

Aquatic Warbler Conservation Team

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

13<sup>th</sup> to 26<sup>th</sup> January 2008



Before establishing the mist nets near Tiguet (photo: Sven Baumung)

## Final Report

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on behalf of the  
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## AWCT West Africa Expedition 2008

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

**13<sup>th</sup> - 26<sup>th</sup> January 2008**

# **Final Report**

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## 1. Executive Summary

The expedition to search for more wintering sites of the globally threatened Aquatic Warbler (AW) in West Africa and to start intensified research at the Djoudj wintering site was successfully performed, largely following the planned schedule.

The outstanding importance of the Djoudj area for wintering AW was confirmed. Fourteen more AW were captured within only a few days at the beginning and towards the end of the expedition (at Tiguet and Grand Lac), and four birds were fitted with transmitters as pilot study for the starting doctor theses of Cosima Tegetmeyer (Greifswald University, Germany) on the ecology of wintering AW at Djoudj. At least for two captured AW wintering site fidelity was confirmed, as they were ringed one year before at the same place (Tiguet).

Nevertheless, the situation of suitable grass marshes in the western Sahel turned out to be alarming! Obviously there have been tremendous losses of this habitat type during the past two or three decades.

### **Mauritania:**

- Recent AW wintering sites were not found.
- The habitats in the Diawling NP are partly potentially suitable, but were almost (>95 %) dry in mid-January 2008. There are large areas that might have been suitable for AW in November and December (and thus probably still during the moulting period), but in mid-January were dried out. Intensive mist-netting at remaining wet patches brought many sedge warblers, but no AW record. There might be still a few AW, but density must be low.
- A large area N of the Senegal River NE of Keur Massène that looked very suitable in older satellite images has been transformed into a fresh water reservoir and is now overgrown with the invasive cattail *Typha australis* – and thus lost as AW site.
- Other potential sites near and NE of Rosso were not accessible or not suitable (dry or too small).
- The suggested potential AW wintering site N Nouakchott was not visited, because it is an unsuitable habitat type (periodical salt lake without vegetation).
- Some other potential sites in South- or Southeast-Mauritania suggested by Bruno Lamarche should be visited in future, but are very hard to access.

### **Senegal:**

- There are no more large suitable habitats along the Senegal River up to the border of Mali. Within the recent floodplain, there are only very few small patches of probably suitable habitat (*Cyperus* marshes) at some lakes. Intensive mist-netting at the two best sites brought no AW records. If there are wintering AW at all, the total number must be very small.
- A large suitable habitat area was discovered in the Ndialé Wildlife Reserve S of Ross-Béthio, south of Djoudj (also in the Senegal delta). This area might have been suitable until late December/early January (moulting period), but was almost dry in late January. Intensive mist-netting at the remaining wet parts brought also no AW capture; thus, the number there must be also small.
- The Djoudj area (inside and outside the NP) remains the only large suitable AW wintering site in West-Africa known so far. But also here, habitat conditions were not optimal in this winter, because less water was let into the inundation zones due to management purposes: The big White Pelican colony on an island is threatened by soil erosion and had to be stabilised with big machinery in April/May. To get the area dry for these measures, water

supply of the whole Djoudj area was reduced. Thus, also the area of suitable AW habitats during the late winter (February) was reduced in a substantial degree. The situation will hopefully improve after the next raining season.

- Systematic research has now started in the Djoudj area (doctor thesis of Cosima Tegetmeyer). 14 AW have been captured during our short stay and four have been fitted with radio transmitters. The results should help us to give proper management advice to the NP administration.
- Unfortunately, the former satellite image analysis was not useful. Obviously, the chosen approach was not suitable for our targets. A new analysis done after this expedition, using the recent ground data and following a new approach, gained much more reliable results and is attached as Annex V.

## 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. [BB] = Bruno Bargain.*

Country	Name	Special function, responsibilities	Team Sen/Maur
<b>Belgium</b>	Norbert Roothaert		Senegal
<b>France</b>	Bruno Bargain	<i>Head of bird ringing</i>	Mauritania
	Arnaud Le Nevé	<i>Species list; organisation</i>	Mauritania
<b>Germany</b>	Sven Baumung	<i>Species list Senegal</i>	Senegal
	Alex Eilers	<i>Clap traps (for crakes)</i>	Mauritania
	Martin Flade	<i>Head of expedition, chairman AWCT</i>	Senegal
	Benedikt Giessing	<i>DNA blood sampling</i>	Mauritania
	Britta Kiesewetter		Senegal
	Torsten Ryslavy		Mauritania
	Volker Salewski	<i>Financial management, GPS</i>	Senegal
	Franziska Tanneberger	<i>Habitat description, GPS</i>	Mauritania
	Cosima Tegetmeyer		Mauritania
<b>Latvia</b>	Oskars Keiss		Senegal
<b>Mauritania</b>	Moctar Ould Daddah	<i>Conserveur Diawling National Park</i>	Mauritania
<b>Poland</b>	Janusz Kłoskowski	<i>Habitat description, GPS</i>	Senegal
<b>Senegal</b>	Indega Bindia	<i>Local guide</i>	Senegal
	Ibrahima Diop	<i>Director of the Djoudj Biological Station</i>	Mauritania

### 3. Schedule

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

Date	Activities
<b>Joint Team</b>	
13.01.08	<ul style="list-style-type: none"> <li>Arrival at Dakar airport of most participants</li> <li>Bird watching on Cape Vert peninsula</li> <li>Joint boat trip to Madeline Island National Park</li> </ul>
14.01.08	<ul style="list-style-type: none"> <li>Organisation of car and financial matters at Dakar</li> <li>Travel from Dakar to Djoudj</li> <li>Mist-netting near Tiguet, site 10A/B, 60 m nets, catching of 6 AW (one with ring from 2007) (Bruno, Arnaud, Oskars, Janusz, Norbert)</li> </ul>
15.01.08	<ul style="list-style-type: none"> <li>9:15-12:15 h Mist-netting by two groups near Tiguet (site 10 A/B, 30 + 36 m nets) and another place further NE (60 m nets)</li> <li>first radio-tagging of two AW, test of transmitters and receivers (Cosima, Benedikt)</li> <li>Preparation of field trips to S-Mauretania and NE-Senegal</li> <li>Mist netting near Tiguet/Diadiem II at TS 12A/B by Bruno, Arnaud, Oskars, Benedikt (60 m nets)</li> <li>Evening bird watching at Grand Lac (Grand Mirador, Petit Mirador)</li> </ul>
<b>Senegal Team</b>	
16.01.08	<ul style="list-style-type: none"> <li>Travel Djoudj – Richard Toll – Podor – Ouro M’Baye – Ouro Sogui (Hotel Oasis Fouta)</li> </ul>
17.01.08	<ul style="list-style-type: none"> <li>Travel to Kanel and to Lac Lamlamco, Tiempin and Lake Haré Maham near Garli (first potential habitat, <i>Cyperus</i> marshes)</li> <li>Sintiàñ and Gana Balo (near Kanel)</li> <li>Lac Véndou Kanél</li> <li>via Ogo to Ouro Sogui (Oasis Fouta)</li> </ul>
18.01.08	<ul style="list-style-type: none"> <li>Unsuccessful start (flat near town)</li> <li>Matam, unsuccessful search for a lake, road to Ogo</li> <li>Haré Maham S Garli: start of mist-netting (14:45 h – 19:20 h) in <i>Cyperus</i> marsh</li> <li>Overnight at Ouro Sogui (Oasis Fouta)</li> </ul>
19.01.08	<ul style="list-style-type: none"> <li>Haré Maham (Garli), mist-netting from 7:40 h to 11:30 h</li> <li>Back to Ouro Sogui, travel to Fadaria (dry lake at 15°06'N, 12°47'W)</li> <li>Travel to Adabéré, small lake Bire Tokosel, big lake Bire Maoudou; start of mist-netting during sunset in <i>Cyperus</i> marsh at Bire Maoudou</li> <li>Overnight stay in tents</li> </ul>
20.01.08	<ul style="list-style-type: none"> <li>Bire Maoudou, mist-netting from 7:00 h to 11:00 h</li> <li>Travel via Ouro Sogui to Richard Toll</li> <li>Overnight stay at Hotel Taouey (short visit in hospital with Norbert...)</li> </ul>
21.01.08	<ul style="list-style-type: none"> <li>Travel to Ross-Béthio and to Ndial Wildlife Reserve</li> <li>In the evening start of mist-netting at Lake Ndial</li> <li>Overnight stay in tents</li> </ul>
22.01.08	<ul style="list-style-type: none"> <li>Lake Ndial, mist-netting from 7:00 to 9:00 h</li> <li>9:50 h travel to Djoudj</li> </ul>
<b>Mauritania Team</b>	
16.01.08	<ul style="list-style-type: none"> <li>Transfer to Diawling NP headquarters via Diama barrage</li> <li>Meeting with Park administration</li> <li>Checking areas N of headquarters from E, mist-netting (site M1)</li> </ul>
17.01.08	<ul style="list-style-type: none"> <li>Checking areas N of headquarters from E, mist-netting (site M1)</li> <li>Discussion with conservateur about potential habitats</li> <li>Checking areas N of headquarters from W</li> <li>Checking areas S of the headquarters (near village Biret)</li> </ul>
18.01.08	<ul style="list-style-type: none"> <li>Checking of the area NE of Keur Massène</li> <li>Checking of area N of Bassin du Diawling and mist-netting (site M2)</li> </ul>

19.01.08	<ul style="list-style-type: none"> <li>• Nist-netting at M2</li> <li>• Checking of areas near northern mirador at Bassin du Diawling</li> </ul>
20.01.08	<ul style="list-style-type: none"> <li>• Transfer to Rosso, checking areas E of Rosso</li> <li>• Inspection of a small river valley close to Senegal river</li> <li>• Attempt to reach wetlands S of Lac Rkis</li> <li>• Checking of areas SE of Lac Rkis up to northern tip of the lake</li> </ul>
21.01.08	<ul style="list-style-type: none"> <li>• Inspection of areas in the NE of the river valley</li> <li>• Second attempt to reach wetlands S of Lac Rkis</li> </ul>
22.01.08	<ul style="list-style-type: none"> <li>• Transfer to Djoudj</li> </ul>
<b>Joint Team</b>	
22.01.08	<ul style="list-style-type: none"> <li>• Afternoon: continuation of mist-netting at Lac Ndiae</li> </ul>
23.01.08	<ul style="list-style-type: none"> <li>• Mist-netting at Lac Ndiae</li> <li>• Evening: mist-netting in high <i>Typha</i> stands near Biol. Station,</li> </ul>
24.01.08	<ul style="list-style-type: none"> <li>• Discussion of ecological situation and conservation strategy at Djoudj with Ibrahima Diop</li> <li>• Team I: Mist-netting at Grand Lac, TS 9C (start 17:00 h), 1 AW caught, mist nets open over night</li> <li>• Team II: mist-netting at new site at upper Marigot (Norbert, Torsten, Cosima, Bruno, Arnaud; 140 m net)</li> </ul>
25.01.08	<ul style="list-style-type: none"> <li>• Team I: Continuation of mist-netting at Grand Lac (288 m mist nets); trials with rope of 130 m length from distance of 130 m (2 AW caught)</li> <li>• Team II: Mist-netting at Marigot Crocodile</li> </ul>
26.01.08	<ul style="list-style-type: none"> <li>• Travel back from Djoudj via Lampsar and Keur Moussa (Thiès) to Dakar.</li> </ul>

## 4. Background and targets

According to the Aquatic Warbler MoU (“Memorandum of Understanding concerning Conservation Measures for the Aquatic Warbler”, a Memorandum under the Convention on Migratory Species CMS) including the Aquatic Warbler Species Action Plan, and the priority setting in 2006 (MoU Conference of Signatory Parties at Criewen, Germany) highest priority was given to the identification of the wintering sites of the globally threatened Aquatic Warbler (AW) in W-Africa. An AWCT expedition in January/February 2007 resulted in the discovery of a major wintering site of AW in the Djoudj area in Senegal; according to first estimates, the Senegal delta holds probably one third, eventually more than half of the global population. While working in the area, the AWCT also realised the outstanding importance of the vast *Scirpus* grass marshes of the Djoudj area not only for AW, but for many other wintering Palaearctic migrants (e.g. Bittern, Snipe, Sand Martin, Yellow Wagtail, Sedge Warbler, Grasshopper Warbler, Bluethroat). Another new discovery was the occurrence of big numbers of the Baillon’s Crake (BC) in the same habitat type; this is either an unknown breeding population and/or the first known wintering site of this species in W-Africa.

The AWCT people realised also the ongoing changes of environmental conditions and threats to this type of marshes in the region (alteration of water regime, fresh water storage for irrigation, transformation of grass marshes into sugar cane and rice fields, water pollution from intensive agriculture). There is a clear need of thorough analyses of conservation status of and threats to AW and BC and their wintering habitat. This is planned to be done by two doctor students (one for AW, one for BC). First satellite image analyses from 2007 (Graeme Buchanan, RSPB) studied the likelihood of occurrence of such grass marshes in entire W-Africa and showed a high probability of such habitats at the Mauritanian side of the Senegal delta (confirmation of the occurrence such habitats by the director of the Diawling NP), for one area in W-Mauretania near Nouakchott, and for the upper Senegal floodplain in NE-Senegal (especially the IBA ‘Ferlo North’).

There was an urgent need to investigate these areas in order to find all major AW wintering sites, especially the wintering site of the tiny and endangered Pomeranian population, which is thought to be located north of the wintering sites of the Central-European population according to analyses of stable isotopes in AW feathers (PAIN et al. 2004).

### **Targets of the expedition:**

1. To confirm occurrence of suitable habitats and wintering of AW at the Mauritanian side of the Senegal delta (Diawling NP and surroundings) and to estimate the area of suitable habitat and population size;
2. to explore the area with high probability of occurrence of suitable habitats near Nouakchott in W-Mauretania, search for suitable habitats;
3. to find, catch and ring AW in W-Mauretania, to try to find evidence (DNA, stable isotopes, ring recoveries...) for the wintering of the Pomeranian population;
4. to help the two doctor students with start of their field work in Djoudj (cooperation with the NP administration, local organisation; demonstration of the 2007 trapping sites, first captures of AW and BC, test of radio-transmitters and radio-tagging; joint habitat inventory, comparison of methods, exchange of best-practice experience);
5. exploration of probably suitable habitats in NE-Senegal according to the satellite image analyses (to find suitable habitats, to study occurrence of wintering AW).

### **Field methods:**

- Standard habitat descriptions according to the 2007 method; collection of GPS coordinates of suitable habitats (for comparison with satellite image analyses);
- mist-netting in (probably suitable) habitats with mist-net fences of 150-200 m length (up to 4 teams);
- application of the ‘rope method’ (pulling a rope towards the mist net over 2 x 1 ha area) to assess the AW density;
- survey of accompanying species (mist-netting and field observations);
- trapping with clap-traps for Baillon’s Crakes (Djoudj and Diawling only);
- collection of feather and DNA samples from AW and BC;
- continuation of training and education of Senegalese and Mauritanian colleagues in bird ringing work and habitat inventory methods (startet in 2007).

## **5. Search along the Senegal River in Senegal**

We followed the Senegal River upstreams as close to the river as possible, and tried to assess the suitability of the floodplain as AW habitat. East of Thille-Boubacar we crossed the (at this area) wide floodplain to Podor, situated directly on the river bank, and then went back to the main road at Taréddji. Near the small village Ouro M’Baye (Forêt de N’Dioum Oualo) we walked from the road through the floodplain towards the river until the first oxbows with water (surrounded by *Acacia* forests). We realised, that the whole floodplain was dry (but flooded during the rainy season) with exception of some oxbows and river arms. River and river arms are deeply carved into the floodplain. On parts of the floodplain maize and vegetables are grown, at moister places or along river arms there occur *Acacia nilotica* forests. Abandoned termites’ nests indicate that the floodplain has become drier in recent years. Areas with suitable vegetation types for AW – according to our experiences from Djoudj - were completely absent.

Moreover, the whole floodplain was rather homogeneous. There were no signs of general habitat changes within the floodplain. Finally we decided to visit two regions of the floodplain where some bigger lakes are indicated in the maps: the areas between Matam and Kanel and between Adabéré and Fadaria. If there is anywhere water left in the floodplain in January it should be at these lakes.

At first, we tried to find and visit all lakes SE of Matam indicated in the maps. Some of them were also dry or almost dry (e.g. Lac Lamlamco near Kanel; see Table 3), some could not be found at all. However, there were at least three lakes that had water and larger zones of potentially suitable habitat: Lake Haré Haram S of Garli, Lake Véndou Kanél N of Kanel, and Lake Bire Maoudou SW of Adabéré (for details see Table 3 and Annex 1).

These habitats consist of *Cyperus* marshes on fine muddy ground, partly water-logged, partly with open mud, and – at least near Matam/Kanel – with a pronounced microrelief. The accompanying bird species (Yellow Wagtail and Sedge Warbler predominating) are quite similar to those in the AW wintering habitats of the Senegal delta.

At the two largest and probably best habitats, Haré Haram and Bire Maoudou, we performed intensive mist-netting in the evening and at morning (Tables 3-5). We did not catch any AW. However, both sites were rather small (c. 25 hectares at Haré Haram, c. 5-10 hectares at Bire Maoudou). Even if there do occur some resting AW, these lakes cannot be of big importance as wintering and moulting sites for the species. On the other hand they could potentially function as stopover sites for AW migrating along the Senegal River from the coast inland (possibly to Mali) or back.

After this experience we were convinced, that it is very unlikely to find larger suitable habitat areas along the Senegal River upstreams of Richard Toll. Following an advice of Indega Bindia, we therefore went back to the Ndialé Wildlife Reserve SE of Ross-Béthio in the south-eastern Senegal estuary, not far from Djoudj. There, we found large areas (hundreds of hectares) of low grassy marsh vegetation quite similar to Djoudj, with predominating *Scirpus littoralis* and *Sporobolus robustus* stands. The major part of the presumably suitable habitat area was already dry on 21<sup>st</sup> January, but might have been very suitable a few weeks ago. We focussed our mist-netting activities on the wettest part NE of Lac Ndialé, with larger habitat patches that were still water-logged around small shallow open ponds. The bird assemblage in these areas was very similar to those at Tiguet and in the Diawling National Park (Fig. 4, 5). Despite intensive use of the ‘rope method’ and up to 276 m of mist nets we did not catch any AW.

We think that the Ndialé Reserve may hold a larger population of AW earlier in the season. In late January 2008 it was already too dry, and if there were still some AW, their number (or density) must have been low.

