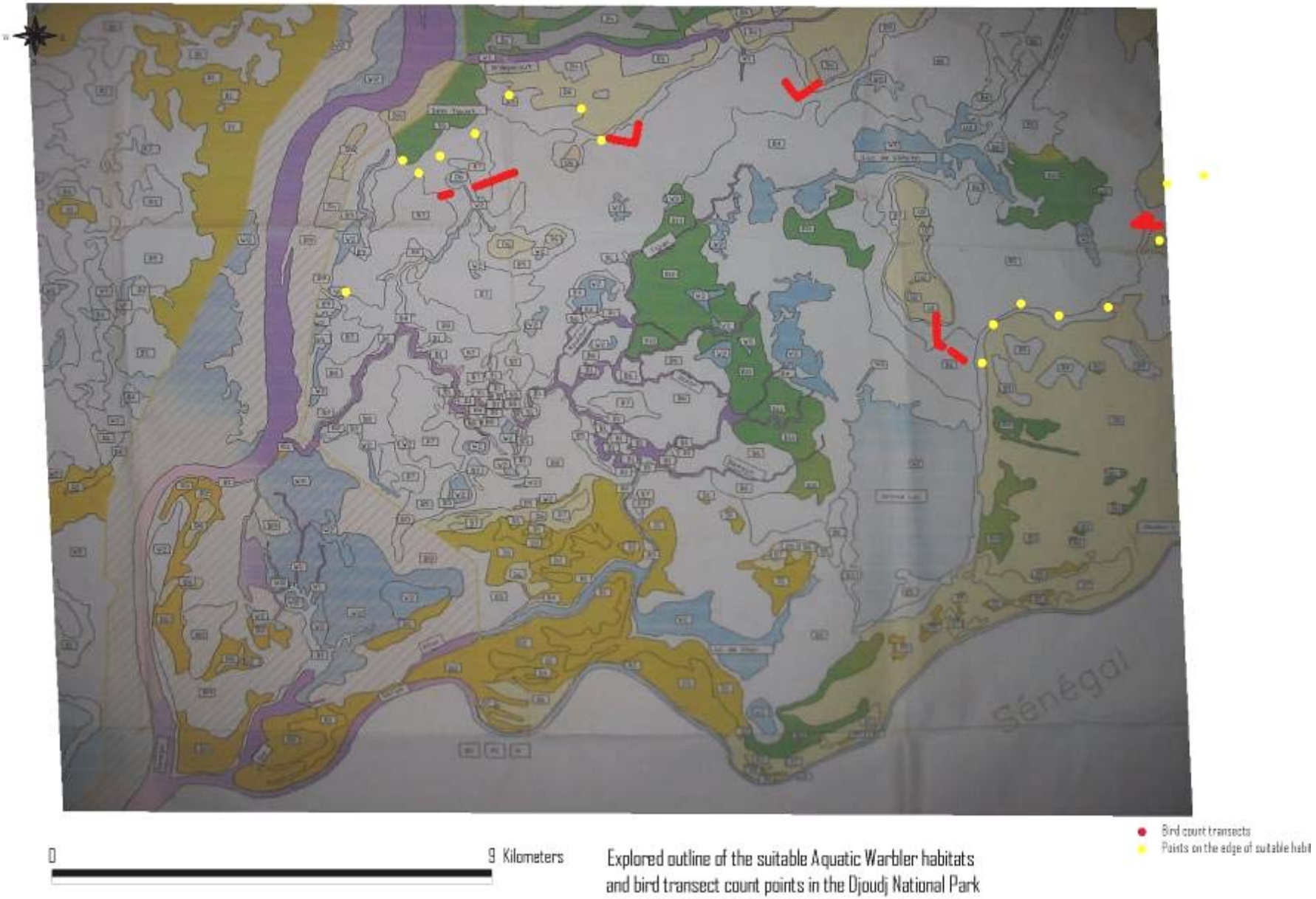
Ringing sites in the Djoudj National Park



Ringing sites in the Djoudj National Park




Goulloch
Treguel
Diaouling
© 2007 Europa Technologies
Image © 2007 TerraMetrics
Image © 2007 DigitalGlobe
9 Kilometers
Explored outline of the suitable Aquatic Warbler habitats
and bird transect count points in the Djoudj National Park




Explored outline of the suitable Aquatic Warbler habitats and bird transect count points in the Djoudj National Park

# Annex II - Mist-netting work

(Photo documentation)