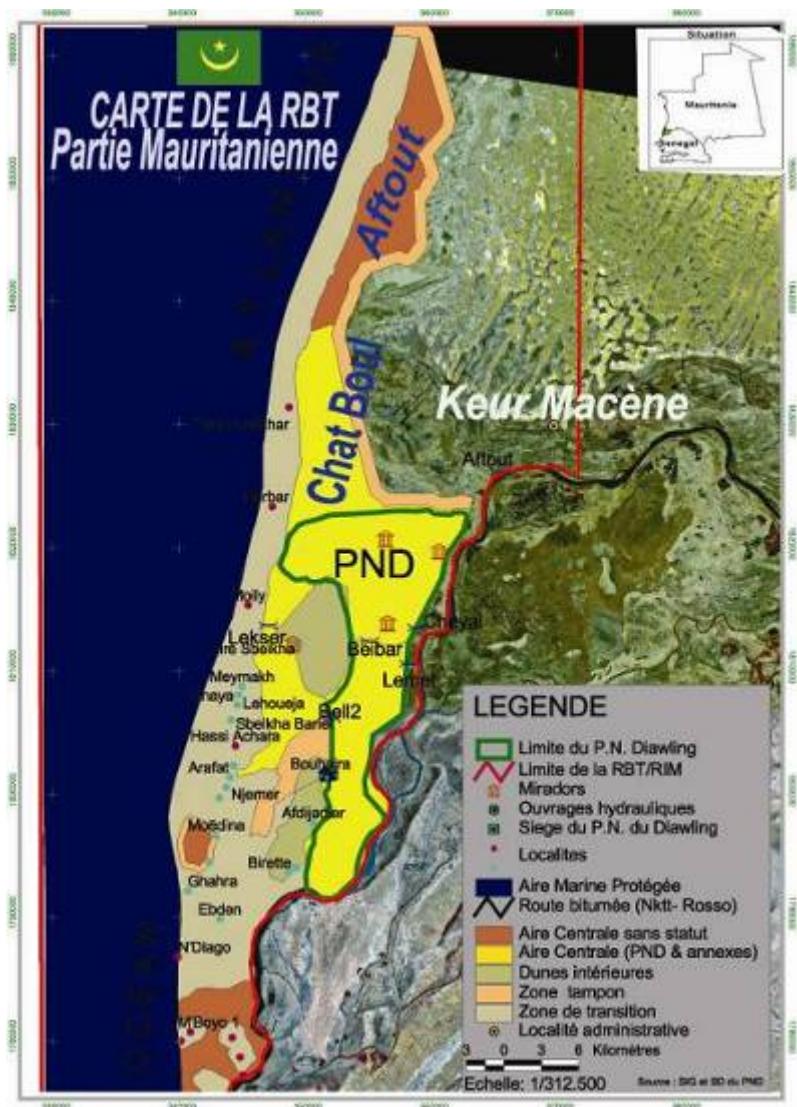
**Table 3** (following pages): Names, coordinates and habitat descriptions of important observation and mist-netting localities in Senegal and Mauritania.

Site name	Country	Geographical Coordinates		dates of visit	mist nets (m)	habitat description
		North	West			
Tiguet, TS 10A/B	Senegal	16°27'26"	16°16'56"	14/01-15/01	66	<i>Oryza longistaminata</i> grass marsh with <i>Typha</i> islands, only parts with water
Tiguet, TS 12A/B	Senegal	16°28'30"	16°12'40"	15/01	60	<i>Oryza longistaminata</i> grass marsh with <i>Typha</i> islands, only parts with water
Ouro M'Baye	Senegal	16°29'58"	14°34'47"	16/01	-	part of Senegal floodplain with <i>Acacia</i> forests, partly still flooded; unsuitable for AW
Lac Lamlamco near Tiempin, Matam	Senegal	15°32'	13°08'	17/01	-	remnant of flooded area in Aishemonmanaye area, many white water lils and c. 2 ha of <i>Cyperus</i> swamp (Indega: " <i>Cyperus aspar</i> "), good structure, shallow water and mud, but too small
Haré Haram S Garli, Matam	Senegal	15°35'51.0"	13°12'35.3"	17/01-18/01	180	<i>Cyperus</i> marsh on fine floodplain mud, partly with water lils, area c. 25 ha
Lac Véndou Kanél, Matam	Senegal	15°32'	13°11'	17/01	-	light, patchy <i>Cyperus</i> marsh at the northern and northwestern bank of the lake, several hectares, but very light stands (high coverage of mud and open water, pronounced microrelief)
dry lake 5 km from Fadaria	Senegal	15°06'	12°47'	19/01	-	large lake completely dry since November, with short-grazed <i>Cyperus</i> vegetation (Indega: " <i>Cyperus robustus</i> ")
Bire Maoudou near Adabéré	Senegal	15°07'40.4	12°48'26.0"	19/1-20/01	144	up to c. 60 m wide <i>Cyperus robustus</i> belt of a large, shallow floodplain lake, with water channels and some <i>Acacia</i> trees
Lac Ndiae S Ross-Béthio	Senegal	16°16'01.9" - 16°17'01,1"	16°03'14,5" - 16°03'55.7"	21/01-23/01	144 / 276	large shallow pan in the semi-desert (2 m a.s.l.) with a big and several small shallow lakes, and several hundred hectares of <i>Sporobolus</i> / <i>Scirpus</i> marsh; flooded until c. two weeks ago, but now almost dry with patches of shallow water or wet mud
Station Biologique de Djoudj, Djoudj NP	Senegal	16°21'58	16°16'26	23/01	70	high <i>Typha australis</i> stands near the station, water level 30-50 cm
Grand Lac, Djoudj NP, TS 9C	Senegal	16°25'21.5"	16°11'00.6"	24/01-25/01	288	Large <i>Scirpus</i> marsh, still water-logged, but clearly less water than in 2007
Upper Marigot, Djoudj NP	Senegal	coordinates?		24/01	140	<i>short description lacking</i>
Marigot Crocodile, Djoudj	Senegal	coordinates?		25/01	36	flooded <i>Sporobolus</i> marsh, water level c. 25 cm

Site name	country	GPS UTM coordinates+ Geographical coordinates		dates of visit	mist nets (m)	habitat description
		North	West			
Diawling, GPS mark 108, TS M1A	Mauritania	356514 16°22'20.0	1810584 16°20'36.6	16/01	50	<i>Sporobolus</i> and <i>Scirpus</i> marsh, small <i>Typha</i> islands; water level 0-15 cm; quite suitable, but too small (?)
Diawling, GPS mark 109, TS M1C	Mauritania	356637 16°22'25.0	1810894 16°20'36.0	16/01	30	<i>Sporobolus</i> and <i>Scirpus</i> marsh, small <i>Typha</i> islands; water level 0-15 cm; quite suitable, but too small (?)
Diawling, GPS mark 4	Mauritania	351692 16°20'35.8	1807414 16°23'18.4	17/01	-	water, close to shore; potentially suitable but now dry
Diawling, GPS mark 5	Mauritania	352396 16°20'39.7	1807527 16°22'54.7	17/01	-	channel crossing; potentially suitable but now dry
Diawling, GPS mark 6	Mauritania	353550 16°20'56.5	1808038 16°22'15.9	17/01	-	<i>Scirpus maritimus</i> area with patches of <i>Typha</i> , potentially suitable but now dry
Diawling, GPS mark 356	Mauritania	355981 16°21'46.9	1809569 16°20'54.4	17/01	-	large area behind channel; in principle suitable but now dry
Diawling, GPS mark 357	Mauritania	355711 16°21'47.8	1809598 16°21'03.5	17/01	80	large area behind channel; <i>Sporobolus</i> and <i>Scirpus</i> marsh, small <i>Typha</i> islands; in principle suitable but now dry
Diawling, GPS mark 386	Mauritania	368769 16°32'53.2	1829967 16°13'47.6	18/01	-	in principle suitable but now dry
North of Diawling NP, GPS mark 387, TS M2A	Mauritania	356812 16°29'00.2	1822881 16°20'29.3	18/01-19/01	144	<i>Scirpus</i> and <i>Sporobolus</i> marsh, water level 0-15 cm; quite suitable, but too small (?)
Diawling, GPS mark 391, TS M1D	Mauritania	356695 16°22'02.1	1810032 16°20'30.4	19/01	?	marsh with <i>Sporobolus</i> , <i>Scirpus maritimus</i> , <i>Scirpus littoralis</i> , <i>Typha australis</i> , some <i>Tamarix</i> bushes; water level 0-20 cm; quite suitable, but too small (?)
Road to Lac Rkis, GPS mark 403	Mauritania	461391 16°39'13.7	1841293 15°21'43.4	20/01	-	favourable area close to road, stop of one car; quite suitable, but too small (?)
Between Senegal river and Lac Rkis, GPS mark 434	Mauritania	452869 16°40'24.9	1843499 15°26'31.3	21/01	-	small area (1 ha), with oscillating vegetation layer, camels nearby, two Sedge Warblers; quite suitable, but too small
Near Rosso, GPS mark 439	Mauritania	432964 16°33'36.2	1830991 15°37'42.0	21/01	-	close to Rosso, vegetation 120 cm, dom. <i>Cyperus</i> , < 20 ha, potentially suitable, but now dry

## 6. Search in Mauritania

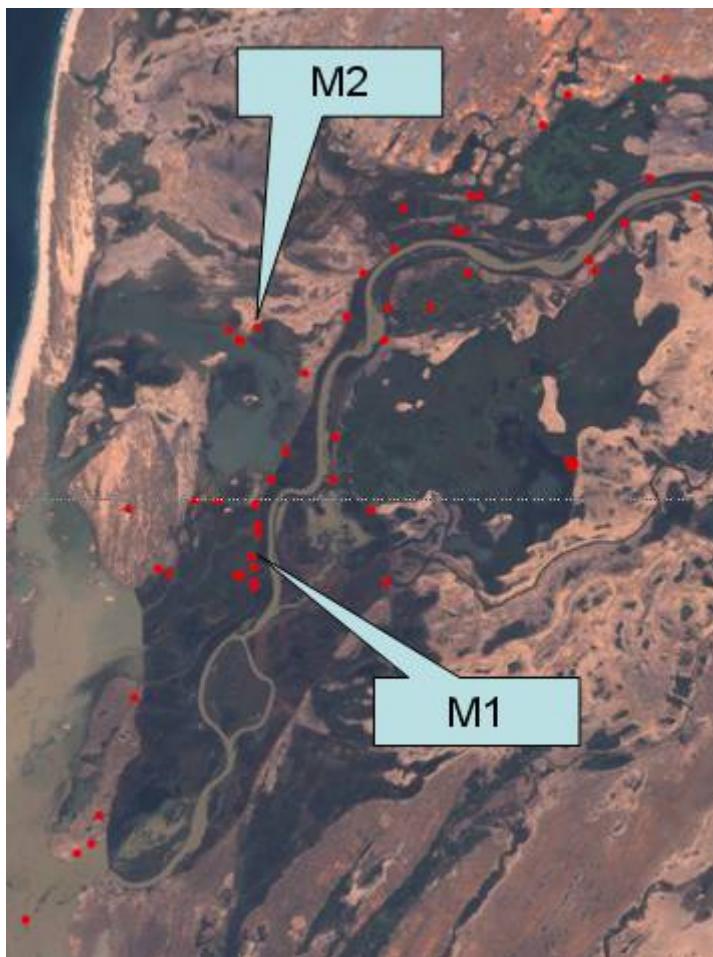
Because of its location right on the other site of the Senegal river close to Djoudj National Park, we started the AW search in Mauritania in Diawling National Park (Fig. 1). The Diawling National Park lies in southwest Mauritania along the Senegal River delta. During the rainy season, much of the park consists of large lakes. It is known for having over 220 bird species, including pelicans, Black Storks, and flamingos, and also for its fish. Diawling is part of a cross-border Biosphere Reserve that is of big importance as nesting site for birds because of the combination of fresh and salt water at the Senegal River delta. The park also holds significant populations of primates, warthogs and wild donkeys.



**Fig. 1:** Location and map of the Diawling National Park (map provided by GIS expert of DNP, Mr. BOUBACAR MAMADOU).

Starting from the National Park headquarters (Siege du PN du Diawling, Fig. 1), we surveyed first (16. 01. 2008) a large grassy and presumably wet area north-east of it (picture p. 34, upper picture). At our first glance, the area looked like an "African Zvanets". Unfortunately, we had difficulty entering the area because of a deep channel. Therefore, we started trapping in two teams at the sites M1a and M1b. Both places had a vegetation of *Scirpus littoralis*, *Sporobolus spec.* and sparse *Typha australis* and 0-15 cm water above soil surface, and we caught many Sedge Warblers, but no Aquatic Warbler. The following day, we continued catching there (M1c) without success, and three persons crossed the channel with waterproof trousers. It turned out that only a belt of 100-200 m along the channel was wet (5-15 cm water

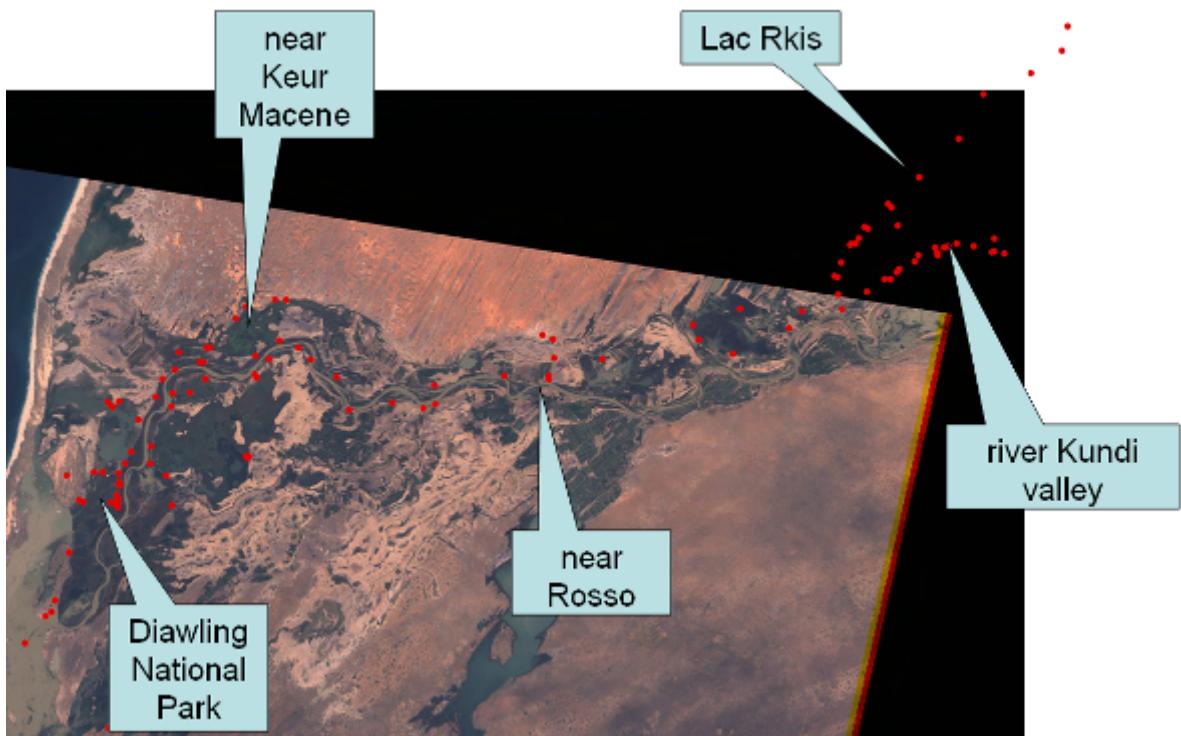
above soil surface) and that the parts more to the West were much drier. A later check by four persons entering the area from West showed that the whole area was dry.



**Fig. 2:** Location of mist-netting sites in Mauritania (M1 and M2).

We continued visiting areas with *Sporobolus* vegetation shown us by Park staff, and all those areas were rather dry and partly with *Tamarix* overgrowth. As the Park staff stressed that the area including trapping site M1 is usually the wettest part of the Park in January, we stopped further search in southern and central part of the Park and concentrated the following day (18. 01. 2008) on an area in the northern basin (with trapping site M2). Here, we found small areas with suitable vegetation and water level in a mosaic with completely dry areas. Trapping in the wet parts yielded again many Sedge Warblers, but no Aquatic Warbler.

As suggested by the Landsat image from Djoudj NP (see 2007 report), there was also a promising area northeast of the Park near Keur Macene. We checked this area on 18. 01. 2009 and it turned out that it is currently dominated by *Typha*. The view from a dune stretching along the basin in the north allowed for surveying dominant vegetation down to the river, and it consisted everywhere of *Typha*. Close to the dune, we checked a small area (mark 385) that was also dry, but had some *Sporobolus* and *Scirpus* vegetation and must have been previously much wetter. Park staff confirmed that such zonation (river - wide *Typha* area - narrow strip with small *Scirpus/Sporobolus* spots and village gardens - road - dune) is characteristic for this section of Senegal River up to Rosso.



**Fig. 3:** Location of searching areas in Mauritania.

As continued trapping at M2 and at a fourth site of M1 (M1d; 19.01.) was still without success, we travelled on 20.01. to Rosso. During the trip along the river, we found only very small spots (< 1 ha) looking suitable. From Rosso we continued along the river, and the next wet area with grassy vegetation was found in the River Kundu valley (mark 403). Here, *Scirpus littoralis* dominated with sparse *Scirpus maritimus* and small islands of *Typha*. Water level was 0-15 cm in drier parts and 15-30 in wetter parts. A more thorough check one day later (21.01.), however, showed that the suitable area was rather narrow (100-300 m). In order to survey a large area, we continued to travel along the valley as well as closer to Lac Rkis and checked the wetland stripes between the dunes by walking, and interviewed locals about wet areas and *Sporobolus* vegetation. They confirmed that there are only narrow wetlands stripes with a strong gradient in water level (from edge to river/lake).

At the trapping sites, both the standard habitat description scheme used in 2007 (IBA scheme) and the slightly modified general observation card of the Polish-German LIFE-Project has been used (Table of habitat parameters of trapping sites see Annex I).

To explore larger areas, the teams split off often in smaller groups and conducted exploration walks instead of standardised mist-netting. Interesting areas were marked using GPS (UTM coordinates). Despite of intensive searching, no AW has been observed in the field or captured during the Mauritania expedition. Main reason is probably, that 95 % of the Diawling NP was dry in mid-January. That means that the steering of the water budget in Diawling is detrimental for AW at the moment (not enough water, potentially suitable habitats become dry too early in winter).

It has to be stressed, that agriculture is aiming to intensify the rice hydro-agriculture and to perform two harvests instead of one per year. Furthermore, there exist plans to construct a channel to Nouakchott to transfer Senegal River water to the north for hydro-agriculture.

During several discussions with DNP staff we informed staff members about current distribution, population size, and threats of Aquatic Warbler in the breeding and migration countries. Ibrahima Diop explained the situation in Djoudj NP.

Facing severe logistic problems (no roads, only one of two cars with 4x4 drive, etc.), we checked a smaller area than planned previously. Areas potentially interesting for Aquatic Warbler wintering were either potentially suitable, but actually dry, or looked quite suitable, but were probably too small. Large areas that still looked suitable on maps from ~1995 were completely transformed either to rice fields or to fresh water reservoirs with monotonous *Typha australis* stands in permanently inundated areas (e.g. NE Keur Macene)..

Potential threats to the AW and its habitats at the lower Sénégäl River are:

- succession due to changes in water regime,
- conversion to agricultural land (hydro-agriculture, mainly rice and sugar cane fields),
- fragmentation/isolation,
- intensive grazing,
- *Sporobolus* cutting in December/January.

## 7. Works in the Djoudj area

Fieldwork in Djoudj was done in two phases: during the first days (14.-15.01.) we focussed on the area S of Tiguet, aiming at catching some AW to test the radio-tracking technique (Cosima with instructions from Benedikt). The mist-netting site at Tiguet was the most successful in the previous year with high AW density and good mist-netting success. The high quality of this area for AW could be confirmed, despite the water table was much lower. Two AW were captured with rings from the previous winter from the same place (site fidelity). First experiences with fitting the transmitters to the birds and localising the birds in the vegetation were collected (Cosima).

In the second period (23.-25.01.) we tried to confirm AW occurrence at Grand Lac and at Marigot Crocodile. At Grand Lac (south of Mirador President) we succeeded in catching four AW despite density seemed to be low. This catching success was only possible by establishing 288 m of mist nets (24 x 12 m) and four chases (two different sections from each side of the net) with a 130 m long rope and 8 people (25.01. at morning). In total, an area of c. 4 ha (2 x 1 ha from each side) was covered. Thus, the AW density was roughly 1 bird/ha.

Despite the water level was much lower than in the previous year, the area at Grand Lac was still almost flooded. At the northern parts between Tiguet and Canal Crocodile, large parts of potentially suitable habitats were already dry in mid/late January.

Due to planned construction works at the pelican breeding island, only a reduced amount of water was let into the National Park. Thus, the water level was much lower in this winter, and the drying out of AW habitats started several weeks earlier than normal. According to information from Ibrahima Diop, in the next winter the water management will be as usual again.

## 8. Summarising discussion of results

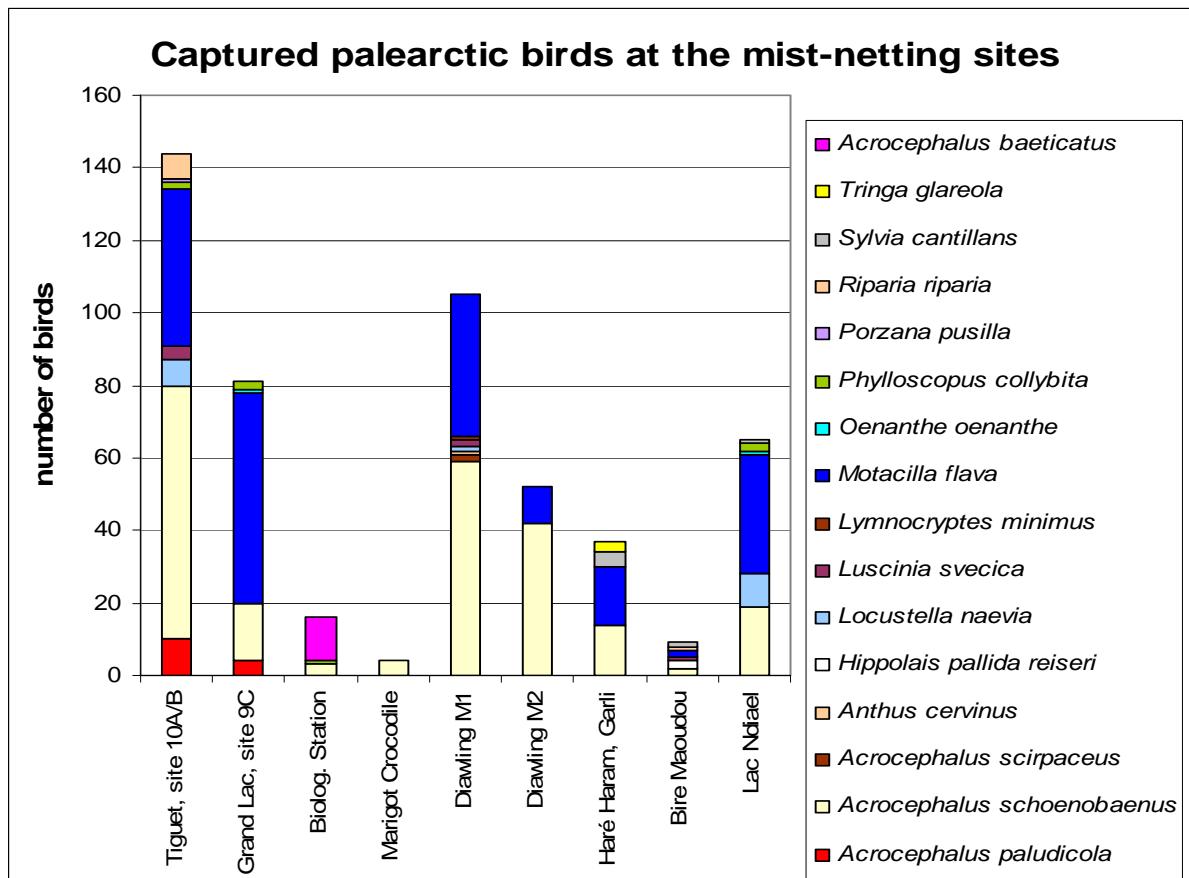
**Table 4:** Captured and ringed Palearctic migrants and African Reed Warblers *A. baeticatus* at the mist-netting sites in January 2008.

species	Djoudj NP and hunting zone				Diawling		Matam	Adabéré	Ndiael	Total
	Tiguet, site 10A/B	Grand Lac, site 9C	Biol. Stat.	Mari Groc dile	Diawling NP		Garli	Bire Maoudou	Lac Ndiael	
	14.- 15.01.; 22.- 25.01.	24.- 25.01.	23.01.	25.01.	M1	M2				
					17.- 18.- 18. 01.	19. 01.	18.- 19.01.	19.- 20.01.	21.- 23.01.	
<i>Acrocephalus paludicola</i>	10	4								14
<i>Acrocephalus schoenobaenus</i>	70	16	3	4	59	42	14	2	19	229
<i>Acrocephalus scirpaceus</i>					2					2
<i>Acrocephalus baeticatus</i>				12						12
<i>Anthus cervinus</i>					1					1
<i>Hippolais pallida reisleri</i>								2		2
<i>Locustella naevia</i>	7				1				9	17
<i>Luscinia svecica</i>	4				2			1		7
<i>Lymnocryptes minimus</i>					1					1
<i>Motacilla flava</i>	43	58			39	10	16	2	33	201
<i>M. flava iberiae</i>	12	52			2	2	2	2	32	102
<i>M. flava flava</i>							8			8
<i>Oenanthe oenanthe</i>		1							1	2
<i>Phylloscopus collybita</i>	2	2	1						2	7
<i>Porzana pusilla</i>	1									1
<i>Riparia riparia</i>	7							1		8
<i>Sylvia cantillans</i>							4	1	1	6
<i>Tringa glareola</i>							3			3
<b>Total</b>	<b>144</b>	<b>81</b>	<b>16</b>	<b>4</b>	<b>103</b>	<b>54</b>	<b>37</b>	<b>9</b>	<b>65</b>	<b>501</b>

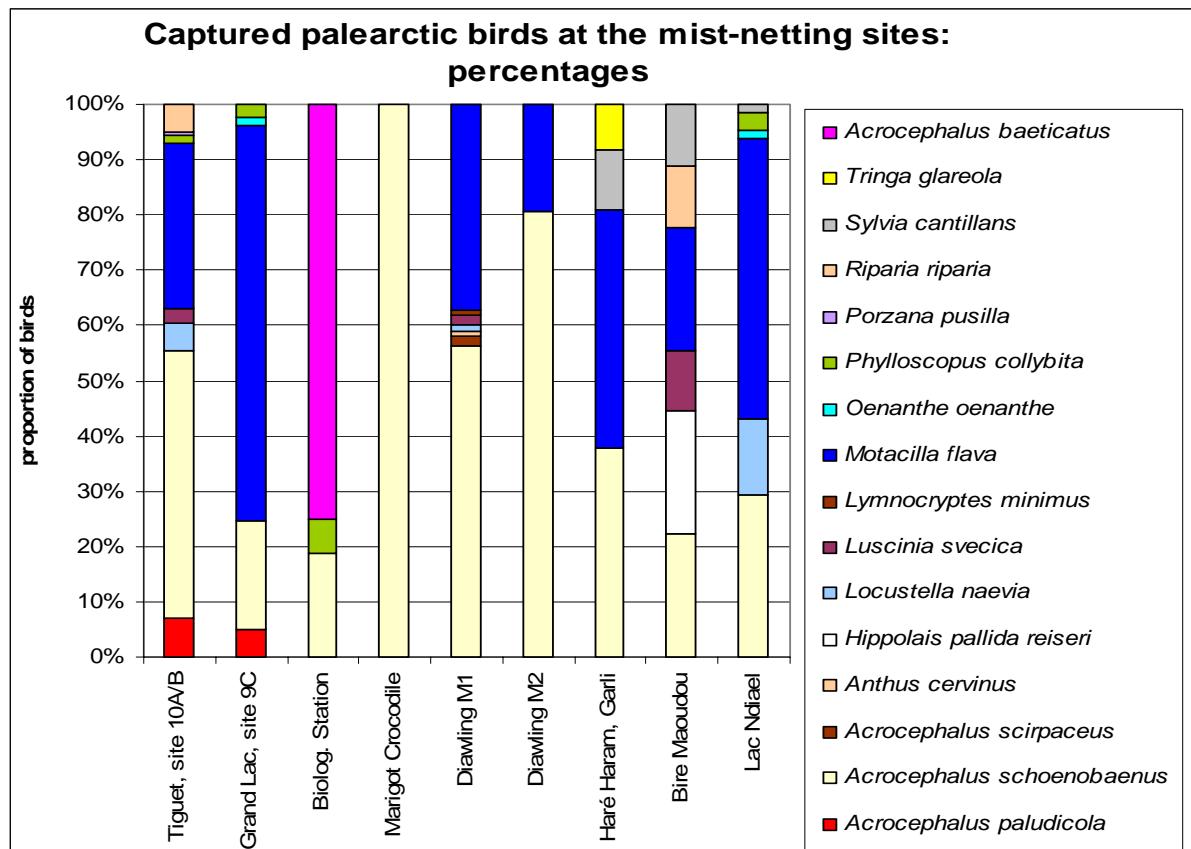
Looking at the mist-netting results (Table 4, 5; Fig. 4, 5) it seems clear, that potentially suitable sites are characterised by the predominance of Yellow Wagtail and Sedge Warbler. Lac Ndiael resembles Tiguet, as the Grasshopper Warbler is also relatively numerous. Grasshopper Warbler and Bluethroat occur also in Diawling. In the relatively narrow *Cyperus* belts at the floodplain lakes upstreams Matam bush-inhabiting species like Subalpine Warbler and Eastern Olivaceous Warbler play a more important role. In contrast to all the other sites, the high *Typha* stands near the Djoudj Biological station are characterised by the absence of Yellow Wagtail and the abundant occurrence of African Reed Warbler.

**Table 4:** Captured African bird species (numbers are estimates) at the mist-netting sites along Senegalg river floodplain.

species	Matam	Adabéré	Ndiael	Total
	Haré Haram, Garli	Bire Maoudou	Lac Ndiael	
	18.-19.01.	19.-20.01.	21.-23.01.	
<i>Alcedo cristata</i>			2	2
<i>Amadina fasciata</i>			1	1
<i>Bubalornis albirostris</i>	2			2
<i>Cisticola galactotes</i>			3	3
<i>Cisticola juncidis</i>		5	8	13
<i>Euplectes afer</i>	24	68	74	166
<i>Glareola pratincola</i>			11	11
<i>Lymnocryptes minimus</i>	1			1
<i>Passer luteus</i>			9	9
<i>Ploceus melanocephalus</i>			48	48
<i>Quelea quelea</i>	1	3	25	29
<i>Rostratula benghalensis</i>	4	2	1	7
<i>Sporaeginthus subflavus</i>			2	2
<i>Sporopipes frontalis</i>	1			1
<i>Streptopelia vinacea</i>		1		1
Total	33	79	184	296



**Fig. 4:** Captured Palearctic migrants and African Reed Warbler *A. baeticatus* at the mist-netting sites.



**Fig. 5:** Percentage of captured Palearctic migrants and African Reed Warbler *A. baeticatus* at the mist-netting sites.

The Djoudj basin (National Park and hunting zone near Tiguet–Debi) remains the only confirmed wintering site of AW in West Africa. Large potentially suitable habitats were also found in the Diawling NP in Mauritania and the Ndial Wildlife Reserve SE Ross-Béthio in Senegal, but were almost dry in mid/late January 2008. During the moult period (November–December) the area of suitable habitat was much larger in and around the Senegal estuary: the flooded habitats in Djoudj were bigger, and the habitats in Diawling and Ndial were flooded.

What happens, if these large areas dry out early like in 2008? How do the AW react? Do they move to suboptimal habitats or do they start earlier with spring migration towards the breeding range? Does this effect the constitution and fitness of the birds at the breeding sites? These questions are still open.

An important result is that there exist no bigger suitable habitats in the Senegal River floodplain upstreams of Djoudj until the border of Mali. The whole structure of the floodplain makes it unlikely that we have omitted such areas. There are only comparatively small *Cyperus* marshes of a few hectares size at some shallow lakes upstreams Matam that remain after floods. These sites could eventually function as stopover sites just before moulting in autumn and before pre-nuptial migration in early spring.

Another important result is the fact that large formerly probably suitable habitats have been transformed into fresh water reservoirs (like the area E of Keur Massène in Mauritania) or hydro-agriculture, like between Lac de Guiers and Richard Toll and north of Tiguet–Debi. So, suitable AW habitat was always restricted to a few sites in West Africa, and habitat loss due to water management and agriculture has accelerated tremendously during the last years.

## 9. Future work

Search for wintering sites:

It is still very unlikely, that the Djoudj area is the only important wintering site of AW in West Africa. Because of the ongoing habitat loss in the region it is more important to identify and protect other wintering sites. These could be located in southern Mauritania, in Mali (innere Niger delta) or further south in Gambia, the Casamance or in Guinea Bissau (most likely not in the other parts of Senegal).

Before planning another searching expedition, the DNA and stable isotope analyses of samples from Djoudj should be finished. The results will show us the between-year variation in stable isotopes of birds captured in Djoudj and will allow a comparison with the results from the former isotope studies on 10 European breeding populations (PAIN et al. 2004 and unpublished). DNA and isotope analyses could also give an indication about the likelihood of the existence of other important wintering sites (e.g. if DNA loci of certain breeding populations are missing in Djoudj or the isotope values differ substantially from those measured at the breeding sites).

Another preparatory step is the new satellite analysis that is based on the 2008 ground data and is attached to this report as Annex VI. According to this latest analysis, the area of potential AW habitat is extremely small and fragmented in West Africa. Larger (but still small) patches besides the Senegal delta are only shown in Mali and southern Mauritania, and the number of potential sites is small (Annex VI).

The combination of all three approaches – satellite image analysis, DNA and stable isotopes analyses – should enable us to decide over further searching activities in the next years.

Threat analysis of the Djoudj AW wintering site:

Independently from further search for wintering sites, ecological studies at Djoudj have to be continued and intensified. We should try to obtain more detailed information on key habitat parameters, home ranges and seasonal movements of AW in Djoudj. In particular, we need a proper threat analysis for the wintering habitats with respect to National Park management and possible long-term habitat changes. All these questions are subject of the doctor thesis project of Cosima Tegetmeyer and some more connected diploma theses.

## 10. Financial Report

### Payments:

Purpose	CFA 664,20 = 1€	Euro	Total in €
Flight tickets and visa for <u>Arnaud &amp; Bruno</u> (1,228 + 63 €), <u>Anatoly</u> (250 €, cancellation fee*), <u>Alex</u> , <u>Franziska</u> , <u>Janusz</u> , <u>Martin</u> (590 € each = 2,360 €)	0	1,291 250 2,360	<b>3,901.00</b>
Local transport (car rent and petrol)	1,051,100	740	<b>2,322.40</b>
Food (in the field)	739,905	0	<b>1,113.91</b>
Hotel accommodations, accommodation in Djoudj	206,500	3,240	<b>3,550.88</b>
Equipment (mist net sticks, rope, boot repair, maps)	58,000	0	<b>87.32</b>
Ibrahima for expenses in Mauritania	90,000	0	<b>135.50</b>
Salary for Indega Bindia a. o. local guides	40,000	50	<b>60.22</b>
Taxi	0	30	<b>30.00</b>
<b>Total</b>			<b>11,201.23</b>

\*) Anatoly Poluda had to cancel his participation and his flight, because he got no visa in time! We paid for the cancellation fee.

### Funding:

RSPB – Small Grant contract for AWCT, April 2008 (pending):	<b>5,460 €</b>
RSPB – additional small grant for W-Afrika expedition (paid):	<b>5,000 €</b>
Contribution of Max Planck Institute Radolfzell for Volker:	<b>523 €</b>
Contributions of German/Belgian participants:	<b>218 €</b>
<b>Total:</b>	<b>11,201 €</b>

## 11. Acknowledgements

We thank the Royal Society for the Protection of Birds (RSPB), especially Norbert Schäffer and Lars Lachmann (Int. Dept.), for providing the major funding for all our activities in West Africa. We also thank Ibrahima Diop, director of the Djoudj Biological Station, for providing accommodation and all kinds of support and advice in Djoudj and also in Diawling - without his assistance, the expedition to Mauritania would not have been possible.