# Annex III - Trapping results

**III.1 - Trapped birds (European species)**

**III.2 – Trapped birds – African species and waders (not ringed)**

**III.3 – Cage traps (European species)**

**III.4 - Ring list**

**III.3 - Photo documentation ‘birds in the hand’**

# Annex III.1- Trapped birds in mist nets, European species (without waders)

| species / site | 0 | 1 | 2A | 2B | 3 | 4 | 5 | 6 | 7 | 8 | 9A | 9B | 9C | 9D | 10A | 10B | 11 | 12A | 12B | 13 | 14 | 15 | 16 | all |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| date | 18.1. | 20.-21.1. | 20.-22.1. 2.-8.2. | 6.-8.2. | 20.-22.1. | 22.-24.1. | 22.-24.1. | 22.-24.1. | 23.-24.1. | 24.-26.1. | 24.-27.1. | 24.-27.1. | 27.-29.1 | 27.-29.1 | 25., 27.-28.1. | 25.-31.1., 7.2. | 30.1.-08.2. | 30.1.-02.2., 05.2. | 30.1., 1.-8.2. | 6.-8.2. | 3.2. | 1.-2.2. | 7.2. | $\sum_i$ |
| hours | 0,5 | 15 | 39 | 15 | 15,5 | 16,5 | 17,3 | 11,2 | 10,3 | 12,5 | 19,3 | 19,3 | 12,8 | 13,1 | 12,8 | 37 | 31,2 | 14,3 | 17,8 | 12,5 | 6 | 4,5 | 1 | |
| *Acrocephalus arundinaceus* | | | | | | 1 | | | | | | | | | | | | | | | | | | **1** |
| *Acrocephalus paludicola* | | | | | | | | | | | 3 | 2 | 2 | 1 | 1 | 34 | 5 | 2 | 6 | | | | | **56** |
| *Acroceph. schoenobaenus* | 3 | 23 | 232 | 82 | 6 | 52 | 51 | 9 | 12 | 13 | 21 | 16 | 21 | 20 | 12 | 54 | 37 | 47 | 88 | 29 | 13 | 9 | 3 | **853** |
| *Acrocephalus scirpaceus* | | 3 | 17 | 17 | 4 | 21 | 18 | 9 | 5 | 1 | | | | 1 | 1 | | | 1 | | | | 7 | | **105** |
| *Anthus trivialis* | | | 1 | | | | | | | | | | | | | | | | | | | | | **1** |
| *Calidris minuta* | | | | | | | | | | | | | | | | | 1 | | | | | | | **1** |
| *Gallinago gallinago* | | | | | | | | | | | 1 | | | | | 1 | | | | | | | | **2** |
| *Hippolais opaca* | | | 2 | | | | | | | | | | | | | | | | | | | | | **2** |
| *Hippolais pallida reiseri* | | | | | 1 | | | | | | | | | | | | | | | | | | | **1** |
| *Hirundo rustica* | | | 1 | | | | | | | | | | | | | | | | | | | | | **1** |
| *Locustella luscinioides* | | | 2 | 2 | | | | | | | | | | | | | | | | | | | | **4** |
| *Locustella naevia* | | | 2 | 1 | 5 | | 1 | | 1 | 1 | 4 | 6 | | 1 | 1 | 10 | 10 | | | 4 | | | | **47** |
| *Luscinia svecica* | | 1 | 23 | 3 | 2 | 4 | 4 | 2 | | 4 | 1 | 4 | | 1 | | 1 | 1 | 2 | 1 | 8 | | | | **62** |
| *Motacilla alba* | | | | | | 1 | 1 | | | | | | | | | | | | | | | | | **2** |
| *Motacilla flava* | | 6 | 30 | 22 | 3 | 7 | 2 | | | 62 | 33 | 25 | 37 | 16 | 47 | 85 | 59 | 18 | 10 | 29 | 1 | 1 | | **493** |
| *Oenanthe oenanthe* | | | 1 | | | | | | | | | | | | | | | | | | | | | **1** |
| *Phoenicurus phoenicurus* | | | | 1 | | | | | | | | | | | | | | | | | | | | **1** |
| *Phylloscopus collybita* | 1 | 14 | 40 | 40 | 21 | 14 | 17 | | 2 | | 3 | 19 | 3 | 5 | | | 2 | 2 | 1 | 11 | 9 | | | **204** |
| *Porzana pusilla* | | | | | | | | | | 2 | 1 | | | | 1 | 1 | | | | | | | | **5** |
| *Riparia riparia* | | | 5 | 3 | | | | | | 4 | | 4 | | 1 | 3 | | 8 | 1 | 1 | 22 | | | | **52** |
| *Sylvia cantillans* | | 2 | 4 | 3 | 10 | 4 | | | 1 | 1 | | 6 | 1 | | | 1 | 2 | | | 2 | 1 | | | **38** |
| *Sylvia communis* | | | 2 | | 1 | 1 | | | | | | | | | | | 1 | | | | 1 | | | **6** |
| $\sum_i$ | **4** | **49** | **362** | **174** | **53** | **105** | **94** | **20** | **21** | **88** | **67** | **82** | **64** | **46** | **66** | **187** | **126** | **73** | **107** | **105** | **25** | **17** | **3** | **1938** |
| **Ind. per 8 h x 100 m** | **0.02** | **2.66** | **3.06** | **1.06** | **3.83** | **2.06** | **2.48** | **1.01** | **1.08** | **5,01** | **3.87** | **3.53** | **2.75** | **2.62** | **3.17** | **1.56** | **5.70** | **2.64** | **2.91** | **3.26** | **0.18** | **0.41** | **0.05** | **2.39** |

# Annex III.2 - Trapped birds in mist nets and cage traps: African species and waders (not ringed)

| species / site | 0 | 1 | 2A | 2B | 2T | 3 | 4 | 5 | 6 | 6T | 7 | 8 | 9A | 9AT | 9B | 9C | 9CT | 9D | 10A | 10B | 11 | 12A | 12B | 12T | 13 | 13T | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| date | 18.1. | 20.-21.1. | 20.-22.1., 2.-8.2. | 6.-8.2. | 21.-22.1. | 20.-22.1. | 22.-24.1. | 22.-24.1. | 22.-24.1. | 23.-24.1. | 23.-24.1. | 24.-26.1. | 24.-27.1. | 24.-27.1. | 24.-27.1. | 27.-29.1 | 27.-29.1. | 27.-29.2 | 25., 27.-28.1. | 25.-31.1., 7.2. | 30.1.-8.2. | 30.1.-2.2., 5.2. | 30.1., 1.-8.2. | 31.1., 1.2.. 5.2. | 6.-8.2. | 6.-8.2. | 3.2. | 1.2., 2.2. | 7.2. |
| *Acrocephalus baeticatus* | | | + | + | | + | 31 | 35 | + | | + | 1 | | | | | | | | | 2 | 3 | 1 | | | | | 1 | |
| *A. baeticatus* - ringed | | | 1 | 1 | | | | 2 | 7 | 1 | | | | | | | | | | | | 2 | | | | | | 5 | |
| *Acrocephalus rufescens* | | | | | | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| *Alcedo cristata* | | + | + | + | | + | 14 | 6 | | | | + | | | | | | + | + | | | | + | | + | | | + | |
| *Amaurornis flavirostra* | | | + | | + | | + | | + | | | | | | | | | | | | | | | + | | | | | |
| *Camaroptera chloronota* | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Centropus senegalensis* | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | |
| *Ceryle rudis* | | | | | | | | | | | | | | | | | | | | | | | | | + | | | | |
| *Cinnyris pulchellus* | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Cisticola galactotes* | | + | + | + | | 5 | + | 4 | | | + | + | + | | + | + | | | + | + | + | 8 | + | | | | + | 3 | |
| *Cisticola juncidis* | | | | | | 2 | | | | | | | + | | + | + | | | + | + | + | + | + | | + | | | | |
| *Dendropicos goertae* | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | |
| *Euplectes afer* | | + | + | | | + | | 2 | | | + | + | | | | + | | | | | + | + | + | | + | | | | |
| *Euplectes franciscanus* | | | | | | | | | | | | | | | | | | | | | + | | | | | | | | |
| *Galerida cristata* | | | | | | + | + | | | | | 1 | | | | | | | 1 | | + | 1 | | | | | | | |
| *Glareola pratincola* | | | | | | | | | | | | | | | 4 | | | | | | | | | | | | | | |
| *Halcyon chelicuti* | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Halcyon leucocephala* | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | |
| *Hippolais pallida reiseri* | | | | | | + | | | | | | | | | | | | | | | | | | | | | | | |
| *Merops pusillus* | | | + | + | | 2 | | 3 | | | | + | | | | | | | | | | | | | | | | | |
| *Oena capensis* | | | | | | | | | | | | + | | | | | | | | | | | + | | | | | | |
| *Passer luteus* | | | + | | | | | | | | | + | | | | | | | | | + | + | + | | | | | + | |
| *Ploceus cucullatus* | | | + | + | | | | | | | | | | | | | | | | | | + | | | + | | | + | |
| *Ploceus melanocephalus* | | + | + | + | | + | + | 50 | | | + | + | | | | + | | + | + | + | + | + | + | | + | | | + | |
| *Porphyrio porphyrio* | | | | | | | | | | | | | | | | | | | | | | | + | | | | | | |
| *Prinia fluviatilis* | | | + | + | | + | + | | + | | | + | | | | | | | | | | | | | + | | | | |
| *Quelea quelea* | | + | + | + | | + | | 3 | | | + | + | + | | + | + | | | + | | + | + | + | | + | | | + | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Rostratula benghalensis* | 2 | | | + | 2 | | 1 | | | | | | | 1 | 1 | | 1 | | | | | | | | | | | | |
| *Saxicola torquatus* | | | + | | | | | | | | | 1 | | | | | | | | | | | | | | | | | |
| *Sporaeginthus subflavus* | | | | | | | | | 3 | | | | | | | | | | | | | + | | + | | | | | |
| *Streptopelia decipiens* | | | | | | | | | | | | | | | | | | | 1 | + | | | | | | | | | |
| *Sylvietta brachyura* | | | | + | | + | | | | | | | | | | | | | | | | | | | | | | | |
| *Tringa glareola* | | | + | + | | + | | | | | | | + | | | | | | 1 | | | | | | | + | | | |
| *Tringa ochropus* | | | | + | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Turnix sylvatica* | | | | | | | | | | | | | | | | | | | | | | | | | | | 2 | | |