Furthermore, we are grateful to the Djoudj and Diawling National Park staff, in particular Conservateur Moctar Ould Daddah (Diawling) and senior ornithologist Indega Bindia (Djoudj), for their patience, assistance and helpful advice.

The participation of Oskars Keiss was financed by the European Social Fund grant to the University of Latvia.

Volker Salewskis participation was supported by the Max Planck Institute for Ornithology "Vogelwarte Radolfzell" in Möggingen, Germany.

The participation of Cosima Tegetmeyer and her doctor thesis project in Djoudj are supported by the Deutsche Bundesstiftung Umwelt (DBU) and the MAVA Foundation.

**ANNEXES**

## Annex I – Mist-netting sites

(Table of habitat parameters and photo documentation)

1	Observer	JK	JK	JK	FT	FT
2	Place	Haré Haham near Garli	Lac Ndiael	Bire Maoudou	PND/ Grand Lac	
3	Coordinates - N	15°35'51.9"	16°16'01.9"	15°07'40.4"	16°25'21.5"	
	Coordinates - S	13°12'35.3"	16°03'14.5"	12°48'26.0"	16°11'00.6"	
					Plot 1	Plot 2
4	Date	19.01.2008	23.01.2008	20.01.2008	24.01.2008	24.01.2008
5	AW caught	0	0	0	2	
7	Water depth (cm)	36	0	8	17	
		34	0	16	14	
		11	0	35	23	
		39	5	46	20	
		9	4	12	18	
		19	7	34	16	
		22	8	6	0	
		23	10	19	8	
		30	12	29	18	
		17	12	10	20	
8	Plot 1 (%)					
	bare soil	7,5	5	1	0	
	Scirpus mar.				38	
	Scirpus litt.				20	
	Typha australis		1		0	
	Sporolobus spec.				10	
	Cyperus spec.	40				
	litter				2,5	
	water	60	5	17,5	20	
	other					
	Plot 2 (%)					
	bare soil	10	5		0	
	Scirpus mar.				20	
	Scirpus litt.				38	
	Typha australis		1		0	
	Sporolobus spec.				20	
	Cyperus spec.					
	litter	40			2,5	
	water	50	15	25	10	
	other					
9a	vegetation structure	with tussocks	partly with tussocks	with tussocks		
9b	vegetation height (cm)	80	100	110	88	60
		90	105	122	73	30
		90	90	105	37	45
		125	110	95	30	48
		125	80	115	85	40

		100	40	108	0	52
		125	75	114	60	18
		115	85	95	100	78
		130	95	98	55	75
		105	75	114	100	77
9c	litter height (cm)	0			17	10
		0			15	8
		0			14	5
		0			15	2
					0	8
					0	5
					30	4
					18	10
					5	5
					18	15
11	shrub coverage (%)	0	0	0	0	0
12a	number of shrubs	0	0	0,5	0	0
12b	height of shrubs (m)	-	-	>3	-	



Mist-netting site near Tiguet [VS]



Mist-netting site Tiguet [VS]



Senegal floodplain near Podor [VS]



Oxbow with water and *Acacia nilotica* forest near Ouro M'Baye, Podor [VS]



Margin of Senegal floodplain near Tarédji [VS]



Lac Lamlamco near Tiempin, Matam, remnant of flooded area in Aishemonmanaye vegetation [VS]



Aishemonmanaye vegetation near Kanel [VS]



*Cyperus* marsh at Haré Haram S Garli, Matam [VS]



*Cyperus* marsh at Haré Haram S Garli, Matam [VS]



Gouts grazing on the *Cyperus* marsh Haré Haram S Garli, Matam [VS]



Gouts near Haré Haram S Garli, Matam [VS]



Dry lake in the Senegal floodplain 5 km from Fadaria, Matam, with grazed *Cyperus* vegetation [VS]



Bire Tokosel in the Senegal floodplain near Adabéré [VS]



*Cyperus* belt of Bire Maoudou near Adabéré [VS]



Trapping site at Bire Maoudou, Adabéré [VS]



Trapping site at Bire Maoudou, Adabéré [VS]



Lac Ndiael SE Ross-Béthio [VS]



Trapping site N of Lac Ndial with *Scirpus littoralis* vegetation and small pond [VS]



Trapping site N of Lac Ndial with *Scirpus littoralis* vegetation [VS]



Trapping site at Grand Lac de Djoudj, S of Mirador President [AE]



Trapping site M1 in the Diawling NP, Mauritania [FT]



Grassy marshes in the Diawling NP, Mauritania [FT]



Trapping site M2 in the Diawling NP, Mauritania [AE]



Diawling NP near trapping site M2, GPS Mark 390, Mauritania [FT]



Diawling NP near trapping site M2, GPS Mark 389, Mauritania [FT]



Wetland E Keur Massène [FT]



Kundi valley, Mauritania, with marshy vegetation: suitable for AW, but too small [FT]



Kundi valley, GPS Mark 403: suitable habitat, but too small [FT]



Lac Rkis area, Mauritania, GPS Mark 433: suitable, but too small [FT]

## Annex II – Ring list

### Ring list

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5293001	B	ACROLA	14.01.2008	830	Senegal	Tiguet, site 10B	?	+1A		50	63,0	11,4	1
FRP	BB	5293003	B	ACROLA	14.01.2008	830	Senegal	Tiguet, site 10B	M?	+1A		50	63,0	12,2	1
FRP	BB	5293009	B	ACROLA	14.01.2008	1030	Senegal	Tiguet, site 10B	F?	+1A		50	60,5	11,0	1
FRP	BB	5293009	C	ACROLA	15.01.2008	1000	Senegal	Tiguet, site 10B	?	+1A	8	50	0,0	0,0	1
FRP	BB	5293010	B	ACROLA	14.01.2008	1030	Senegal	Tiguet, site 10B	F?	+1A		50	61,5	10,4	1
FRP	BB	5293011	B	ACROLA	14.01.2008	1030	Senegal	Tiguet, site 10B	?	+1A		50	62,0	10,9	1
FRP	BB	5293201	B	ACROLA	15.01.2008	1000	Senegal	Tiguet, site 10B	?	+1A		50	66,0	11,8	1
FRP	BB	5293204	B	ACROLA	15.01.2008	1115	Senegal	Tiguet, site 10B	?	+1A		50	61,5	11,1	2
FRP	BB	5293343	B	ACROLA	24.01.2008	1930	Senegal	Grand Lac, site 9C	?	+1A		240	63,0	10,8	1
FRP	BB	5293348	B	ACROLA	24.01.2008	800	Senegal	Grand Lac, site 9C	?	+1A		240	62,0	10,1	1
FRP	BB	5293351	B	ACROLA	24.01.2008	800	Senegal	Grand Lac, site 9C	?	+1A		240	62,0	10,3	1
FRP	BB	5293407	B	ACROLA	25.01.2008	1900	Senegal	Grand Lac, site 9C	?	+1A		288	63,5	10,8	1
FRP	BB	5464157	C	ACROLA	14.01.2008	1030	Senegal	Tiguet, site 10B	M?	+2A	8	50	64,0	11,5	1
FRP	BB	5464249	C	ACROLA	22.01.2008	1730	Senegal	Tiguet, site 10B	F?	+2A	8	50	61,5	12,4	2
FRP	BB	5509045	B	ACROLA	25.01.2008	930	Senegal	Tiguet, site 10B	M	+1A		30	62,5	10,9	1
FRP	BB	5027230	C	ACRSCH	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A	8	130	66,0	10,1	1
FRP	BB	5027230	C	ACRSCH	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A	8	130	0,0	0,0	1
FRP	BB	5293004	B	ACRSCH	14.01.2008	830	Senegal	PN du Djoudj	?	+1A		50	67,5	10,5	1
FRP	BB	5293005	B	ACRSCH	14.01.2008	830	Senegal	PN du Djoudj	?	+1A		50	66,0	10,1	1
FRP	BB	5293006	B	ACRSCH	14.01.2008	945	Senegal	PN du Djoudj	?	+1A		50	65,5	11,6	1
FRP	BB	5293008	B	ACRSCH	14.01.2008	945	Senegal	PN du Djoudj	?	+1A		50	64,0	10,8	1
FRP	BB	5293012	B	ACRSCH	14.01.2008	1030	Senegal	PN du Djoudj	?	+1A		50	67,0	10,6	1
FRP	BB	5293014	B	ACRSCH	14.01.2008	1030	Senegal	PN du Djoudj	?	+1A		50	63,5	11,0	2
FRP	BB	5293016	B	ACRSCH	14.01.2008	1140	Senegal	PN du Djoudj	?	+1A		50	62,5	12,0	2
FRP	BB	5293017	B	ACRSCH	14.01.2008	1140	Senegal	PN du Djoudj	?	+1A		50	68,0	11,4	1
FRP	BB	5293018	B	ACRSCH	14.01.2008	1140	Senegal	PN du Djoudj	?	+1A		50	64,0	10,2	1
FRP	BB	5293020	B	ACRSCH	15.01.2008	930	Senegal	Tiguet Nord, Djoudj	?	+1A		50	68,5	11,2	1
FRP	BB	5293021	B	ACRSCH	15.01.2008	930	Senegal	Tiguet Nord, Djoudj	?	+1A		50	66,5	10,6	1

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5293023	B	ACRSCH	15.01.2008	930	Senegal	Tiguet Nord, Djoudj	?	+1A		50	68,0	10,2	1
FRP	BB	5293029	B	ACRSCH	15.01.2008	1130	Senegal	Tiguet Nord, Djoudj	?	+1A		50	67,0	10,7	1
FRP	BB	5293030	B	ACRSCH	15.01.2008	1130	Senegal	Tiguet Nord, Djoudj	?	+1A		50	68,0	9,8	1
FRP	BB	5293031	B	ACRSCH	15.01.2008	1130	Senegal	Tiguet Nord, Djoudj	?	+1A		50	65,0	10,4	1
FRP	BB	5293032	B	ACRSCH	15.01.2008	1130	Senegal	Tiguet Nord, Djoudj	?	+1A		50	66,0	10,8	1
FRP	BB	5293033	B	ACRSCH	15.01.2008	1130	Senegal	Tiguet Nord, Djoudj	?	+1A		50	64,5	10,3	1
FRP	BB	5293034	B	ACRSCH	15.01.2008	1130	Senegal	Tiguet Nord, Djoudj	?	+1A		50	68,0	11,2	1
FRP	BB	5293035	B	ACRSCH	15.01.2008	1130	Senegal	Tiguet Nord, Djoudj	?	+1A		50	64,0	10,5	1
FRP	BB	5293036	B	ACRSCH	15.01.2008	1130	Senegal	Tiguet Nord, Djoudj	?	+1A		50	64,5	9,8	1
FRP	BB	5293037	B	ACRSCH	15.01.2008	1130	Senegal	Tiguet Nord, Djoudj	?	+1A		50	64,0	9,9	1
FRP	BB	5293038	B	ACRSCH	15.01.2008	1830	Senegal	Tiguet Nord, Djoudj	?	+1A		50	64,5	10,0	1
FRP	BB	5293039	B	ACRSCH	15.01.2008	1830	Senegal	Tiguet Nord, Djoudj	?	+1A		50	65,5	10,4	1
FRP	BB	5293040	B	ACRSCH	15.01.2008	1830	Senegal	Tiguet Nord, Djoudj	?	+1A		50	64,5	10,7	1
FRP	BB	5293041	B	ACRSCH	15.01.2008	1830	Senegal	Tiguet Nord, Djoudj	?	+1A		50	65,0	10,1	1
FRP	BB	5293043	B	ACRSCH	15.01.2008	1830	Senegal	Tiguet Nord, Djoudj	?	+1A		50	66,5	10,8	1
FRP	BB	5293044	B	ACRSCH	15.01.2008	1830	Senegal	Tiguet Nord, Djoudj	?	+1A		50	64,0	10,6	1
FRP	BB	5293045	B	ACRSCH	15.01.2008	1830	Senegal	Tiguet Nord, Djoudj	?	+1A		50	69,0	10,4	1
FRP	BB	5293046	B	ACRSCH	18.01.2008	630	Mauritania	PN de Diawling	?	+1A		140	65,0	11,4	2
FRP	BB	5293047	B	ACRSCH	18.01.2008	630	Mauritania	PN de Diawling	?	+1A		140	65,5	10,5	1
FRP	BB	5293048	B	ACRSCH	18.01.2008	630	Mauritania	PN de Diawling	?	+1A		140	65,5	10,8	1
FRP	BB	5293049	B	ACRSCH	18.01.2008	630	Mauritania	PN de Diawling	?	+1A		140	67,0	11,8	1
FRP	BB	5293050	B	ACRSCH	18.01.2008	630	Mauritania	PN de Diawling	?	+1A		140	67,5	12,1	2
FRP	BB	5293051	B	ACRSCH	18.01.2008	630	Mauritania	PN de Diawling	?	+1A		140	66,0	11,3	1
FRP	BB	5293052	B	ACRSCH	18.01.2008	630	Mauritania	PN de Diawling	?	+1A		140	68,0	12,1	2
FRP	BB	5293052	C	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A	8	140		11,2	2
FRP	BB	5293053	B	ACRSCH	18.01.2008	630	Mauritania	PN de Diawling	?	+1A		140	65,5	10,3	1
FRP	BB	5293054	B	ACRSCH	18.01.2008	630	Mauritania	PN de Diawling	?	+1A		140	66,0	11,0	1
FRP	BB	5293055	B	ACRSCH	18.01.2008	630	Mauritania	PN de Diawling	?	+1A		140	65,0	10,6	1
FRP	BB	5293056	B	ACRSCH	18.01.2008	630	Mauritania	PN de Diawling	?	+1A		140	65,0	10,0	1
FRP	BB	5293056	C	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A	8	140		9,3	1
FRP	BB	5293058	B	ACRSCH	18.01.2008	700	Mauritania	PN de Diawling	?	+1A		140	67,0	11,5	1
FRP	BB	5293059	B	ACRSCH	18.01.2008	700	Mauritania	PN de Diawling	?	+1A		140	63,5	10,7	1

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5293060	B	ACRSCH	18.01.2008	700	Mauritania	PN de Diawling	?	+1A		140	67,5	11,1	1
FRP	BB	5293061	B	ACRSCH	18.01.2008	700	Mauritania	PN de Diawling	?	+1A		140	65,5	10,6	1
FRP	BB	5293062	B	ACRSCH	18.01.2008	700	Mauritania	PN de Diawling	?	+1A		140	63,5	10,1	1
FRP	BB	5293063	B	ACRSCH	18.01.2008	700	Mauritania	PN de Diawling	?	+1A		140	60,5	12,0	2
FRP	BB	5293064	B	ACRSCH	18.01.2008	700	Mauritania	PN de Diawling	?	+1A		140	67,0	11,7	2
FRP	BB	5293065	B	ACRSCH	18.01.2008	700	Mauritania	PN de Diawling	?	+1A		140	67,5	11,7	1
FRP	BB	5293066	B	ACRSCH	18.01.2008	700	Mauritania	PN de Diawling	?	+1A		140	63,5	11,2	1
FRP	BB	5293066	C	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A	8	140		9,8	1
FRP	BB	5293067	B	ACRSCH	18.01.2008	700	Mauritania	PN de Diawling	?	+1A		140	65,0	10,4	1
FRP	BB	5293068	B	ACRSCH	18.01.2008	700	Mauritania	PN de Diawling	?	+1A		140	65,5	11,5	1
FRP	BB	5293068	C	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A	8	140		10,8	1
FRP	BB	5293068	C	ACRSCH	19.01.2008	930	Mauritania	PN de Diawling	?	+1A	8	140		10,7	1
FRP	BB	5293069	B	ACRSCH	18.01.2008	700	Mauritania	PN de Diawling	?	+1A		140	66,0	11,0	1
FRP	BB	5293071	B	ACRSCH	18.01.2008	700	Mauritania	PN de Diawling	?	+1A		140	63,0	10,4	1
FRP	BB	5293077	B	ACRSCH	22.01.2008	1800	Senegal	Tiguet, Djoudj	?	+1A		50	66,5	12,7	2
FRP	BB	5293078	B	ACRSCH	22.01.2008	1800	Senegal	Tiguet, Djoudj	?	+1A		50	66,0	13,0	2
FRP	BB	5293078	C	ACRSCH	23.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A	8	60	65,0	12,3	2
FRP	BB	5293087	B	ACRSCH	23.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		60	63,5	10,5	1
FRP	BB	5293088	B	ACRSCH	23.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		60	64,5	14,4	3
FRP	BB	5293092	B	ACRSCH	23.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		60	64,0	10,5	1
FRP	BB	5293097	B	ACRSCH	23.01.2008	830	Senegal	Tiguet, Djoudj	?	+1A		60	62,0	11,0	1
FRP	BB	5293211	B	ACRSCH	18.01.2008	1830	Senegal	Garli/Matam	?	+1A		180	63,0	10,5	1
FRP	BB	5293212	B	ACRSCH	18.01.2008	1900	Senegal	Garli/Matam	?	+1A		180	64,0	10,2	1
FRP	BB	5293212	C	ACRSCH	19.01.2008	800	Senegal	Garli/Matam	?	+1A	8	180	64,0	10,2	
FRP	BB	5293213	B	ACRSCH	18.01.2008	1900	Senegal	Garli/Matam	?	+1A		180	68,5	10,8	1
FRP	BB	5293214	B	ACRSCH	18.01.2008	1900	Senegal	Garli/Matam	?	+1A		180	67,0	11,2	1
FRP	BB	5293215	B	ACRSCH	19.01.2008	800	Senegal	Garli/Matam	?	+1A		180	67,0	10,4	1
FRP	BB	5293224	B	ACRSCH	19.01.2008	800	Senegal	Garli/Matam	?	+1A		180	67,0	10,5	1
FRP	BB	5293225	B	ACRSCH	19.01.2008	800	Senegal	Garli/Matam	?	+1A		180	64,5	9,5	1
FRP	BB	5293226	B	ACRSCH	19.01.2008	800	Senegal	Garli/Matam	?	+1A		180	67,0	9,9	1
FRP	BB	5293227	B	ACRSCH	19.01.2008	800	Senegal	Garli/Matam	?	+1A		180	64,0	9,6	1
FRP	BB	5293228	B	ACRSCH	19.01.2008	800	Senegal	Garli/Matam	?	+1A		180	68,0	10,7	1

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5293229	B	ACRSCH	19.01.2008	800	Senegal	Garli/Matam	?	+1A		180	65,0	11,4	1
FRP	BB	5293230	B	ACRSCH	19.01.2008	800	Senegal	Garli/Matam	?	+1A		180	65,0	10,5	1
FRP	BB	5293232	B	ACRSCH	19.01.2008	800	Senegal	Garli/Matam	?	+1A		180	65,0	9,9	1
FRP	BB	5293233	B	ACRSCH	19.01.2008	800	Senegal	Garli/Matam	?	+1A		180	65,0	10,4	2
FRP	BB	5293246	B	ACRSCH	20.01.2008	700	Senegal	Lac Maoudou	?	+1A		144	65,0	10,0	1
FRP	BB	5293250	B	ACRSCH	20.01.2008	800	Senegal	Lac Maoudou	?	+1A		144	65,0	9,0	1
FRP	BB	5293253	B	ACRSCH	21.01.2008	1900	Senegal	Lac Ndiael	?	+1A		144	69,0	12,0	2
FRP	BB	5293254	B	ACRSCH	21.01.2008	1900	Senegal	Lac Ndiael	?	+1A		144	66,5	14,4	3
FRP	BB	5293255	B	ACRSCH	21.01.2008	1900	Senegal	Lac Ndiael	?	+1A		144	67,5	11,0	1
FRP	BB	5293261	B	ACRSCH	22.01.2008	800	Senegal	Lac Ndiael	?	+1A		276	66,0	9,5	1
FRP	BB	5293265	B	ACRSCH	22.01.2008	830	Senegal	Lac Ndiael	?	+1A		276	67,0	9,4	1
FRP	BB	5293266	B	ACRSCH	22.01.2008	830	Senegal	Lac Ndiael	?	+1A		276	65,5	10,2	1
FRP	BB	5293267	B	ACRSCH	22.01.2008	830	Senegal	Lac Ndiael	?	+1A		276	64,0	10,2	1
FRP	BB	5293268	B	ACRSCH	22.01.2008	830	Senegal	Lac Ndiael	?	+1A		276	67,0	12,3	2
FRP	BB	5293272	B	ACRSCH	22.01.2008	900	Senegal	Lac Ndiael	?	+1A		276	68,5	10,3	1
FRP	BB	5293275	B	ACRSCH	22.01.2008	1830	Senegal	Lac Ndiael	?	+1A		276	66,0	10,9	1
FRP	BB	5293280	B	ACRSCH	22.01.2008	1930	Senegal	Lac Ndiael	?	+1A		276	62,0	11,2	2
FRP	BB	5293281	B	ACRSCH	22.01.2008	1930	Senegal	Lac Ndiael	?	+1A		276	70,0	11,6	2
FRP	BB	5293286	B	ACRSCH	23.01.2008	700	Senegal	Lac Ndiael	?	+1A		276	66,5	9,8	1
FRP	BB	5293319	B	ACRSCH	24.01.2008	1700	Senegal	Grand Lac/Djoudj	?	+1A		240	69,0	10,5	1
FRP	BB	5293323	B	ACRSCH	24.01.2008	1700	Senegal	Grand Lac/Djoudj	?	+1A		240	65,5	12,0	2
FRP	BB	5293327	B	ACRSCH	24.01.2008	1815	Senegal	Grand Lac/Djoudj	?	+1A		240	66,0	11,0	2
FRP	BB	5293327	C	ACRSCH	25.01.2008	800	Senegal	Grand Lac/Djoudj	?	+1A	8	288	0,0	0,0	1
FRP	BB	5293331	B	ACRSCH	24.01.2008	1815	Senegal	Grand Lac/Djoudj	?	+1A		240	68,0	10,0	1
FRP	BB	5293331	C	ACRSCH	25.01.2008	800	Senegal	Grand Lac/Djoudj	?	+1A	8	288	0,0	0,0	1
FRP	BB	5293339	B	ACRSCH	24.01.2008	1900	Senegal	Grand Lac/Djoudj	?	+1A		240	66,5	10,5	2
FRP	BB	5293342	B	ACRSCH	24.01.2008	1930	Senegal	Grand Lac/Djoudj	?	+1A		240	65,0	10,0	1
FRP	BB	5293345	B	ACRSCH	24.01.2008	800	Senegal	Grand Lac/Djoudj	?	+1A		240	67,5	10,2	1
FRP	BB	5293346	B	ACRSCH	24.01.2008	800	Senegal	Grand Lac/Djoudj	?	+1A		240	66,5	10,0	1
FRP	BB	5293349	B	ACRSCH	24.01.2008	800	Senegal	Grand Lac/Djoudj	?	+1A		240	65,0	0,0	1
FRP	BB	5293350	B	ACRSCH	24.01.2008	800	Senegal	Grand Lac/Djoudj	?	+1A		240	68,0	10,1	1
FRP	BB	5293354	B	ACRSCH	25.01.2008	800	Senegal	Grand Lac/Djoudj	?	+1A		288	66,0	10,5	1

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5293357	B	ACRSCH	25.01.2008	800	Senegal	Grand Lac/Djoudj	?	+1A		288	64,0	10,6	1
FRP	BB	5293358	B	ACRSCH	25.01.2008	800	Senegal	Grand Lac/Djoudj	?	+1A		288	56,5	9,5	1
FRP	BB	5293374	B	ACRSCH	25.01.2008	900	Senegal	Grand Lac/Djoudj	?	+1A		288	67,0	12,2	2
FRP	BB	5293410	B	ACRSCH	25.01.2008	2000	Senegal	Grand Lac/Djoudj	?	+1A		288	66,5	9,8	1
FRP	BB	5293411	B	ACRSCH	25.01.2008	2000	Senegal	Grand Lac/Djoudj	?	+1A		288	68,5	10,6	1
FRP	BB	5509001	B	ACRSCH	23.01.2008	830	Senegal	Tiguet, Djoudj	?	+1A		60	63,5	10,9	1
FRP	BB	5509005	B	ACRSCH	23.01.2008	900	Senegal	Tiguet, Djoudj	?	+1A		60	66,0	9,2	1
FRP	BB	5509006	B	ACRSCH	23.01.2008	900	Senegal	Tiguet, Djoudj	?	+1A		60	66,5	10,6	1
FRP	BB	5509008	B	ACRSCH	24.01.2008	1830	Senegal	Tiguet, Djoudj	?	+1A		80	65,0	9,4	1
FRP	BB	5509009	B	ACRSCH	24.01.2008	1830	Senegal	Tiguet, Djoudj	?	+1A		80	65,0	9,9	1
FRP	BB	5509011	B	ACRSCH	24.01.2008	1830	Senegal	Tiguet, Djoudj	?	+1A		80	65,0	9,4	1
FRP	BB	5509012	B	ACRSCH	24.01.2008	1830	Senegal	Tiguet, Djoudj	?	+1A		80	66,5	9,8	1
FRP	BB	5509014	B	ACRSCH	24.01.2008	1830	Senegal	Tiguet, Djoudj	?	+1A		80	64,0	10,4	1
FRP	BB	5509015	B	ACRSCH	24.01.2008	1830	Senegal	Tiguet, Djoudj	?	+1A		80	67,0	11,3	1
FRP	BB	5509016	B	ACRSCH	24.01.2008	1830	Senegal	Tiguet, Djoudj	?	+1A		80	67,5	10,7	1
FRP	BB	5509018	B	ACRSCH	24.01.2008	1830	Senegal	Tiguet, Djoudj	?	+1A		80	64,5	9,7	1
FRP	BB	5509019	B	ACRSCH	24.01.2008	1830	Senegal	Tiguet, Djoudj	?	+1A		80	63,5	12,3	2
FRP	BB	5509020	B	ACRSCH	24.01.2008	1830	Senegal	Tiguet, Djoudj	?	+1A		80	65,5	9,3	1
FRP	BB	5509022	B	ACRSCH	24.01.2008	1830	Senegal	Tiguet, Djoudj	?	+1A		80	66,0	10,7	2
FRP	BB	5509023	B	ACRSCH	24.01.2008	1830	Senegal	Tiguet, Djoudj	?	+1A		80	66,0	9,3	1
FRP	BB	5509024	B	ACRSCH	24.01.2008	1830	Senegal	Tiguet, Djoudj	?	+1A		80	63,0	9,2	1
FRP	BB	5509025	B	ACRSCH	24.01.2008	1830	Senegal	Tiguet, Djoudj	?	+1A		80	64,0	9,3	1
FRP	BB	5509026	B	ACRSCH	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	64,0	9,8	1
FRP	BB	5509030	B	ACRSCH	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	66,5	9,5	1
FRP	BB	5509031	B	ACRSCH	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	66,0	9,7	1
FRP	BB	5509032	B	ACRSCH	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	67,5	10,5	1
FRP	BB	5509039	B	ACRSCH	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	67,5	15,1	3
FRP	BB	5509040	B	ACRSCH	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	66,0	10,2	1
FRP	BB	5509041	B	ACRSCH	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	67,5	10,4	1
FRP	BB	5509042	B	ACRSCH	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	68,0	10,6	1
FRP	BB	5509043	B	ACRSCH	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	66,0	10,4	1
FRP	BB	5509047	B	ACRSCH	25.01.2008	930	Senegal	Tiguet, Djoudj	?	+1A		130	66,5	10,4	1

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5509048	B	ACRSCH	25.01.2008	930	Senegal	Tiguet, Djoudj	?	+1A		130	69,0	10,2	1
FRP	BB	5509049	B	ACRSCH	25.01.2008	1030	Senegal	Tiguet, Djoudj	?	+1A		130	70,5	10,7	1
FRP	BB	5509050	B	ACRSCH	25.01.2008	1030	Senegal	Tiguet, Djoudj	?	+1A		130	67,0	11,4	2
FRP	BB	5509051	B	ACRSCH	25.01.2008	1030	Senegal	Tiguet, Djoudj	?	+1A		130	61,5	10,2	1
FRP	BB	5509052	B	ACRSCH	25.01.2008	1030	Senegal	Tiguet, Djoudj	?	+1A		130	67,5	9,6	1
FRP	BB	5509053	B	ACRSCH	25.01.2008	1030	Senegal	Tiguet, Djoudj	?	+1A		130	69,0	10,1	1
FRP	BB	5509054	B	ACRSCH	26.01.2008	1830	Senegal	Marigot Crocodile	?	+1A		30	69,0	13,2	2
FRP	BB	5509055	B	ACRSCH	26.01.2008	1830	Senegal	Marigot Crocodile	?	+1A		30	64,5	9,9	1
FRP	BB	5509056	B	ACRSCH	26.01.2008	1830	Senegal	Marigot Crocodile	?	+1A		30	67,5	11,9	2
FRP	BB	5509057	B	ACRSCH	26.01.2008	1830	Senegal	Marigot Crocodile	?	+1A		30	66,0	10,3	1
FRP	BB	5509101	B	ACRSCH	16.01.2008	1800	Mauritania	PN de Diawling	?	+1A		50	66,5	10,6	1
FRP	BB	5509102	B	ACRSCH	16.01.2008	1800	Mauritania	PN de Diawling	?	+1A		50	65,5	11,5	2
FRP	BB	5509103	B	ACRSCH	16.01.2008	1800	Mauritania	PN de Diawling	?	+1A		50		10,6	1
FRP	BB	5509103	C	ACRSCH	17.01.2008	815	Mauritania	PN de Diawling	?	+1A	8	80		9,0	1
FRP	BB	5509103	C	ACRSCH	18.01.2008	1100	Mauritania	PN de Diawling	?	+1A	8	80		9,8	1
FRP	BB	5509104	B	ACRSCH	16.01.2008	1800	Mauritania	PN de Diawling	?	+1A		50	65,0	10,4	1
FRP	BB	5509105	B	ACRSCH	16.01.2008	1800	Mauritania	PN de Diawling	?	+1A		50	64,5	10,3	2
FRP	BB	5509106	B	ACRSCH	16.01.2008	1800	Mauritania	PN de Diawling	?	+1A		50	67,5	12,3	2
FRP	BB	5509107	B	ACRSCH	16.01.2008	1800	Mauritania	PN de Diawling	?	+1A		50	64,5	11,3	1
FRP	BB	5509108	B	ACRSCH	16.01.2008	1800	Mauritania	PN de Diawling	?	+1A		50	64,5	11,3	2
FRP	BB	5509108	C	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A	8	80		10,7	1
FRP	BB	5509109	B	ACRSCH	16.01.2008	1800	Mauritania	PN de Diawling	?	+1A		50	65,0	11,3	2
FRP	BB	5509111	B	ACRSCH	16.01.2008	1800	Mauritania	PN de Diawling	?	+1A		50	64,5	10,3	1
FRP	BB	5509114	B	ACRSCH	16.01.2008	1800	Mauritania	PN de Diawling	?	+1A		50	68,5	11,1	2
FRP	BB	5509115	B	ACRSCH	16.01.2008	1830	Mauritania	PN de Diawling	?	+1A		50	65,0	10,3	2
FRP	BB	5509115	C	ACRSCH	17.01.2008	815	Mauritania	PN de Diawling	?	+1A	8	80		9,0	1
FRP	BB	5509118	B	ACRSCH	16.01.2008	1830	Mauritania	PN de Diawling	?	+1A		50	68,0	10,7	2
FRP	BB	5509120	B	ACRSCH	16.01.2008	1830	Mauritania	PN de Diawling	?	+1A		50	67,0	10,1	1
FRP	BB	5509121	B	ACRSCH	16.01.2008	1830	Mauritania	PN de Diawling	?	+1A		50		11,0	1
FRP	BB	5509122	B	ACRSCH	16.01.2008	1830	Mauritania	PN de Diawling	?	+1A		50	66,0	11,1	1
FRP	BB	5509122	C	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A	8	80		10,7	1
FRP	BB	5509123	B	ACRSCH	16.01.2008	1830	Mauritania	PN de Diawling	?	+1A		50	64,5	11,2	2

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5509123	C	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A	8	80		10,9	2
FRP	BB	5509124	B	ACRSCH	16.01.2008	1830	Mauritania	PN de Diawling	?	+1A		50	65,5	10,7	2
FRP	BB	5509125	B	ACRSCH	16.01.2008	1830	Mauritania	PN de Diawling	?	+1A		50	70,0	11,6	2
FRP	BB	5509126	B	ACRSCH	17.01.2008	815	Mauritania	PN de Diawling	?	+1A		80	66,5	11,0	1
FRP	BB	5509127	B	ACRSCH	17.01.2008	815	Mauritania	PN de Diawling	?	+1A		80	63,0	9,0	1
FRP	BB	5509128	B	ACRSCH	17.01.2008	815	Mauritania	PN de Diawling	?	+1A		80	67,0	11,0	1
FRP	BB	5509130	B	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A		80	69,0	11,7	2
FRP	BB	5509132	B	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A		80	68,0	10,6	1
FRP	BB	5509133	B	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A		80	64,5	10,4	1
FRP	BB	5509135	B	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A		80	66,0	10,4	1
FRP	BB	5509136	B	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A		80	69,0	10,3	1
FRP	BB	5509138	B	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A		80	67,5	10,8	1
FRP	BB	5509139	B	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A		80	65,0	9,9	1
FRP	BB	5509140	B	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A		80	65,0	9,9	1
FRP	BB	5509141	B	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A		80	65,5	9,8	1
FRP	BB	5509143	B	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A		80	66,5	10,6	2
FRP	BB	5509145	B	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A		80	65,0	9,9	1
FRP	BB	5509146	B	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A		80	65,0	10,2	1
FRP	BB	5509147	B	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A		80	69,5	10,6	1
FRP	BB	5509150	B	ACRSCH	17.01.2008	1000	Mauritania	PN de Diawling	?	+1A		80	67,5	10,2	1
FRP	BB	5509152	B	ACRSCH	17.01.2008	1000	Mauritania	PN de Diawling	?	+1A		80	64,5	9,6	1
FRP	BB	5509160	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	67,0	10,2	1
FRP	BB	5509160	C	ACRSCH	19.01.2008	930	Mauritania	PN de Diawling	?	+1A	8	140		9,9	1
FRP	BB	5509161	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	70,0	10,5	1
FRP	BB	5509162	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	64,5	10,3	1
FRP	BB	5509163	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	69,0	10,4	1
FRP	BB	5509164	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	70,5	9,6	1
FRP	BB	5509165	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	68,0	10,4	1
FRP	BB	5509166	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	66,0	9,9	1
FRP	BB	5509167	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	66,0	8,8	1
FRP	BB	5509168	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	66,0	10,5	1
FRP	BB	5509169	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	65,5	9,5	1

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5509170	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	65,0	9,7	1
FRP	BB	5509171	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	63,5	10,2	1
FRP	BB	5509172	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	67,5	9,6	1
FRP	BB	5509173	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	67,0	9,8	1
FRP	BB	5509176	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	65,0	9,4	1
FRP	BB	5509178	B	ACRSCH	19.01.2008	800	Mauritania	PN de Diawling	?	+1A		140	65,0	8,9	1
FRP	BB	5509182	B	ACRSCH	19.01.2008	930	Mauritania	PN de Diawling	?	+1A		140	65,5	10,0	1
FRP	BB	5509183	B	ACRSCH	19.01.2008	930	Mauritania	PN de Diawling	?	+1A		140	67,0	10,3	1
FRP	BB	5509184	B	ACRSCH	19.01.2008	930	Mauritania	PN de Diawling	?	+1A		140	64,5	9,8	1
FRP	BB	5509185	B	ACRSCH	19.01.2008	930	Mauritania	PN de Diawling	?	+1A		140	66,5	10,2	1
FRP	BB	5509186	B	ACRSCH	19.01.2008	930	Mauritania	PN de Diawling	?	+1A		140	66,5	10,8	2
FRP	BB	5509187	B	ACRSCH	19.01.2008	1630	Mauritania	PN de Diawling	?	+1A		140	62,5	9,3	1
FRP	BB	5509190	B	ACRSCH	19.01.2008	1630	Mauritania	PN de Diawling	?	+1A		140	62,5	10,2	1
FRP	BB	5509191	B	ACRSCH	19.01.2008	1630	Mauritania	PN de Diawling	?	+1A		140	62,5	9,9	1
FRP	BB	5509193	B	ACRSCH	19.01.2008	1630	Mauritania	PN de Diawling	?	+1A		140	66,0	11,2	1
FRP	BB	5509194	B	ACRSCH	19.01.2008	1630	Mauritania	PN de Diawling	?	+1A		140	63,5	10,3	1
FRP	BB	5509199	B	ACRSCH	19.01.2008	1630	Mauritania	PN de Diawling	?	+1A		140	64,0	10,1	1
FRP	BB	5509200	B	ACRSCH	19.01.2008	1630	Mauritania	PN de Diawling	?	+1A		140	63,5	10,2	1
FRP	BB	5509202	B	ACRSCH	19.01.2008	1800	Mauritania	PN de Diawling	?	+1A		140	66,5	10,7	1
FRP	BB	5509203	B	ACRSCH	19.01.2008	1800	Mauritania	PN de Diawling	?	+1A		140	64,5	10,6	1
FRP	BB	5509205	B	ACRSCH	19.01.2008	1800	Mauritania	PN de Diawling	?	+1A		140	67,5	10,8	1
FRP	BB	5509216	B	ACRSCH	19.01.2008	1915	Mauritania	PN de Diawling	?	+1A		140	67,0	11,1	1
FRP	BB	5509219	B	ACRSCH	19.01.2008	1915	Mauritania	PN de Diawling	?	+1A		140	68,5	11,1	1
FRP	BB	5509220	B	ACRSCH	19.01.2008	1915	Mauritania	PN de Diawling	?	+1A		140	65,5	10,7	2
FRP	BB	5509223	B	ACRSCH	19.01.2008	1915	Mauritania	PN de Diawling	?	+1A		140	67,0	10,5	1
FRP	BB	5509224	B	ACRSCH	19.01.2008	1915	Mauritania	PN de Diawling	?	+1A		140	67,0	10,3	1
FRP	BB	5509226	B	ACRSCH	19.01.2008	1915	Mauritania	PN de Diawling	?	+1A		140	64,0	10,6	1
FRP	BB	5509227	B	ACRSCH	19.01.2008	1915	Mauritania	PN de Diawling	?	+1A		140	64,0	11,1	1
FRP	BB	5509228	B	ACRSCH	23.01.2008	1745	Senegal	Djoudj Biol. Station	?	+1A		70	63,5	10,3	1
FRP	BB	5509229	B	ACRSCH	23.01.2008	1745	Senegal	Djoudj Biol. Station	?	+1A		70	64,5	9,9	1
FRP	BB	5509230	B	ACRSCH	23.01.2008	1745	Senegal	Djoudj Biol. Station	?	+1A		70	64,5	11,0	2
FRP	BB	5509298	B	ACRSCH	23.01.2008	800	Senegal	Lac Ndiael	?	+1A		276	67,5	12,0	2