## III.3 - Bird captures in cage traps (European species)

| **Trapping site** | 2T | 6T | 9AT | 9CT | 12T | 13T | All sites |
|---|---|---|---|---|---|---|---|
| **Trapping date** | 21.-22.1. | 23.-24.01. | 24.-29.01. | 37.-29.01 | 31.1.\|1.2.\|5.2. | 6.-8.2. | |
| **species** | | | | | | | |
| *Acrocephalus schoenobaenus* | 2 | 2 | | | 6 | 4 | 14 |
| *Acrocephalus scirpaceus* | | 1 | | | | | 1 |
| *Gallinago gallinago* | | | 2 | | | | 2 |
| *Locustella naevia* | | | 1 | | | | 1 |
| *Luscinia svecica* | 1 | | | | | | 1 |
| *Motacilla flava* | 9 | | 12 | 6 | 3 | 12 | 42 |
| *Phylloscopus collybita* | | | | | | 1 | 1 |
| *Porzana parva* | | 1 | | | 1 | | 2 |
| *Porzana pusilla* | 2 | | 2 | 1 | 4 | 2 | 11 |
| | **14** | **4** | **17** | **7** | **14** | **19** | **75** |

# III.4 - Ring list

# III.3 - Photo documentation ‘birds in the hand’

# Annex IV - Bird observations

# IV.1 - Systematic list of bird records

# IV.2 - Photo documentation ‘birds in the wild’

# **Annex V – Wild animals** (photo documentation)

# Annex VI - AWCT people and ringing work
(photo documentation)

# Annex VII - Satellite image analysis
(Report of Graeme Buchanan & Andrew Nelson)

# VIII - Public relations: articles in newspapers and journals

FA = Frankfurter Allgemeine Zeitung

FR = Frankfurter Rundschau

BZ = Berliner Zeitung

MOZ = Märkische Oderzeitung

Seite 10 / Mittwoch, 28. Februar 2007, Nr. 50 FAZ Deutschland

# Singt in Senegals Sümpfen

## Eine Expedition findet das Winterquartier des Seggenrohrsängers / Von Roland Knauer

FRANKFURT, im Februar. Öde sieht es aus in den Sümpfen um den Djoudj-Nationalpark im Norden Senegals. So weit das Auge reicht, wogt kniehohes Gras unter der Wintersonne. Aber Martin Flade findet in der Ödnis Vielfalt. Der Forscher vom Landesumweltamt Brandenburg leitet eine Expedition von 19 Europäern und 12 Afrikanern, die den am stärksten bedrohten Singvogel des europäischen Festlands aufspüren soll, den Seggenrohrsänger. Und tatsächlich: Unter den mehr als 2000 Zugvögeln, die er im Gras fängt, sind auch 56 Seggenrohrsänger.

Im Sommer lebt der unscheinbare Vogel in den letzten intakten Niedermooren Zentraleuropas. Noch am Anfang des 20. Jahrhunderts war der Gesang der Seggenrohrsängermännchen am Havelländischen Luch und am Rhinluch im heutigen Bundesland Brandenburg die Nachtmusik. Mehr als 10 000 Paare des zehn bis zwölf Gramm leichten Vogels lebten dort. Aber die meisten großen Sumpfgebiete Europas sind mittlerweile trockengelegt. Der Seggenrohrsänger verlor seine Heimat. Im Jahr 1992 kannte man nur noch ein größeres Vorkommen mit 2500 Seggenrohrsängermännchen in den Biebrza-Sümpfen im Osten Polens. Ornithologen zählen meist nur die Männchen, deren Schnarren und Flöten man weit hört. Die unauffälligen Weibchen dagegen entdecken selbst Spezialisten nur zufällig, denn sie kümmern sich um die Brut – und singen nicht.

In Deutschland zählten die Vogelforscher im vergangenen Jahr nur noch fünf Männchen, im Nationalpark Unteres Odertal an der Grenze zu Polen. Auf der anderen Seite gibt es noch einmal etwa siebzig Männchen und ähnlich viele Weibchen, mehr Seggenrohrsänger Europas sind nicht übriggeblieben. Der Vogel galt daher als vom Aussterben bedroht – bis Martin Flade mit Norbert Schäffer von der britischen Royal Society for the Protection of Birds (RSPB) sowie anderen deutschen und weißrussischen Vogelkundlern im Sommer 1995 in einer abenteuerlichen Expedition in die Pripjet-Sümpfe im Süden Weißrusslands vorstieß. Als die Expedition und später der weißrussische Ornithologe Alexander Kozulin dort 10 000 Seggenrohrsängermännchen orteten, war das eine Sensation: Zwei Drittel des Weltbestands brüten in Weißrussland. Weitere 2500 Männchen entdeckten Mitglieder des BirdLife International Aquatic Warbler Conservation Team in der Ukraine, noch einmal 500 Männchen in der ungarischen Hortóbagy Puszta. In Weißrussland kamen die Wissenschaftler und Naturschützer gerade noch rechtzeitig. Die Regierung in Minsk hatte gerade beschlossen, die letzten großen Niedermoore Europas am Pripjet trockenzulegen. Dort sollten die Bauern, die vom Fallout der Kernreaktorkatastrophe in Tschernobyl aus ihrer Heimat vertrieben worden waren, neue Äcker erhalten. Als die Naturschützer mit dem Greifswalder Hochschullehrer Michael Succow an der Spitze der Regierung erklärten, das Überleben des Singvogels hänge von ihrem Land ab, handelten die Verantwortlichen: Die Moore samt Randgebieten in den Pripjet-Sümpfen wurden mit

*Da ist er: Der Seggenrohrsänger überwintert in Senegal.* Foto Lars Lachmann

Unterstützung der deutschen Michael-Otto-Stiftung und des RSPB geschützt.