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5509299	B	ACRSCH	23.01.2008	800	Senegal	Lac Ndiael	?	+1A		276	64,0	10,8	1
FRP	BB	5509300	B	ACRSCH	23.01.2008	800	Senegal	Lac Ndiael	?	+1A		276	62,0	10,5	1
FRP	BB	5509305	B	ACRSCH	23.01.2008	800	Senegal	Lac Ndiael	?	+1A		276	66,6	10,9	1
FRP	BB	5509307	B	ACRSCH	23.01.2008	900	Senegal	Lac Ndiael	?	+1A		276	66,0	9,0	1
FRP	BB	5509313	B	ACRSCH	23.01.2008	900	Senegal	Lac Ndiael	?	+1A		276	66,0	11,9	1
FRP	BB	5511082	C	ACRSCH	15.01.2008	1145	Senegal	Tiguet, Djoudj	?	+1A	8	50	67,5	12,7	2
FRP	BB	5511571	C	ACRSCH	17.01.2008	930	Mauritania	PN de Diawling	?	+1A	8	80	68,0	11,3	2
GBT	BB	T676866	C	ACRSCH	19.01.2008	1800	Mauritania	PN de Diawling	?	+1A	8	140	66,0		1
GBT	BB	V621011	C	ACRSCH	19.01.2008	930	Mauritania	PN de Diawling	?	+1A	8	140	65,5	10,4	1
FRP	BB	5509116	B	ACRSCI	16.01.2008	1830	Mauritania	PN de Diawling	?	+1A		50	65,0	10,6	1
FRP	BB	5509117	B	ACRSCI	16.01.2008	1830	Mauritania	PN de Diawling	?	+1A		50		9,8	1
FRP	BB	5509213	B	ANTCER	19.01.2008	1800	Mauritania	PN de Diawling	?	+2A		140	89,0	21,7	1
FRP	BB	5293247	B	HIPPALREI	20.01.2008	700	Senegal	Lac Maoudou	?	+1A		144	65,0	8,6	1
FRP	BB	5293248	B	HIPPALREI	20.01.2008	800	Senegal	Lac Maoudou	?	+1A		144	67,0	9,4	1
FRP	BB	5293002	B	LOCNAE	14.01.2008	830	Senegal	PN du Djoudj	?	+1A		50	65,0	12,9	1
FRP	BB	5293007	B	LOCNAE	14.01.2008	945	Senegal	PN du Djoudj	?	+1A		50	60,0	11,9	1
FRP	BB	5293074	B	LOCNAE	22.01.2008	1800	Senegal	Tiguet, Djoudj	?	+1A		50	66,0	14,6	1
FRP	BB	5293091	B	LOCNAE	23.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		60	63,5	11,8	1
FRP	BB	5293095	B	LOCNAE	23.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		60	63,0	13,8	2
FRP	BB	5293202	B	LOCNAE	15.01.2008	1115	Senegal	Tiguet, Djoudj	?	+1A		50	65,5	16,0	2
FRP	BB	5293258	B	LOCNAE	22.01.2008	800	Senegal	Lac Ndiael	?	+1A		276	61,5	12,1	2
FRP	BB	5293259	B	LOCNAE	22.01.2008	800	Senegal	Lac Ndiael	?	+1A		276	63,5	13,9	3
FRP	BB	5293260	B	LOCNAE	22.01.2008	800	Senegal	Lac Ndiael	?	+1A		276	64,0	14,1	4
FRP	BB	5293262	B	LOCNAE	22.01.2008	830	Senegal	Lac Ndiael	?	+1A		276	65,0	10,2	1
FRP	BB	5293271	B	LOCNAE	22.01.2008	900	Senegal	Lac Ndiael	?	+1A		276	66,0	13,6	3
FRP	BB	5293271	C	LOCNAE	23.01.2008	700	Senegal	Lac Ndiael	?	+1A	8	276		13,0	2
FRP	BB	5293276	B	LOCNAE	22.01.2008	1830	Senegal	Lac Ndiael	?	+1A		276	63,0	13,3	3
FRP	BB	5293282	B	LOCNAE	23.01.2008	700	Senegal	Lac Ndiael	?	+1A		276	63,5	12,1	2
FRP	BB	5509021	B	LOCNAE	24.01.2008	1830	Senegal	Tiguet, Djoudj	?	+1A		80	64,5	12,4	2
FRP	BB	5509148	B	LOCNAE	17.01.2008	1000	Mauritania	PN de Diawling	?	+1A		80	64,5	13,5	1
FRP	BB	5509288	B	LOCNAE	23.01.2008	700	Senegal	Lac Ndiael	?	+1A		276	64,0	16,8	3
FRP	BB	5509289	B	LOCNAE	23.01.2008	700	Senegal	Lac Ndiael	?	+1A		276	63,0	13,7	2

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5200165	C	LUSSVE	19.01.2008	1915	Mauritania	PN de Diawling	F	+2A	8	140	71,5	16,1	1
FRP	BB	5293042	B	LUSSVE	15.01.2008	1830	Senegal	Tiguet Nord, Djoudj	M	+2A		50	78,0	16,8	1
FRP	BB	5293251	B	LUSSVE	20.01.2008	800	Senegal	Lac Maoudou	M	2A		144	76,5	16,5	1
FRP	BB	5509033	B	LUSSVE	25.01.2008	730	Senegal	Tiguet, Djoudj	F	+2A		130	70,0	14,1	1
FRP	BB	5509034	B	LUSSVE	25.01.2008	730	Senegal	Tiguet, Djoudj	M	+2A		130	77,5	15,5	1
FRP	BB	5509046	B	LUSSVE	25.01.2008	900	Senegal	Tiguet, Djoudj	M	+2A		130	78,0	16,2	1
FRP	BB	5509134	B	LUSSVE	17.01.2008	930	Mauritania	PN de Diawling	M	+2A		80	77,5	17,0	1
FRP	BB	SA985501	B	LYMMIN	16.01.2008	1800	Mauritania	PN de Diawling	?	+1A		20	114,0	56,0	1
FRP	BB	5293013	C	MOTFLA	15.01.2008	1200	Senegal	Tiguet, Djoudj	?	+1A	8	50		16,5	1
FRP	BB	5293072	B	MOTFLA	22.01.2008	1800	Senegal	Tiguet, Djoudj	M?	2A		50	78,0	16,6	1
FRP	BB	5293073	B	MOTFLA	22.01.2008	1800	Senegal	Tiguet, Djoudj	M?	2A		50	73,0	16,4	1
FRP	BB	5293079	B	MOTFLA	22.01.2008	1800	Senegal	Tiguet, Djoudj	F	+1A		50	79,0	18,1	1
FRP	BB	5293080	B	MOTFLA	23.01.2008	730	Senegal	Tiguet, Djoudj	F	+2A		60	79,0	14,4	1
FRP	BB	5293081	B	MOTFLA	23.01.2008	730	Senegal	Tiguet, Djoudj	M	2A		60	80,0	17,8	1
FRP	BB	5293082	B	MOTFLA	23.01.2008	730	Senegal	Tiguet, Djoudj	?	2A		60	79,0	14,1	1
FRP	BB	5293083	B	MOTFLA	23.01.2008	730	Senegal	Tiguet, Djoudj	F	2A		60	77,0	14,1	1
FRP	BB	5293084	B	MOTFLA	23.01.2008	730	Senegal	Tiguet, Djoudj	F	+2A		60	79,0	16,5	1
FRP	BB	5293085	B	MOTFLA	23.01.2008	730	Senegal	Tiguet, Djoudj	M	2A		60	76,0	15,0	1
FRP	BB	5293086	B	MOTFLA	23.01.2008	730	Senegal	Tiguet, Djoudj	F	2A		60	77,0	14,1	1
FRP	BB	5293089	B	MOTFLA	23.01.2008	730	Senegal	Tiguet, Djoudj	?	2A		60	68,0	16,9	1
FRP	BB	5293090	B	MOTFLA	23.01.2008	730	Senegal	Tiguet, Djoudj	F	2A		60	75,0	13,9	1
FRP	BB	5293093	B	MOTFLA	23.01.2008	730	Senegal	Tiguet, Djoudj	?	2A		60	81,0	16,3	1
FRP	BB	5293094	B	MOTFLA	23.01.2008	730	Senegal	Tiguet, Djoudj	M	2A		60	67,0	15,6	1
FRP	BB	5293096	B	MOTFLA	23.01.2008	730	Senegal	Tiguet, Djoudj	M	+2A		60	78,0	16,1	1
FRP	BB	5293098	B	MOTFLA	23.01.2008	830	Senegal	Tiguet, Djoudj	F	2A		60	75,0	14,3	1
FRP	BB	5293099	B	MOTFLA	23.01.2008	830	Senegal	Tiguet, Djoudj	M	2A		60	73,0	13,6	1
FRP	BB	5293100	B	MOTFLA	23.01.2008	830	Senegal	Tiguet, Djoudj	F	2A		60	80,0	13,3	1
FRP	BB	5293203	B	MOTFLA	15.01.2008	1115	Senegal	Tiguet, Djoudj	M?	2A		50	76,0	16,9	1
FRP	BB	5293205	B	MOTFLA	15.01.2008	1145	Senegal	Tiguet, Djoudj	M	2A		50	74,5	14,7	1
FRP	BB	5293206	B	MOTFLA	15.01.2008	1200	Senegal	Tiguet, Djoudj	?	+2A		50	78,5	15,9	1
FRP	BB	5293207	B	MOTFLA	15.01.2008	1215	Senegal	Tiguet, Djoudj	M	2A		50	79,0		1
FRP	BB	5293208	B	MOTFLA	15.01.2008	1215	Senegal	Tiguet, Djoudj	F	+1A		50	76,0		1

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5293216	B	MOTFLA	19.01.2008	800	Senegal	Garli/Matam	?	2A		180	75,5	13,4	1
FRP	BB	5293217	B	MOTFLA	19.01.2008	800	Senegal	Garli/Matam	?	+1A		180	78,0	13,2	1
FRP	BB	5293221	B	MOTFLA	19.01.2008	800	Senegal	Garli/Matam	F	2A		180	81,0	15,4	1
FRP	BB	5293222	B	MOTFLA	19.01.2008	800	Senegal	Garli/Matam	F	2A		180	76,5	13,8	1
FRP	BB	5293223	B	MOTFLA	19.01.2008	800	Senegal	Garli/Matam	?	2A		180	81,0	15,4	1
FRP	BB	5293236	B	MOTFLA	19.01.2008	800	Senegal	Garli/Matam	?	2A		180	81,5	14,0	1
FRP	BB	5293320	B	MOTFLA	24.01.2008	1700	Senegal	Grand Lac/Djoudj	F	+2A		240	79,5	16,2	1
FRP	BB	5293330	B	MOTFLA	24.01.2008	1815	Senegal	Grand Lac/Djoudj	F	2A		240	78,0	15,5	1
FRP	BB	5293333	C	MOTFLA	25.01.2008	1030	Senegal	Grand Lac/Djoudj	?	+2A	8	288			
FRP	BB	5293338	B	MOTFLA	24.01.2008	1900	Senegal	Grand Lac/Djoudj	F	2A		240	75,5	14,5	1
FRP	BB	5293341	B	MOTFLA	24.01.2008	1930	Senegal	Grand Lac/Djoudj	M	+2A		240	77,5	14,6	1
FRP	BB	5293359	B	MOTFLA	25.01.2008	900	Senegal	Grand Lac/Djoudj	F	2A		288	78,0	13,8	1
FRP	BB	5293409	B	MOTFLA	25.01.2008	2000	Senegal	Grand Lac/Djoudj	F	+1A		288	76,5	14,3	1
FRP	BB	5509002	B	MOTFLA	23.01.2008	830	Senegal	Tiguet, Djoudj	?	2A		60	79,0	15,3	1
FRP	BB	5509003	B	MOTFLA	23.01.2008	830	Senegal	Tiguet, Djoudj	M	2A		60	78,0	15,3	1
FRP	BB	5509004	B	MOTFLA	23.01.2008	830	Senegal	Tiguet, Djoudj	?	2A		60	76,0	14,8	1
FRP	BB	5509007	B	MOTFLA	23.01.2008	900	Senegal	Tiguet, Djoudj	F	2A		60	73,0	14,1	1
FRP	BB	5509010	B	MOTFLA	24.01.2008	1830	Senegal	Tiguet, Djoudj	F	+2A		80	77,0	12,3	1
FRP	BB	5509013	B	MOTFLA	24.01.2008	1830	Senegal	Tiguet, Djoudj	M	2A		80	78,0	13,3	1
FRP	BB	5509017	B	MOTFLA	24.01.2008	1830	Senegal	Tiguet, Djoudj	F	2A		80	72,0	13,2	1
FRP	BB	5509044	B	MOTFLA	25.01.2008	730	Senegal	Tiguet, Djoudj	F	2A		130	76,5	14,0	1
FRP	BB	5509110	B	MOTFLA	16.01.2008	1800	Mauritania	PN de Diawling	M	+2A		50	81,0	18,1	1
FRP	BB	5509112	B	MOTFLA	16.01.2008	1800	Mauritania	PN de Diawling	M	2A		50	78,0	17,2	1
FRP	BB	5509113	B	MOTFLA	16.01.2008	1800	Mauritania	PN de Diawling	M	+1A		50	78,0	17,1	1
FRP	BB	5509119	B	MOTFLA	16.01.2008	1830	Mauritania	PN de Diawling	M	+2A		50	80,5	19,2	1
FRP	BB	5509129	B	MOTFLA	17.01.2008	815	Mauritania	PN de Diawling	F	+2A		80	77,0	15,7	1
FRP	BB	5509131	B	MOTFLA	17.01.2008	930	Mauritania	PN de Diawling	F	+2A		80	78,5	15,5	1
FRP	BB	5509137	B	MOTFLA	17.01.2008	930	Mauritania	PN de Diawling	F	2A		80	76,5	15,3	1
FRP	BB	5509142	B	MOTFLA	17.01.2008	930	Mauritania	PN de Diawling	M	2A		80	80,0	16,4	1
FRP	BB	5509144	B	MOTFLA	17.01.2008	930	Mauritania	PN de Diawling	?	2A		80	77,0		1
FRP	BB	5509149	B	MOTFLA	17.01.2008	1000	Mauritania	PN de Diawling	F	+2A		80	76,0	14,9	1
FRP	BB	5509151	B	MOTFLA	17.01.2008	1000	Mauritania	PN de Diawling	F	+2A		80	80,0	15,9	1