Im Sommer ist der Seggenrohrsänger nun also weitgehend in Sicherheit. Im Spätsommer aber macht sich der Vogel auf den Weg in den Süden und überwintert irgendwo südlich der Sahara. Da aber niemand wusste, wo genau er den Winter verbringt, konnte man ihn nicht schützen. Die Forscher hefteten sich dem Vogel mit modernsten Methoden wie der Isotopen-Analyse an die Schwanzfedern. In diesen Federn ist das Verhältnis der Kohlenstoffsorten C-12 und C-13 unterschiedlich – je nach der Region, in der der Vogel fraß, als ihm die Federn wuchsen. Auch die Verhältnisse der Wasserstoffatome H und D sowie der Stickstoffatome N-14 und N-15 unterscheiden sich je nach Herkunft. Da Seggenrohrsänger im Winterquartier ihre Flugfedern wechseln, fingen Forscher in mehreren Ländern ein paar Tiere im Sommerquartier und analysierten die Verhältnisse der drei Isotopenpaare in jeweils einer einzigen Schwanzfeder. Das Ergebnis verglichen sie mit den Isotopen-Verhältnissen anderer Vogelarten wie dem Schwarzrückenzistensänger, die in Gegenden Afrikas leben, in denen man das Winterquartier der Seggenrohrsänger vermutete. Danach war anzunehmen, dass die meisten Seggenrohrsänger in Sumpfgebieten südlich der Sahara zwischen dem 13. und dem 20. Breitengrad überwintern. Wissenschaftler der Universität Kopenhagen hatten inzwischen Gebiete eingegrenzt, in denen Seggenrohrsänger überwintern könnten – irgendwo zwischen Senegal und Mali. Aber wo genau? Mitte Januar 2007 war es so weit. Mit 18 Vogelkundlern aus zehn europäischen Ländern brach Flade im Auftrag des Sekretariats der Bonner Konvention für den Schutz wandernder Tierarten nach Senegal auf, mit insgesamt 800 Meter langen Netzen aus feinem Nylon.

Mindestens ein Drittel der Seggenrohrsänger der Erde scheint in den Grassümpfen am Djoudj-Nationalpark zu überwintern. Vielleicht sind im Januar und Februar sogar fast alle Seggenrohrsänger des europäischen Festlandes in den Sümpfen am Unterlauf des Senegal-Flusses, die mit 250 Quadratkilometern etwa so groß sind wie das Stadtgebiet von Frankfurt. Viele der früheren Feuchtgebiete sind heute Reis- oder Zuckerrohrfelder. Immerhin aber scheinen die letzten Winterquartiere dem Seggenrohrsänger und vielen anderen seltenen Vögeln Europas zunächst erhalten zu bleiben: Die Verwaltung des Nationalparks kontrolliert den Wasserhaushalt – und seltene Gäste sind für einen Nationalpark eine Attraktion.

Für Martin Flade ist die Suche noch nicht zu Ende. Zwar hat sein spanischer Kollege Carlos Martinez vom Global Nature Fund einen Seggenrohrsänger in Senegal gefangen, den er schon einmal an einem Vogelrastplatz im Norden Spaniens in Händen hielt. Aber von den bedrohten Seggenrohrsängern im Odertal Brandenburgs und Polens hat Martin Flade keinen Einzigen im Senegal gefunden. Mit Hilfe der jetzt im Senegal erbeuteten Schwanzfedern, weiteren Isotopenanalysen des britischen RSPB, den dänischen Computermodellen für die Lebensräume und einer Expedition vielleicht im Winter dürfte man die Winterquartiere der Pommern-Population aber wohl auch noch finden.

# Fahndungserfolg im Senegal

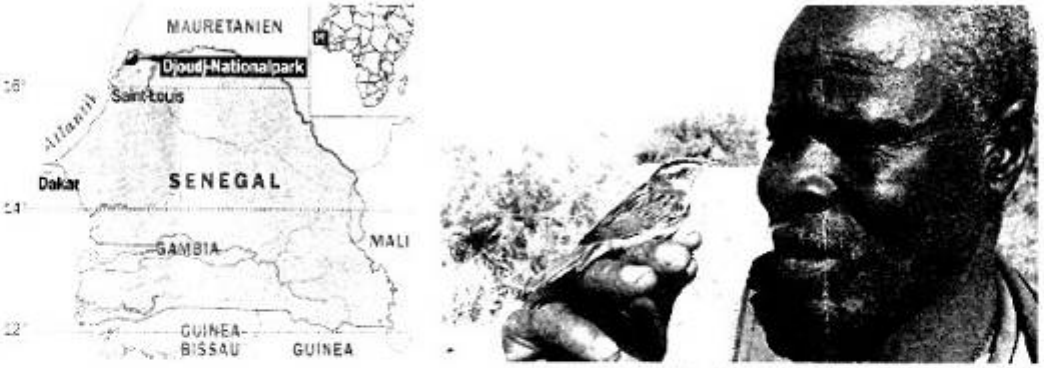
***Bald brütet der seltene Seggenrohrsänger wieder im Odertal. Eine Ornithologen-Expedition hat jetzt sein Winterquartier aufgespürt***

VON KERSTIN VIERING

Lange blieb es ein Geheimnis, wo die unscheinbaren braunen Vögel den Winter verbringen. Irgendwo in Marokko oder Mauretanien hatte sich ihre Spur stets verloren. Nun aber sind europäische und afrikanische Wissenschaftler dem Seggenrohrsänger auf die Schliche gekommen: Im Umkreis des Djoudj-Nationalparks im Nordwesten Senegals haben sie ein etwa hundert Quadratkilometer großes Gebiet entdeckt, in dem etwa ein Drittel der gesamten Weltpopulation überwintert.

„Um die Vögel künftig besser schützen zu können, wollten wir unbedingt wissen, wo sie die kalte Jahreszeit verbringen", sagt Martin Flade vom Landesumweltamt Brandenburg in Eberswalde, der die Expedition in den Senegal leitete. Schließlich gilt der Seggenrohrsänger mit dem wissenschaftlichen Namen *Acrocephalus paludicola* als die am stärksten bedrohte Singvogelart Europas. Seine Lebensräume in Niedermooren sind vielerorts trocken gelegt und damit zerstört worden. Weltweit soll es noch etwa fünfzehntausend Paare geben, von denen mehr als die Hälfte in Weißrussland brüten. In Deutschland ist der Bestand der früher sehr häufigen Vögel auf höchstens zehn Paare im Nationalpark Unteres Odertal geschrumpft.

Um die gefiederten Moorbewohner zu retten, gibt es seit dem Jahr 2003 ein internationales Zusatzabkommen zur Bonner Konvention zum Schutz wandernder Tierarten. Infolgedessen stehen nun die wichtigsten Brutgebiete in Weißrussland, Ostpolen und der Ukraine unter Schutz. Das würde aber wenig nützen, wenn vielleicht die – bisher unbekannten – Winterquartiere der Vögel gefährdet wären.




**Seggenrohrsänger überwintern im Djoudj-Nationalpark im Nordosten Senegals (Karte). Der senegalesische Ornithologe Indega Bindia zeigt einen der seltenen Singvögel, die jetzt auf einer Expedition in dem Park entdeckt wurden.**

Erste Hinweise auf die gesuchte Region entdeckten britische Vogelschützer von der Royal Society for the Protection of Birds (RSPB) in den Federn der Tiere. „Seggenrohrsänger wechseln im Winterquartier ihr Gefieder", erläutert RSPB-Mitarbeiter Norbert Schäffer. In den nachwachsenden Federn lagern sie dabei je nach Lebensraum unterschiedliche Mengen von schweren und leichteren Kohlenstoff-Isotopen ein. Dieses charakteristische Verhältnis haben die Forscher bei Seggenrohrsängern, die in Europa gefangen wurden, analysiert. Die Ergebnisse verglichen sie anschließend mit denen von Schwarzrücken-Zistensängern, deren Verbreitungsgebiete in Afrika bekannt sind. Fazit: Das geheimnisvolle Winterquartier musste nördlich des Äquators liegen, irgendwo zwischen dem 13. und 17. Breitengrad.

Im nächsten Schritt grenzten Ornithologen der Universität Kopenhagen das Gebiet weiter ein. Auf der Basis von Vegetations- und Klimadaten berechneten sie, welche afrikanischen Feuchtgebiete im Winter noch soviel Wasser haben, dass sie als Seggenrohrsängerquartier in Frage kommen. Und schließlich wälzten die dänischen Forscher alte Berichte über frühere Funde von Seggenrohrsängern in Afrika. „Diese Indizien zusammengenommen wiesen auf den Norden Senegals hin", sagt Martin Flade. Also brach eine Suchexpedition mit 19 europäischen und 12 afrikanischen Ornithologen und Naturschützern Mitte Januar dorthin auf.

Tagelang schlugen sich die Forscher durch dichtes, drei Meter hohes Schilf – von Seggenrohrsängern keine Spur. Schließlich fand die Expedition im Umkreis des Djoudj-Nationalparks große überschwemmte Flächen mit kniehohem Gras: Genau so sehen auch die Brutgebiete der Vögel in Europa aus.

Also baute das Team dort lange Netze auf und zog ein Seil durch das Gras, um die Vögel aufzustöbern und in die Netzfallen zu scheuchen. Tatsächlich verfingen sich Tausende von Wintergästen aus Europa in den Maschen: Schilfrohrsänger, Uferschwalben, Schafstelzen und Blaukehlchen.

Den ersten Seggenrohrsänger fand Carlos Martinez von der spanischen Organisation Fundación Global Nature. Der Ornithologe erkannte den Vogel sogar: Er hatte ihn in der Lagune La Nava im Nordwesten Spaniens schon einmal gefangen und beringt.

Während der Expedition, die im Februar endete, gingen den Forschern weitere 55 Seggenrohrsänger ins Netz. Alle Vögel mussten eine Schwanzfeder für die Isotopenanlyse opfern, wurden beringt und wieder freigelassen.

Noch ist das Winterquartier der gefiederten Weltreisenden nicht in Gefahr. Wie sich die Lage in Djoudj jedoch langfristig entwickelt, weiß niemand. Denn Wasser ist knapp in der Region. Da könnte es schon bald zum Konflikt kommen zwischen dem Schutz der Feuchtgebiete und den Interessen der Bauern, die ihre Felder bewässern wollen. Zudem liegt das Vogel-Dorado am südlichen Rand der Sahara. Die Wüste aber breitet sich immer weiter in Richtung Äquator aus. Sie wird die Moorvögel wie den Seggenrohrsänger früher oder später wohl vertreiben.

Berliner Zeitung, Wissenschaft, 10. 3. 2007

# Entdeckung in Afrika

## Der Seggenrohrsänger gilt inzwischen als Europas seltenster Singvogel / Das Winterquartier in Senegal ist bedroht

VON STEPHAN BÖRNECKE

Ein Allerweltsvogel wie Spatz und Meise war der ähnlich große Seggenrohrsänger nie. Und doch muss er vor hundert Jahren in den Mooren Norddeutschlands oder im Havelluch vor Berlin in großer Zahl gelebt haben: Allein in Brandenburg tummelten sich damals, als die Moore noch keine Agrarstandorte waren, so um die 10 000 Seggenrohrsänger in den sumpfigen Grasländern.

In Deutschland singt Ende April vielleicht noch ein halbes Dutzend Männchen, berichtet der Ornithologe Martin Flade, und zwar ausschließlich im Nationalpark Unteres Odertal in der Nordostecke der Republik. Drüben, im polnischen Teil des Odertals, sind es zwar noch ein paar Vögel mehr. Doch auch dort leben nur Reste einer ehedem großen pommerschen Population.

Wie nur wenige andere ehemals heimische Vögel wurde der Seggenrohrsänger durch eine radikale Vernichtung seines Lebensraums aus Deutschland fast vollständig vertrieben. 95 Prozent seines europäischen Lebensraums ist zerstört. Zuletzt hatte man ihn noch in der Nähe von Greifswald gehört. Doch dann wurde er auch dort Opfer einer intensiven Beweidung.

Heute ist der Seggenrohrsänger europaweit der seltenste Singvogel, seltener noch als Großtrappe und Schreiadler – und deshalb birgt er manches Geheimnis.

So gelang es einem internationalen Team von Ornithologen erst in diesem Winter jene Gegend zu lokalisieren, in der dieser Zugvogel die kalte Jahreszeit verbringt. Das ahnten die Experten bisher nur. Mit dem Nationalpark Djoudj im nordwestlichen Senegal konnten sie nun mit Hilfe wissenschaftlicher Methoden erstmals ein Gebiet bestimmen, in dem mehrere tausend dieser Sänger leben. Das aber dürfte erst ein kleiner Teil der noch verbliebenen Weltpopulation sein.

Denn entsprechend seiner geringen Zahl war das Wissen um den raren Vogel klein. Noch am ehesten kann man heute den Seggenrohrsänger beim Wegflug in den Süden beobachten. Denn dieser Singvogel braucht spätestens nach 500 Kilometern eine Pause, um sich zu stärken. Er legt keine Fettpolster an. Vor allem in einem küstennahen Streifen entlang von Ost- und Nordsee sowie Atlantik kann man ihn beim Zwischenstopp zwei, drei Tage lang beobachten. Doch das ist Glückssache. Wo aber fliegt der Vogel hin, wo kommt er her, wenn er für kurze Zeit im Spätsommer und dann erst wieder Ende April die Küsten Deutschlands, der Niederlande, Frankreichs und Spaniens streift?

BILD: LARS LACHMANN

Kriminaltechnik führte zum Ziel: der Seggenrohrsänger in Senegal.