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5509153	B	MOTFLA	17.01.2008	1100	Mauritania	PN de Diawling	F	+2A		80	77,0	15,4	1
FRP	BB	5509154	B	MOTFLA	17.01.2008	1100	Mauritania	PN de Diawling	M	+2A		80	83,0	18,9	1
FRP	BB	5509155	B	MOTFLA	17.01.2008	1100	Mauritania	PN de Diawling	M	2A		80	78,0	16,2	1
FRP	BB	5509156	B	MOTFLA	17.01.2008	1100	Mauritania	PN de Diawling	?	2A		80	76,0	16,9	1
FRP	BB	5509157	B	MOTFLA	17.01.2008	1100	Mauritania	PN de Diawling	M	2A		80	78,0		1
FRP	BB	5509158	B	MOTFLA	19.01.2008	800	Mauritania	PN de Diawling	F	+1A		140	74,0	16,0	1
FRP	BB	5509159	B	MOTFLA	19.01.2008	800	Mauritania	PN de Diawling	F	+2A		140	74,0	14,3	1
FRP	BB	5509174	B	MOTFLA	19.01.2008	800	Mauritania	PN de Diawling	F	2A		140	71,5	12,4	1
FRP	BB	5509175	B	MOTFLA	19.01.2008	800	Mauritania	PN de Diawling	M	+2A		140	83,5	16,4	1
FRP	BB	5509177	B	MOTFLA	19.01.2008	800	Mauritania	PN de Diawling	F	2A		140	79,5	15,3	1
FRP	BB	5509179	B	MOTFLA	19.01.2008	930	Mauritania	PN de Diawling	M	+2A		140	79,0	16,8	1
FRP	BB	5509180	B	MOTFLA	19.01.2008	930	Mauritania	PN de Diawling	F	+2A		140	78,0	15,6	1
FRP	BB	5509181	B	MOTFLA	19.01.2008	930	Mauritania	PN de Diawling	M	+1A		140	79,5	14,4	1
FRP	BB	5509188	B	MOTFLA	19.01.2008	1630	Mauritania	PN de Diawling	?	2A		140	75,5	14,2	1
FRP	BB	5509189	B	MOTFLA	19.01.2008	1630	Mauritania	PN de Diawling	M	2A		140	78,5	15,4	1
FRP	BB	5509192	B	MOTFLA	19.01.2008	1630	Mauritania	PN de Diawling	F	2A		140	76,5	17,6	1
FRP	BB	5509195	B	MOTFLA	19.01.2008	1630	Mauritania	PN de Diawling	M	2A		140	78,5	16,2	1
FRP	BB	5509196	B	MOTFLA	19.01.2008	1630	Mauritania	PN de Diawling	M	+2A		140	78,0	17,7	1
FRP	BB	5509197	B	MOTFLA	19.01.2008	1630	Mauritania	PN de Diawling	M	2A		140	81,0	17,8	1
FRP	BB	5509198	B	MOTFLA	19.01.2008	1630	Mauritania	PN de Diawling	F	2A		140	76,0	15,1	1
FRP	BB	5509201	B	MOTFLA	19.01.2008	1630	Mauritania	PN de Diawling	F	+2A		140	76,5	15,7	1
FRP	BB	5509204	B	MOTFLA	19.01.2008	1800	Mauritania	PN de Diawling	M	+2A		140	82,0	17,6	1
FRP	BB	5509206	B	MOTFLA	19.01.2008	1800	Mauritania	PN de Diawling	F	+2A		140	77,0	15,3	1
FRP	BB	5509207	B	MOTFLA	19.01.2008	1800	Mauritania	PN de Diawling	M	+2A		140	82,0	17,4	1
FRP	BB	5509208	B	MOTFLA	19.01.2008	1800	Mauritania	PN de Diawling	M	2A		140	80,0	17,4	1
FRP	BB	5509209	B	MOTFLA	19.01.2008	1800	Mauritania	PN de Diawling	F	2A		140	72,5	14,8	1
FRP	BB	5509210	B	MOTFLA	19.01.2008	1800	Mauritania	PN de Diawling	F	+2A		140	79,5	16,9	1
FRP	BB	5509211	B	MOTFLA	19.01.2008	1800	Mauritania	PN de Diawling	M	+2A		140	81,0	17,2	1
FRP	BB	5509212	B	MOTFLA	19.01.2008	1800	Mauritania	PN de Diawling	F	2A		140	75,5		1
FRP	BB	5509214	B	MOTFLA	19.01.2008	1915	Mauritania	PN de Diawling	F	+2A		140	80,5	16,1	1
FRP	BB	5509215	B	MOTFLA	19.01.2008	1915	Mauritania	PN de Diawling	M	+2A		140	84,0	19,8	1
FRP	BB	5509217	B	MOTFLA	19.01.2008	1915	Mauritania	PN de Diawling	M	+2A		140	82,0	17,2	1

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5509218	B	MOTFLA	19.01.2008	1915	Mauritania	PN de Diawling	F	+1A		140	79,0	16,2	1
FRP	BB	5509221	B	MOTFLA	19.01.2008	1915	Mauritania	PN de Diawling	M	2A		140	79,5	17,4	1
FRP	BB	5509222	B	MOTFLA	19.01.2008	1915	Mauritania	PN de Diawling	F	2A		140	76,0	16,6	1
FRP	BB	5509225	B	MOTFLA	19.01.2008	1915	Mauritania	PN de Diawling	F	2A		140	74,5	14,3	1
FRP	BB	5509316	B	MOTFLA	23.01.2008	1030	Senegal	Lac Ndiael	?	2A		276	78,0	16,5	1
FRP	BB	5293234	B	MOTFLAFLA	19.01.2008	800	Senegal	Garli/Matam	F	+2A		180	78,0	15,4	1
FRP	BB	5293235	B	MOTFLAFLA	19.01.2008	800	Senegal	Garli/Matam	F	2A		180	76,0	13,2	1
FRP	BB	5293237	B	MOTFLAFLA	19.01.2008	800	Senegal	Garli/Matam	F	2A		180	79,0	13,4	1
FRP	BB	5293238	B	MOTFLAFLA	19.01.2008	800	Senegal	Garli/Matam	F	2A		180	78,0	14,7	1
FRP	BB	5293239	B	MOTFLAFLA	19.01.2008	800	Senegal	Garli/Matam	?	2A		180	81,5	14,5	1
FRP	BB	5293240	B	MOTFLAFLA	19.01.2008	800	Senegal	Garli/Matam	F	2A		180	74,5	15,3	1
FRP	BB	5293241	B	MOTFLAFLA	19.01.2008	800	Senegal	Garli/Matam	F	2A		180	79,5	14,4	1
FRP	BB	5293242	B	MOTFLAFLA	19.01.2008	800	Senegal	Garli/Matam	F	2A		180	79,0	14,3	1
FRP	BB	5293013	B	MOTFLAIBE	14.01.2008	1030	Senegal	PN du Djoudj	M	2A		50	80,0	16,4	1
FRP	BB	5293015	B	MOTFLAIBE	14.01.2008	1115	Senegal	PN du Djoudj	F	2A		50	77,0	14,5	1
FRP	BB	5293019	B	MOTFLAIBE	15.01.2008	930	Senegal	Tiguet Nord, Djoudj	F?	2A		50	79,5	14,9	1
FRP	BB	5293022	B	MOTFLAIBE	15.01.2008	930	Senegal	Tiguet Nord, Djoudj	F	2A		50	80,0	16,6	1
FRP	BB	5293024	B	MOTFLAIBE	15.01.2008	1030	Senegal	Tiguet Nord, Djoudj	F	2A		50	78,0	15,4	1
FRP	BB	5293025	B	MOTFLAIBE	15.01.2008	1030	Senegal	Tiguet Nord, Djoudj	M	2A		50	78,0	14,5	1
FRP	BB	5293026	B	MOTFLAIBE	15.01.2008	1030	Senegal	Tiguet Nord, Djoudj	M?	2A		50	79,0	16,4	1
FRP	BB	5293027	B	MOTFLAIBE	15.01.2008	1030	Senegal	Tiguet Nord, Djoudj	M	2A		50	81,0	16,5	1
FRP	BB	5293028	B	MOTFLAIBE	15.01.2008	1030	Senegal	Tiguet Nord, Djoudj	F	2A		50	76,0	15,3	1
FRP	BB	5293057	B	MOTFLAIBE	18.01.2008	630	Mauritania	PN de Diawling	M	2A		140	77,5	19,0	1
FRP	BB	5293070	B	MOTFLAIBE	18.01.2008	700	Mauritania	PN de Diawling	F	+2A		140	74,0	14,7	1
FRP	BB	5293075	B	MOTFLAIBE	22.01.2008	1800	Senegal	Tiguet, Djoudj	M	+2A		50	81,5	21,1	2
FRP	BB	5293076	B	MOTFLAIBE	22.01.2008	1800	Senegal	Tiguet, Djoudj	F	+2A		50	75,5	16,0	1
FRP	BB	5293209	B	MOTFLAIBE	15.01.2008	1230	Senegal	Tiguet, Djoudj	M	+1A		50	80,0	16,5	1
FRP	BB	5293210	B	MOTFLAIBE	18.01.2008	1730	Senegal	Garli/Matam	M	+2A		180	79,0	17,5	1
FRP	BB	5293220	B	MOTFLAIBE	19.01.2008	800	Senegal	Garli/Matam	M	+2A		180	82,0	16,9	1
FRP	BB	5293249	B	MOTFLAIBE	20.01.2008	800	Senegal	Lac Maoudou	F	2A		144	79,0	14,0	1
FRP	BB	5293252	B	MOTFLAIBE	20.01.2008	800	Senegal	Lac Maoudou	F	2A		144	78,0	13,5	1
FRP	BB	5293256	B	MOTFLAIBE	22.01.2008	800	Senegal	Lac Ndiael	F	2A		276	79,0	16,0	1

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5293263	B	MOTFLAIBE	22.01.2008	830	Senegal	Lac Ndiael	F	+1A		276	75,5	15,1	1
FRP	BB	5293264	B	MOTFLAIBE	22.01.2008	830	Senegal	Lac Ndiael	?	+1A		276	81,5	14,4	1
FRP	BB	5293269	B	MOTFLAIBE	22.01.2008	900	Senegal	Lac Ndiael	M	2A		276	81,0	16,6	1
FRP	BB	5293270	B	MOTFLAIBE	22.01.2008	900	Senegal	Lac Ndiael	F	2A		276	76,5	14,3	1
FRP	BB	5293273	B	MOTFLAIBE	22.01.2008	1830	Senegal	Lac Ndiael	M	2A		276	82,0	19,2	2
FRP	BB	5293274	B	MOTFLAIBE	22.01.2008	1830	Senegal	Lac Ndiael	F	2A		276	71,5	16,5	1
FRP	BB	5293277	B	MOTFLAIBE	22.01.2008	1830	Senegal	Lac Ndiael	F	+2A		276	76,5	15,0	1
FRP	BB	5293278	B	MOTFLAIBE	22.01.2008	1830	Senegal	Lac Ndiael	?	+1A		276	79,0	15,8	1
FRP	BB	5293279	B	MOTFLAIBE	22.01.2008	1830	Senegal	Lac Ndiael	M	2A		276	84,0	17,6	1
FRP	BB	5293283	B	MOTFLAIBE	23.01.2008	700	Senegal	Lac Ndiael	F	2A		276	79,5	16,8	1
FRP	BB	5293284	B	MOTFLAIBE	23.01.2008	700	Senegal	Lac Ndiael	M	+2A		276	81,0	16,2	1
FRP	BB	5293285	B	MOTFLAIBE	23.01.2008	700	Senegal	Lac Ndiael	F	2A		276	74,0	13,7	1
FRP	BB	5293317	B	MOTFLAIBE	24.01.2008	1700	Senegal	Grand Lac/Djoudj	?	2A		240	80,0	16,2	1
FRP	BB	5293317	C	MOTFLAIBE	25.01.2008	800	Senegal	Grand Lac/Djoudj	F	2A	8	288	0,0	14,0	1
FRP	BB	5293318	B	MOTFLAIBE	24.01.2008	1700	Senegal	Grand Lac/Djoudj	F	+2A		240	79,5	15,5	1
FRP	BB	5293321	B	MOTFLAIBE	24.01.2008	1700	Senegal	Grand Lac/Djoudj	M	+1A		240	79,0	17,0	1
FRP	BB	5293322	B	MOTFLAIBE	24.01.2008	1700	Senegal	Grand Lac/Djoudj	M	+2A		240	81,0	17,0	1
FRP	BB	5293324	B	MOTFLAIBE	24.01.2008	1815	Senegal	Grand Lac/Djoudj	M	+2A		240	82,0	0,0	1
FRP	BB	5293325	B	MOTFLAIBE	24.01.2008	1815	Senegal	Grand Lac/Djoudj	F	2A		240	79,5	15,8	1
FRP	BB	5293326	B	MOTFLAIBE	24.01.2008	1815	Senegal	Grand Lac/Djoudj	M	+2A		240	79,5	17,1	1
FRP	BB	5293328	B	MOTFLAIBE	24.01.2008	1815	Senegal	Grand Lac/Djoudj	F	2A		240	77,0	17,0	1
FRP	BB	5293329	B	MOTFLAIBE	24.01.2008	1815	Senegal	Grand Lac/Djoudj	M	+2A		240	82,0	16,0	1
FRP	BB	5293332	B	MOTFLAIBE	24.01.2008	1900	Senegal	Grand Lac/Djoudj	F	+2A		240	78,0	15,2	1
FRP	BB	5293333	B	MOTFLAIBE	24.01.2008	1900	Senegal	Grand Lac/Djoudj	M	+2A		240	80,0	16,5	1
FRP	BB	5293334	B	MOTFLAIBE	24.01.2008	1900	Senegal	Grand Lac/Djoudj	M	+2A		240	80,0	16,9	1
FRP	BB	5293335	B	MOTFLAIBE	24.01.2008	1900	Senegal	Grand Lac/Djoudj	M	+2A		240	82,5	15,4	1
FRP	BB	5293336	B	MOTFLAIBE	24.01.2008	1900	Senegal	Grand Lac/Djoudj	F	+2A		240	76,0	15,5	1
FRP	BB	5293337	B	MOTFLAIBE	24.01.2008	1900	Senegal	Grand Lac/Djoudj	F	+2A		240	78,5	14,9	1
FRP	BB	5293340	B	MOTFLAIBE	24.01.2008	1900	Senegal	Grand Lac/Djoudj	F	+2A		240	78,5	0,0	1
FRP	BB	5293344	B	MOTFLAIBE	24.01.2008	800	Senegal	Grand Lac/Djoudj	M	+2A		240	81,0	14,7	1
FRP	BB	5293347	B	MOTFLAIBE	24.01.2008	800	Senegal	Grand Lac/Djoudj	M	+2A		240	78,0	14,0	1
FRP	BB	5293352	B	MOTFLAIBE	25.01.2008	800	Senegal	Grand Lac/Djoudj	?	+2A		288	83,0	16,1	1

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5293353	B	MOTFLAIBE	25.01.2008	800	Senegal	Grand Lac/Djoudj	F	2A		288	76,5	14,1	1
FRP	BB	5293355	B	MOTFLAIBE	25.01.2008	800	Senegal	Grand Lac/Djoudj	M	+2A		288	82,0	14,6	1
FRP	BB	5293356	B	MOTFLAIBE	25.01.2008	800	Senegal	Grand Lac/Djoudj	M	+2A		288	81,5	14,6	1
FRP	BB	5293360	B	MOTFLAIBE	25.01.2008	900	Senegal	Grand Lac/Djoudj	M	2A		288	78,5	16,0	1
FRP	BB	5293361	B	MOTFLAIBE	25.01.2008	900	Senegal	Grand Lac/Djoudj	F	2A		288	77,5	14,6	1
FRP	BB	5293362	B	MOTFLAIBE	25.01.2008	900	Senegal	Grand Lac/Djoudj	F	+2A		288	77,0	13,4	1
FRP	BB	5293363	B	MOTFLAIBE	25.01.2008	900	Senegal	Grand Lac/Djoudj	F	+2A		288	77,5	13,7	1
FRP	BB	5293364	B	MOTFLAIBE	25.01.2008	900	Senegal	Grand Lac/Djoudj	M	2A		288	80,0	14,9	1
FRP	BB	5293365	B	MOTFLAIBE	25.01.2008	900	Senegal	Grand Lac/Djoudj	F	+2A		288	76,0	14,5	1
FRP	BB	5293366	B	MOTFLAIBE	25.01.2008	900	Senegal	Grand Lac/Djoudj	F	2A		288	76,0	14,1	1
FRP	BB	5293367	B	MOTFLAIBE	25.01.2008	900	Senegal	Grand Lac/Djoudj	F	+2A		288	77,0	14,5	1
FRP	BB	5293368	B	MOTFLAIBE	25.01.2008	900	Senegal	Grand Lac/Djoudj	F	+2A		288	75,5	13,3	1
FRP	BB	5293369	B	MOTFLAIBE	25.01.2008	900	Senegal	Grand Lac/Djoudj	M	2A		288	80,0	17,2	1
FRP	BB	5293370	B	MOTFLAIBE	25.01.2008	900	Senegal	Grand Lac/Djoudj	M	+2A		288	78,0	14,4	1
FRP	BB	5293371	B	MOTFLAIBE	25.01.2008	900	Senegal	Grand Lac/Djoudj	F	2A		288	74,0	14,5	1
FRP	BB	5293372	B	MOTFLAIBE	25.01.2008	900	Senegal	Grand Lac/Djoudj	M	+1A		288	79,0	15,6	1
FRP	BB	5293373	B	MOTFLAIBE	25.01.2008	900	Senegal	Grand Lac/Djoudj	F	2A		288	79,0	14,6	1
FRP	BB	5293375	B	MOTFLAIBE	25.01.2008	900	Senegal	Grand Lac/Djoudj	M	+2A		288	80,0	14,4	1
FRP	BB	5293376	B	MOTFLAIBE	25.01.2008	1000	Senegal	Grand Lac/Djoudj	F	+2A		288	80,0	14,5	1
FRP	BB	5293377	B	MOTFLAIBE	25.01.2008	1030	Senegal	Grand Lac/Djoudj	F	+2A		288	77,0	13,9	1
FRP	BB	5293378	B	MOTFLAIBE	25.01.2008	1030	Senegal	Grand Lac/Djoudj	M	+2A		288	85,5	18,0	2
FRP	BB	5293379	B	MOTFLAIBE	25.01.2008	1030	Senegal	Grand Lac/Djoudj	?	+2A		288	81,5	15,0	1
FRP	BB	5293380	B	MOTFLAIBE	25.01.2008	1030	Senegal	Grand Lac/Djoudj	F	2A		288	76,0	13,0	1
FRP	BB	5293381	B	MOTFLAIBE	25.01.2008	1030	Senegal	Grand Lac/Djoudj	M	2A		288	78,0	15,5	1
FRP	BB	5293382	B	MOTFLAIBE	25.01.2008	1030	Senegal	Grand Lac/Djoudj	F	2A		288	77,5	13,5	1
FRP	BB	5293383	B	MOTFLAIBE	25.01.2008	1030	Senegal	Grand Lac/Djoudj	F	+2A		288	81,5	15,5	1
FRP	BB	5293401	B	MOTFLAIBE	25.01.2008	1745	Senegal	Grand Lac/Djoudj	?	+2A		288	82,0	16,0	1
FRP	BB	5293402	B	MOTFLAIBE	25.01.2008	1745	Senegal	Grand Lac/Djoudj	M	+1A		288	79,5	16,5	1
FRP	BB	5293403	B	MOTFLAIBE	25.01.2008	1745	Senegal	Grand Lac/Djoudj	F	+1A		288	77,5	16,5	1
FRP	BB	5293404	B	MOTFLAIBE	25.01.2008	1745	Senegal	Grand Lac/Djoudj	M	+2A		288	77,5	16,7	1
FRP	BB	5293405	B	MOTFLAIBE	25.01.2008	1900	Senegal	Grand Lac/Djoudj	M	+2A		288	83,0	17,5	1
FRP	BB	5293406	B	MOTFLAIBE	25.01.2008	1900	Senegal	Grand Lac/Djoudj	F	+2A		288	77,5	14,7	1