An die Fersen des „Aquatic Warblers", wie *Acocephalus paludicola* englisch heißt, hatte sich Flade bereits zu Beginn der neunziger Jahre geheftet. Damals war der heute 48-Jährige im ostpolnischen Nationalpark Biebrza auf der Suche nach dem Wachtelkönig und stieß auf den Seggenrohrsänger. Die dortige, mit 2500 Männchen schon erstaunlich große Population aber konnte nur ein Teil des wahren Vorkommens sein. Flade fielen Bilder eines Bands über deutsche Truppen im zweiten Weltkrieg ein: Soldaten, Panzer, Geschütze halb versunken in den Pripjet-Sümpfen Weißrusslands und der Ukraine. Zusammen mit weißrussischen Ornithologen konnte Flade 1995 genau in diesen Sümpfen rund 10 000 Seggenrohrsänger orten und damit den Brutraum für zwei Drittel der Weltpopulation entdecken. Diese Moore, einst als Siedlungsraum für vom Tschernobyl-Fallout betroffene Bauern vorgesehen, stehen inzwischen unter Naturschutz, wozu neben dem Naturschützer und Hochschullehrer Michael Succow, der weiland zu den Initiatoren des ostdeutschen Nationalparkprogramms gehörte, auch die Michael-Otto-Stiftung und die britische Royal Society for the Protection of Birds (RSPB) maßgeblich beitrugen.

> Je nach dem, wo der Vogel frisst, trägt er in den Federn einen regionalen chemischen Fingerabdruck.

Weitere Expeditionen zu einer heute isoliert lebenden Seggenrohrsängerpopulation ins westliche Sibirien hingegen verliefen weniger erfolgreich. Man habe, erzählt Flade, der als Landschaftsökologe am Landesumweltamt in Brandenburg arbeitet, mit Hubschraubern über Jahre ein Gebiet abgesucht, dass drei bis viermal so groß ist wie die Bundesrepublik – um am Ende genau zwölf Seggenrohrsänger zu entdecken.

Einen Erfolg hingegen konnten die Ornithologen inzwischen in Afrika verzeichnen. Dass es gelang, das Winterareal des gerade 14,5 Gramm schweren und 13 Zentimeter langen Vogels zu entdecken, ist Methoden zu verdanken, wie sie auch Kriminalisten anwenden: Das von Flade geleitete Team bediente sich der Zusammensetzung und Konzentration „stabiler Isotope" (das sind verschiedene Formen weit verbreiteter Elemente wie etwa Kohlenstoff), wie sie der Vogel über die Ernährung in den Federn einlagert. Je nach dem, wo und was der Vogel frisst, ergibt sich bei diesen Stoffen in den Federn ein regionaler chemischer Fingerabdruck.

Da der Seggenrohrsänger sein Gefieder in einer Vollmauser im Winterquartier wechselt, konnten die Ornithologen anhand von Vergleichsmustern ermitteln, dass der Gesuchte in einem ähnlichen Gebiet wie der standorttreue afrikanische Schwarzrückenzistensänger lebt. Das Ergebnis allerdings förderte ein Areal in Afrika zu Tage, das zwischen dem 13. und 20. nördlichen Breitengrad liegen musste – und damit sich über etliche hundert Kilometer erstreckt.

Gefunden wurde er schließlich auf der Hälfte des Suchraums, und zwar etwas nördlich des 16. Breitengrads im Senegal in einem Nationalpark, der durch ausgedehnte, kniehohe Grassümpfe im Überschwemmungsgebiet des Senegal geprägt ist. Das Refugium freilich wurde nicht wegen des Seggenrohrsängers unter Schutz gestellt: Grund waren vielmehr die riesigen Pulks von Wasservögeln: Knäkenten, staksende Schwarzstörche und Flamingos, Uferschwalben, Feldschwirle sowie Schnepfen.

Flade sieht in der Entdeckung dieses Gebiets als Seggenrohrsänger-Habitat, das durch zwei ebenfalls geschützte Areale im angrenzenden Mauretanien ergänzt wird, einen „Durchbruch" für den Schutz des an den Rand des Aussterbens gebrachten Singvogels. Doch damit sind die Fans des Sängers noch nicht am Ziel: Der Senegal ist eingedeicht, sein Wasser wird als Trinkwasser abgezapft, der Fluss führt, als Folge des Klimawandels, immer weniger Wasser. Das wird, ahnt Flade, nicht ohne Folgen für die Grasländer bleiben und damit den Winterlebensraum des Seggenrohrsängers verändern. Gefahr droht zudem von der Landwirtschaft: Die Ausweitung benachbarter Reis- und Zuckerrohrfelder hinein in Zonen, die nicht zum Nationalpark gehören, aber Lebensort der Sänger sind.

Die Suche geht weiter: Mit Hilfe von Satellitenbildern wollen die Ornithologen in den nächsten Monaten Westafrika nach ähnlichen Lebensräumen absuchen.

# Aus dem fernen Westafrika ins Odertal

## Seggenrohrsänger hat Winterquartier verlassen

Eberswalde (MOZ) **Einer Gruppe von gut 20 Seggenrohrsänger-Experten aus zehn europäischen Staaten sowie den Nationalparks in Senegal und Mauretanien ist es gelungen, die Überwinterungsquartiere dieser Vogelart in Westafrika aufzuspüren. Der weltweit bedrohte Seggenrohrsänger brütet in Deutschland nur noch im Nationalpark Unteres Odertal.**

„Die Entdeckung der überwinternden Seggenrohrsänger am Senegalfluss ist ein echter Durchbruch für die Rettung des auf dem kontinentalen Europa am stärksten bedrohten Singvogels", stellt Martin Flade vom Landesumweltamt Brandenburg fest, unter dessen Leitung die von Januar bis Mitte Februar dauernde, aufwändige Suchexpedition ins nördliche Senegal stand.

Der Seggenrohrsänger brütet heute regelmäßig nur noch in weniger als 40 Mooren in sechs Staaten (Weißrussland, Ukraine, Polen, Ungarn, Litauen und Deutschland). Kaum mehr als ein Dutzend Vögel brüten im Brandenburger Nationalpark Unteres Odertal, dem letzten deutschen Brutgebiet. Der Seggenrohrsänger ist heute deutlich seltener als z. B. die ebenfalls global bedrohte Großtrappe, der Schreiadler oder der afrikanische Elefant. Noch zu Beginn des 20. Jahrhunderts war der Seggenrohrsänger eine häufige Brutvogelart norddeutscher Niedermoore – allein im Havelländischen Luch und Rhinluch waren es mehr als 10 000 Paare, die dann den großen Meliorationen der Lochgebiete zum Opfer fielen. Dabei ist der eher unscheinbare Vogel eine so genannte Leitart der früher in Deutschland weit verbreiteten Seggenmoore. Sie speichern Nährstoffe, Kohlendioxid und weitere „Treibhausgase", die zur globalen Erwärmung und zum Klimawandel beitragen.

Zum Schutz des kleinen Vogels gibt es seit 2003 ein internationales Abkommen unter dem Dach der Bonner Konvention zum Schutz wandernder Tierarten (Convention on Migratory Species, CMS). Diesem „Memorandum of Understanding" sind fast alle Staaten beigetreten, in denen die Art brütet oder auf dem Durchzug rastet. Im Aktionsplan, der auf der letzten Vertragsstaatenkonferenz im Juni 2006 in Criewen (Nationalpark Unteres Odertal) verabschiedet wurde, hat das Auffinden der bisher unbekannten Winterquartiere höchste Priorität. Unklar ist, ob und wie der Seggenrohrsänger in den afrikanischen Winterquartieren, in denen die Vögel auch das Gefieder wechseln, gefährdet ist.

**Experten haben 56 Vögel im Senegal beringt und untersucht**

Die Expertengruppe „Aquatic Warbler Conservation Team" unter dem Dach von BirdLife International konnte jetzt in Senegal 56 der seltenen Vögel fangen, beringen und untersuchen. In einer fünfjährigen Vorbereitungsphase war zuvor der Suchraum in Westafrika mit beinahe kriminalistischen Methoden eingegrenzt worden, eine Computersimulation mit Vegetations- und Klimadaten sowie die Untersuchung so genannter stabiler Isotope in den Schwanzfedern der Vögel hatten den Fokus der Expedition letztendlich auf den Bereich des unteren Senegalflusses gelenkt. Die bis jetzt bekannte Gesamtfläche des Lebensraumes in Senegal und Mauretanien schätzen die Wissenschaftler auf 23 000 Hektar. Sie gehen davon aus, dass von Dezember bis Februar über ein Drittel, eventuell sogar fast der gesamte Weltbestand des Seggenrohrsängers hier anzutreffen ist.

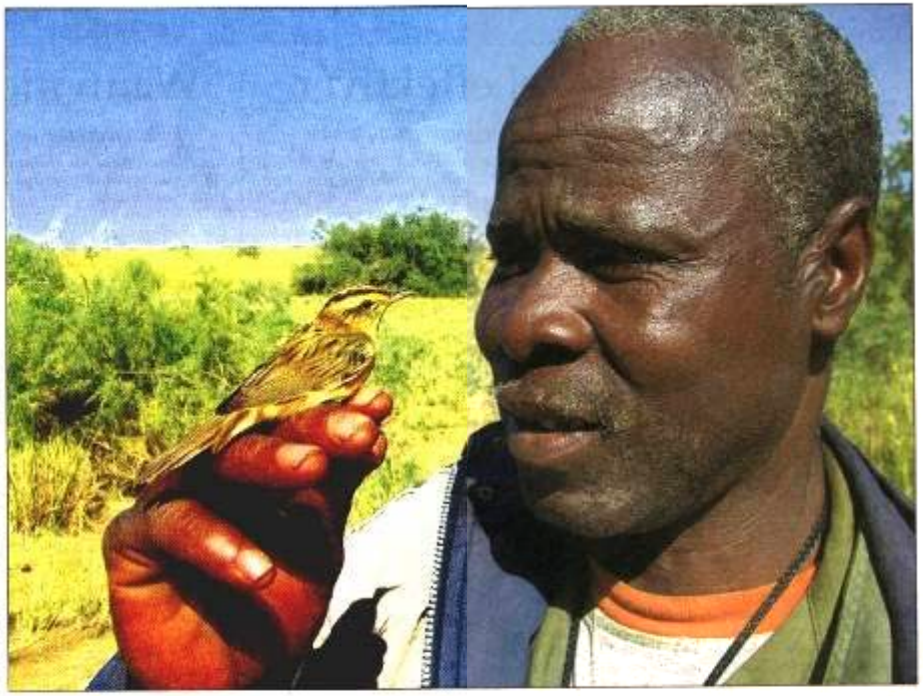
Eine detaillierte Satellitenbildanalyse sowie andere wissenschaftliche Untersuchungen können nun klären, ob es noch weitere derartige Flächen im westlichen Afrika gibt. Fest steht, dass solche Grassümpfe noch vor 20 bis 30 Jahren eine wesentlich größere Fläche in Westafrika einnahmen, aber inzwischen in Reis- und Zuckerrohrfelder umgewandelt wurden. Der große Teil der erhalten gebliebenen Fläche liegt heute in Nationalparks (Djoudj Nationalpark in Senegal, Diawling Nationalpark in Mauretanien) und ihrem Umfeld.

Aber auch dieser Lebensraum schwindet durch Klimawandel (zurückgehende Niederschläge in der Sahelzone, Ausbreitung der Sahara), einen durch Stau- und Bewässerungsprojekte veränderten Wasserhaushalt und die Versalzung. In den vom Seggenrohrsänger besiedelten Grassümpfen überwintern auch andere europäische Zugvögel in sehr großer Zahl, u. a. Rohrdommeln, Uferschwalben, Schafstelzen, Blaukehlchen, Schilfrohrsänger, Bekassinen und die sehr seltene Zwergralle. „Zusammen mit den senegalesischen Naturschutzstellen können wir nun Konzepte entwickeln, wie dieser Lebensraum dauerhaft gesichert werden kann", so Flade.

Ibrahima Diop, Leiter des Djoudj Nationalparks, ist sehr glücklich, dass der bedrohte Seggenrohrsänger hier gefunden wurde. „Diese Kostbarkeit macht unseren Nationalpark auch noch attraktiver für Naturtouristen."

Ermöglicht wurde das große Gemeinschaftsprojekt durch finanzielle Unterstützung des Sekretariats der Bonner Konvention, des britischen Landwirtschafts- und Umweltministeriums, der britischen königlichen Gesellschaft für Vogelschutz, der Deutschen Ornithologen-Gesellschaft, des EU-LIFE-Programms, der Michael-Otto-Stiftung für Umweltschutz und von privaten Spendern.

Vor etwa einer Woche ist der Seggenrohrsänger wieder in der Heimat, im Unteren Odertal, angekommen.



Noch im Winterquartier: Indega Birdia, Ornithologe der Verwaltung des Djoudj-Nationalparks im Senegal, mit einem der ersten gefangenen Seggenrohrsänger am Grand Lac de Djoudj. Foto: Martin Flade

MOZ, 2.3.2007

# Bedrohte Vogelart überwintert im Senegal

## Experten aus der Mark entdecken Quartier

**Groß Glienicke** (dpa) Experten des brandenburgischen Landesumweltamtes haben das Winterquartier einer weltweit bedrohten Vogelart in Westafrika aufgespürt. „Die Entdeckung des Seggenrohrsängers am Senegalfluss ist ein echter Durchbruch für seine Rettung", sagte Präsident Matthias Freude gestern in Groß Glienicke (Potsdam-Mittelmark). Zusammen mit den senegalesischen Naturschutzstellen wolle man nun den Lebensraum der Seggenrohrsänger dauerhaft sichern. Der Brandenburger Nationalpark Unteres Odertal ist den Angaben zufolge das letzte deutsche Brutgebiet des Seggenrohrsängers. Rund ein Dutzend Vögel brüten dort.

Noch zu Beginn des 20. Jahrhunderts war der Seggenrohrsänger eine häufige Brutvogelart in norddeutschen Mooren. Allein im Havelländischen Luch waren mehr als 10 000 Paare heimisch. Charakteristisch für den Vogel ist sein Gesang, der als Schnarren mit kurzen Pfeiftönen noch vor der Morgendämmerung zu hören sei.

Einfügen:
“Auf der Suche nach einem Phantom” (LBV-Zeitschrift)

**SEGGENROHRSÄNGER**

## Afrikanische Winterquartiere entdeckt

Einer internationalen Expedition ins nördliche Senegal unter der Leitung von Martin Flade vom Landesumweltamt Brandenburg ist es gelungen, in Westafrika das Überwinterungsgebiet des weltweit bedrohten Seggenrohrsängers zu entdecken. Der Seggenrohrsänger ist der gefährdetste Singvogel des kontinentalen Europa. Im Nationalpark Unteres Odertal als letztem deutschen Brutgebiet brüten kaum mehr als ein Dutzend Vögel. Noch zu Beginn des 20. Jahrhunderts war der Seggenrohrsänger eine häufige Brutvogelart norddeutscher Niedermoore – allein im Havelländischen Luch und Rhinluch waren es mehr als 10.000 Paare, die sämtlich der Trockenlegung der Luchgebiete zum Opfer fielen.

Das Auffinden der bisher unbekannten Winterquartiere ist von größter Bedeutung, da man nicht weiß, ob und welche Gefahren für die Art in den afrikanischen Winterquartieren bestehen. Auf die Spur der Seggenrohrsänger kamen die Wissenschaftler mit modernsten Methoden. Aus der Konzentration und Zusammensetzung sogenannter stabiler Isotope bestimmter Elemente, die während des Wachstums in die Vogelfedern eingelagert werden, wurde zunächst das Areal eingegrenzt. Weitere Hinweise lieferte ein Computermodell auf der Grundlage von Vegetations- und Klimadaten sowie Funde durchziehender Seggenrohrsänger in Afrika aus den letzten 150 Jahren. Der „Rest" war dann wochenlange aufwändige Feldarbeit der Expedition vor Ort.

Die bis jetzt bekannte Gesamtfläche der von Seggenrohrsängern bewohnten Grassümpfe in Senegal und Mauretanien wird auf 23.000 Hektar geschätzt. Man geht davon aus, dass wenigstens ein Drittel, eventuell sogar fast der gesamte Weltbestand des Seggenrohrsängers hier anzutreffen ist. Außerdem überwintern hier auch andere europäische Zugvögel in sehr großer Zahl. So wurden Uferschwalben, Schafstelzen, Schilfrohrsänger, Feldschwirle, Bekassinen und die sehr seltene Zwergralle angetroffen. □


### WILLKOMMEN WOLF!

*Neben dem von Jana Schellenberg betriebenen „Kontaktbüro Wolfsregion Lausitz" hat der Freistaat Sachsen nun als zusätzlichen Ansprechpartner für Konfliktfälle einen so genannten Wolfsmanager eingestellt. Der 28 Jahre alte Forstwirt Andre Klingenberger ist dem Biosphärenreservat Oberlausitzer Heide- und Teichlandschaft zugeordnet. Zur Zeit ist die Situation in der Lausitz angespannt, weil eine Minderheit der örtlichen Jäger jede Zusammenarbeit verweigert und mit Horrorszenarien kräftig Stimmung gegen die Wölfe macht. Der NABU Sachsen hat bereits zwei Mal den Landesjagdverbandsvorsitzenden in offenen Briefen aufgefordert, Stellung zu nehmen – bisher ohne Reaktion.* □

# Expedition Piepmatz

## Forscher entdeckten die Wanderrouten des seltenen Seggenrohrsängers

Richtige Vogelfreunde scheuen keine Mühe, kennen keine Grenzen. Dr. Martin Flade (48) ist so einer. Der Landschafts-Ökologe aus dem brandenburgischen Eberswalde brach mit 18 Experten aus elf europäischen Ländern auf, um das Winterquartier des äußerst seltenen Seggenrohrsängers zu suchen. Im afrikanischen Senegal wurde die Expedition fündig.

### In Deutschland brüten nur noch etwa zwölf Paare

Nur etwa ein Dutzend Seggenrohrsänger-Paare brüten noch in Deutschland, alle in Brandenburgs einzigem Nationalpark Unteres Odertal. Wo die kleine Familie den Winter über steckt, war bislang ein Rätsel. „Um es zu lösen, brauchte es fünf Jahre Vorarbeit", sagte Flade.

Da waren Federn des Vogels. Darin stecken stabile Isotope, die Aufschluss über den Lebensraum der Vögel geben. Flade: „Verglichen mit Federn afrikanischer Vögel, ließ sich das Winterquartier des Seggenrohrsängers auf unserem Globus zwischen dem 13. und 20. Grad nördlicher Breite eingrenzen." An der Universität Kopenhagen lief zeitgleich ein Projekt nach Suchräumen in dieser Region. Zudem wurden Meldungen von Beringungsstationen aus den letzten 200 Jahren gesammelt. Danach war der Vogel schon in Tunesien, Marokko und Mauretanien aufgetaucht.

„Wir entschieden uns, am Senegalfluss zu suchen", sagte Flade. „Ein Volltreffer!" Nach einer Woche entdeckten die Ornithologen und senegalesische Nationalpark-Mitarbeiter den Seggenrohrsänger im knichohen Grassumpf. Die Expeditionskosten über 30 000 Euro haben u. a. das Sekretariat der Bonner Konvention, die Deutsche Ornithologen-Gesellschaft, in Großbritannien das Umweltministerium und die Königliche Gesellschaft für Vogelschutz gezahlt.

### Der Schutz des Vogels tut auch dem Klima gut

Wozu der ganze Aufwand? „Über den Vogel entsteht auch ein Kontinente übergreifendes Problembewusstsein zum Klimaschutz", sagt Flade. Bei uns ist der Vogel so gut wie verschwunden, weil die Sümpfe hier trockengelegt wurden und nun klimaschädliche Gase in die Luft abgeben. „Dagegen hilft die Renaturierung der Sümpfe, wie es jetzt in Weißrussland passiert. Für dieses Stück intakter Natur ist der Seggenrohrsänger ein Gradmesser. Mittlerweile kennt ihn in Weißrussland jedes Schulkind."

MARION KLEMP

Martin Flade zeigt einem Senegalesen, wie ein Vogel beringt wird.

Die Flugroute des Seggenrohrsängers auf der Weltkarte

**Info**

### Der gefährdetste Singvogel Europas

Vor 100 Jahren noch war der Seggenrohrsänger so häufig, dass er auch „Spatz der Niedermoore" genannt wurde. Heute ist er der in Europa am stärksten bedrohte Singvogel, brütet nur noch in knapp 40 Mooren (Polen, Weißrussland, Ukraine, Ungarn, Litauen, Deutschland). Er ist deutlich seltener als die ebenfalls weltweit vom Aussterben bedrohte Großtrappe oder der afrikanische Elefant.

Der erste Seggenrohrsänger, der in seinem Winterquartier Senegal gefangen wurde