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5293408	B	MOTFLAIBE	25.01.2008	2000	Senegal	Grand Lac/Djoudj	M	+1A		288	75,5	14,2	1
FRP	BB	5509290	B	MOTFLAIBE	23.01.2008	700	Senegal	Lac Ndiae	M	+1A		276	79,3	15,4	1
FRP	BB	5509291	B	MOTFLAIBE	23.01.2008	700	Senegal	Lac Ndiae	F	2A		276	77,0	15,0	1
FRP	BB	5509292	B	MOTFLAIBE	23.01.2008	800	Senegal	Lac Ndiae	F	+1A		276	75,5	14,3	1
FRP	BB	5509293	B	MOTFLAIBE	23.01.2008	800	Senegal	Lac Ndiae	M	2A		276	79,5	17,9	1
FRP	BB	5509294	B	MOTFLAIBE	23.01.2008	800	Senegal	Lac Ndiae	M	2A		276	76,5	16,1	1
FRP	BB	5509295	B	MOTFLAIBE	23.01.2008	800	Senegal	Lac Ndiae	F	2A		276	74,5	16,4	1
FRP	BB	5509296	B	MOTFLAIBE	23.01.2008	800	Senegal	Lac Ndiae	M	2A		276	80,0	16,2	1
FRP	BB	5509297	B	MOTFLAIBE	23.01.2008	800	Senegal	Lac Ndiae	F	2A		276	82,0	17,0	1
FRP	BB	5509301	B	MOTFLAIBE	23.01.2008	800	Senegal	Lac Ndiae	M	2A		276	77,0	16,2	1
FRP	BB	5509302	B	MOTFLAIBE	23.01.2008	800	Senegal	Lac Ndiae	F	2A		276	72,5	15,1	1
FRP	BB	5509303	B	MOTFLAIBE	23.01.2008	800	Senegal	Lac Ndiae	F	2A		276	73,5	14,6	1
FRP	BB	5509304	B	MOTFLAIBE	23.01.2008	800	Senegal	Lac Ndiae	M	2A		276	79,2	15,6	1
FRP	BB	5509306	B	MOTFLAIBE	23.01.2008	800	Senegal	Lac Ndiae	F	2A		276	80,2	15,2	1
FRP	BB	5509308	B	MOTFLAIBE	23.01.2008	900	Senegal	Lac Ndiae	F	2A		276	73,0	15,1	1
FRP	BB	5509309	B	MOTFLAIBE	23.01.2008	900	Senegal	Lac Ndiae	F	2A		276	76,0	13,8	1
FRP	BB	5509310	B	MOTFLAIBE	23.01.2008	900	Senegal	Lac Ndiae	M	+2A		276	80,5	15,4	1
FRP	BB	5509311	B	MOTFLAIBE	23.01.2008	900	Senegal	Lac Ndiae	M	+1A		276	86,0	19,0	1
FRP	BB	5509312	B	MOTFLAIBE	23.01.2008	900	Senegal	Lac Ndiae	F	+1A		276	76,5	15,7	1
FRP	BB	5509314	B	MOTFLAIBE	23.01.2008	945	Senegal	Lac Ndiae	M	+1A		276	78,0	15,9	1
FRP	BB	5293257	B	OENOEN	22.01.2008	800	Senegal	Lac Ndiae	M	2A		276	92,0	18,9	1
FRP	BB	SA985451	B	OENOEN	25.01.2008	900	Senegal	Grand Lac/Djoudj	F	2A		288	104,0	24,1	1
FRP	BB	5509315	B	PHYCOL	23.01.2008	945	Senegal	Lac Ndiae	?	+1A		276	60,0	0,0	1
FRP	BB	RG8301	B	PHYCOL	22.01.2008	1930	Senegal	Lac Ndiae	?	+1A		276	54,5	6,2	1
FRP	BB	RG8302	B	PHYCOL	24.01.2008	1900	Senegal	Grand Lac/Djoudj	?	+1A		240	64,5	10,0	2
FRP	BB	RG8303	B	PHYCOL	25.01.2008	1000	Senegal	Grand Lac/Djoudj	?	2A		288	62,0	7,1	1
FRP	BB	RG8801	B	PHYCOL	15.01.2008	1030	Senegal	PN du Djoudj	?	+1A		50	55,5	7,2	1
FRP	BB	RG8801	B	PHYCOL	15.01.2008	1030	Senegal	Tiguet Nord, Djoudj	?	+1A		50	55,5	7,2	1
FRP	BB	RG8802	B	PHYCOL	23.01.2008	1745	Senegal	Djoudj Biol. Station	?	+1A		50	59,0	6,6	1
FRP	BB	JA572601	B	PORPUS	14.01.2008	1140	Senegal	PN du Djoudj	M?	+1A		50	86,5	46,9	1
FRP	BB	5293245	B	RIPRIP	19.01.2008	1900	Senegal	Lac Maoudou	?	+1A		144		11,2	1
FRP	BB	5509027	B	RIPRIP	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	109,0	12,3	1

Centre	ringer	ring no.	action	species	date	hour	country	location	sex	age	Cond repr	mist net	wing	weight	fat
FRP	BB	5509028	B	RIPRIP	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	106,0	12,4	1
FRP	BB	5509029	B	RIPRIP	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	108,0	12,4	1
FRP	BB	5509035	B	RIPRIP	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	97,0	12,2	1
FRP	BB	5509036	B	RIPRIP	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	96,5	12,3	1
FRP	BB	5509037	B	RIPRIP	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	104,5	12,3	1
FRP	BB	5509038	B	RIPRIP	25.01.2008	730	Senegal	Tiguet, Djoudj	?	+1A		130	105,5	12,0	1
FRP	BB	5293218	B	SYLCAN	19.01.2008	800	Senegal	Garli/Matam	M	+1A		180	56,5	8,2	1
FRP	BB	5293219	B	SYLCAN	19.01.2008	800	Senegal	Garli/Matam	?	+1A		180		8,5	1
FRP	BB	5293231	B	SYLCAN	19.01.2008	800	Senegal	Garli/Matam	M	+2A		180	59,0	9,1	1
FRP	BB	5293243	B	SYLCAN	19.01.2008	800	Senegal	Garli/Matam	M	2A		180	56,5	8,5	2
FRP	BB	5293244	B	SYLCAN	19.01.2008	1900	Senegal	Lac Maoudou	M	2A		144	58,0	9,0	1
		5293287	B	SYLCAN	23.01.2008	700	Senegal	Lac Ndial	M	2A		276	58,5	0,0	1
FRP	BB	JA572801	B	TRIGLA	19.01.2008	800	Senegal	Garli/Matam	?	+1A		180	125,0	50,0	1
FRP	BB	JA572802	B	TRIGLA	19.01.2008	800	Senegal	Garli/Matam	?	+1A		180	125,0	47,6	1
FRP	BB	JA572803	B	TRIGLA	19.01.2008	900	Senegal	Garli/Matam	?	+1A		180	124,0	55,5	2

## **Annex III - Bird observations**

### **III.1 - Systematic list of bird records**

**III.2 - Photo documentation ‘birds in the hand’**

(especially photos of species not shown in the 2007 Report)

*Acrocephalus baeticatus* [VS]*Acrocephalus paludicola* [BG]*Anthus cervinus* [FT]*Babulornis albirostris* [VS]*Hippolais pallida reiseri* [VS]*Hippolais pallida reiseri* [VS]



*Oenanthe oenanthe* [FT]



*Ortygospiza atricollis* [FT]



*Phylloscopus brehmi* [VS]



*Phylloscopus brehmi* [VS]



*Streptopelia vinacea* [VS]



*Streptopelia vinacea* [VS]

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

*Aegypius tracheliotus* [VS]



*Ardea gularis* [VS]



*Caprimulgus climacurus* [VS]



*Centropus senegalus* [VS]



*Columba guinea* [VS]



*Coracias naevia* [VS]



*Corvus albus* [VS]



*Egretta garzetta, E. alba* [VS]



*Gyps africanus, G. rueppelli, G. fulvus* [VS]



*Gyps africanus, G. rueppelli, G. fulvus* [VS]



*Gyps africanus* [VS]



*Gyps fulvus* [VS]



*Gyps rueppelli* [VS]



*Halcyon chelicuti* [VS]



*Lagonosticta senegala* [VS]



*Lagonosticta senegala* [VS]



*Lamprotornis chalibaeus* [VS]



*Lonchura cantans* [VS]



*Milvus parasitus* [VS]



*Milvus parasitus* [VS]



*Necrosyrtes monachus* [VS]



*Pelecanus rufescens* [VS]



*Phaeton lepturus* [VS]



*Phaeton lepturus* [VS]



*Poicephalus senegallus* [VS]



*Quelea quelea* [VS]



*Quelea quelea, Passer luteus et al.* [VS]



*Sporopipes frontalis* [VS]



*Streptopelia decipiens* [VS]



*Streptopelia senegalensis* [VS]



*Streptopelia vinacea* [VS]



*Turtur abyssinicus* [VS]



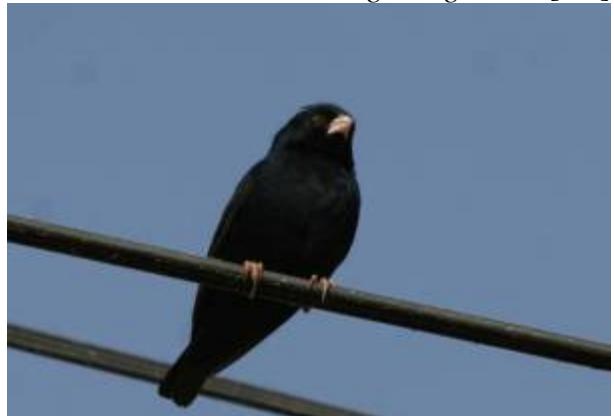
*Tockus erythrorhynchus* [VS]



*Tringa stagnatilis* [VS]



*Urocolius macrourus* [VS]



*Vidua chalybeata* [VS]

#### IV – Photo documentation of AWCT people and work

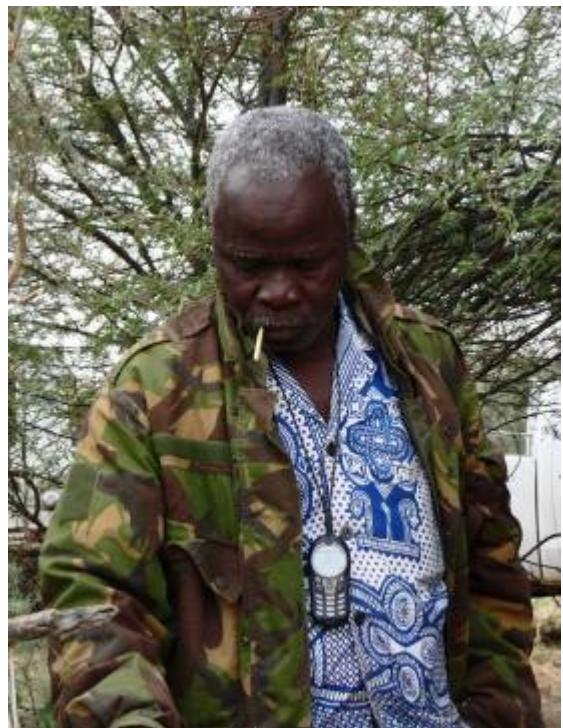


Discussion in Diawling National Park administration and survey in the field [FT]





Torsten with claptraps [AE]



Indega Bindia [SB]



Ibrahima and Martin in discussion in Djoudj [SB]



Ibrahima in Diawling [TR]



Benedikt, Martin, Alex at grand Lac [VS]



Indega and N'da in Ouro Soggi [SB]



Martin in Dakar, and in the field demonstrating strong wind in Ndial and ...sleeping [VS]



Abibatu [BG]



Franziska alias Fatima [SB]



Janusz [VS]



Oskars [VS]



Sven [VS]



Volker [SB]



Loading off the car for mist-netting, Tiguet [FT]



Loading off the car during sand storm,  
Ndiae Wildlife Reserve [VS]



Mist-netting near Tiguet [FT]



Walking through *Sporobulus*, Lac Ndiae [TR]



Before mist-netting near Tiguet [SB]



Preparing mist-netting in *Typha australis* near  
Djoudj Biological Station [VS]



Mist-netting at Grand Lac, PNOD [VS]



Mist-netting at Grand Lac, PNOD [VS]



Performing the roap method, Lac Ndiael[VS]



Ringing & transmitter application at Tiguet  
[VS]



Ringing, measuring, transmitter application, blood sampling near Tiguet [FT]





Blood sampling [FT]



Spotting birds during Wagtail ringing [FT]



Measuring head length of Aquatic Warbler  
[TR]



Fitting the leg loop harness with transmitter  
[FT]



Fitting the leg loop harness with transmitter  
[FT]



Aquatic Warbler with transmitter [FT]



Benedikt and Cosima, radio-tracking Aquatic Warblers near Tiguet [FT]



Cosima, preparing the antenna [FT]



Cosima, radio-tracking Aquatic Warbler [FT]



The “Senegal/Mauritania 2008” Team (without Volker = photograph) at Djoudj Biological Station, 25<sup>th</sup> January 2008 [VS]

## Annex V - List of GPS marks and descriptions in Mauritania

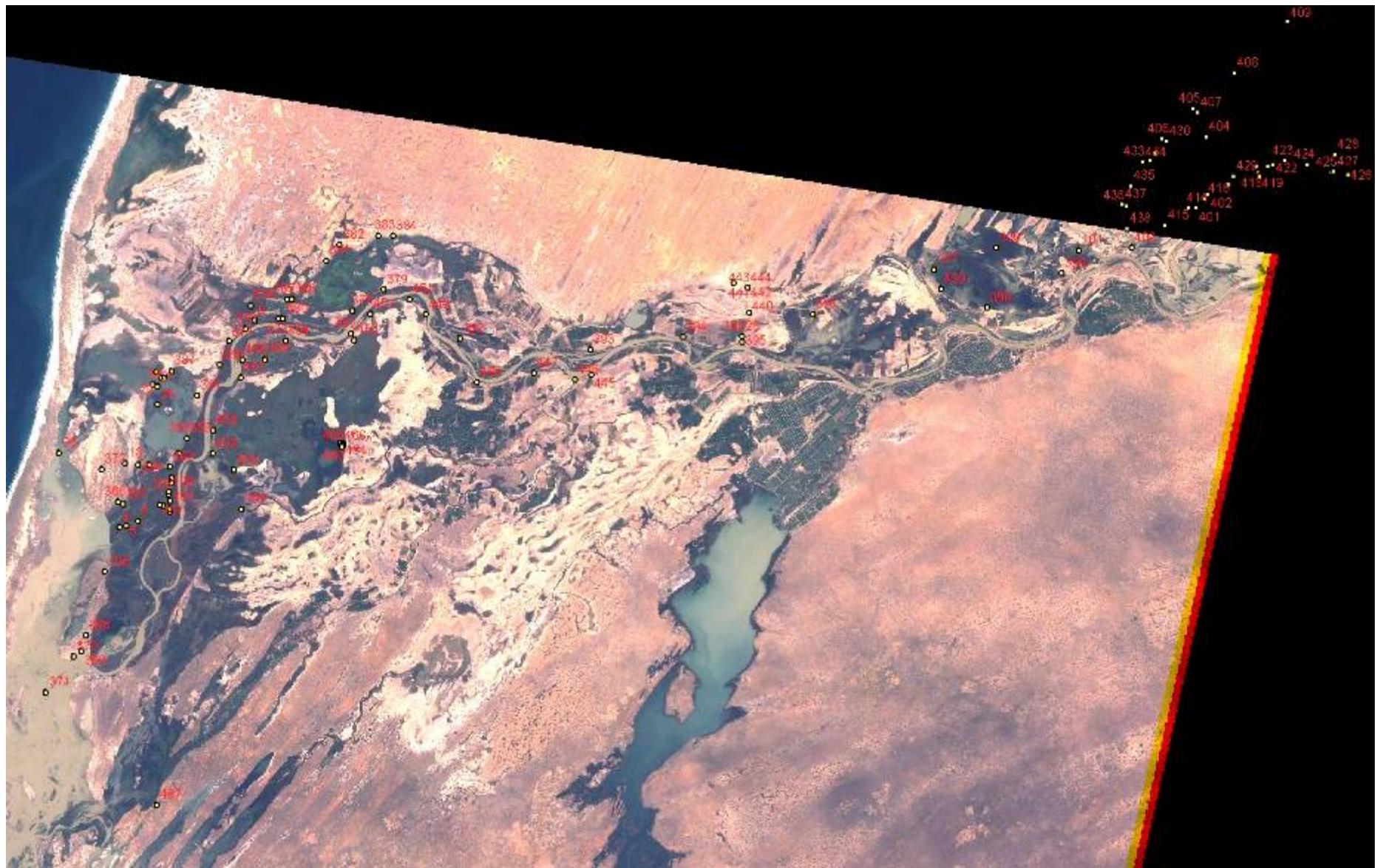
mark	x	y	remarks	country	date	author	potentially suitable, but now dry	quite suitable, but too small (?)
104	350246	1802994	Diawling NP HQ	Mauritania	16.01.2008	Franziska		
108	356514	1810584	trapping site M1A	Mauritania	16.01.2008	Franziska		x
109	356637	1810894	trapping site M1C	Mauritania	16.01.2008	Franziska		x
352	356658	1808966	large inundated aream 8 km NE of NP HQ	Mauritania	16.01.2008	Franziska		
353	356861	1812290	large area, 11.5. NE of NP HQ	Mauritania	16.01.2008	Franziska		
354	357556	1814734	14 km NE of station, AW record????	Mauritania	16.01.2008	Franziska		
355	356673	1809260	close to trapping site M1B, crossing channel	Mauritania	16.01.2008	Franziska		
4	351692	1807414	water, close to shore	Mauritania	17.01.2008	Cosima	x	
5	352396	1807527	channel crossing	Mauritania	17.01.2008	Cosima	x	
6	353550	1808038	Scirpus maritimus area with patches of Typha, potentially suitable but now dry	Mauritania	17.01.2008	Cosima	x	
356	355981	1809569	large area behind channel; in principle suitable but now dry	Mauritania	17.01.2008	Franziska	x	
357	355711	1809598	large area behind channel; in principle suitable but now dry	Mauritania	17.01.2008	Franziska	x	
358	358349	1816258	shore of Bassin du Diawling	Mauritania	17.01.2008	Franziska		
359	358348	1816256	further N	Mauritania	17.01.2008	Franziska		
360	361617	1823473	northermost point, point of return	Mauritania	17.01.2008	Franziska		
361	359359	1820446	mirador, very dry	Mauritania	17.01.2008	Franziska		
362	356717	1813407	exit from dam	Mauritania	17.01.2008	Franziska		
363	354646	1813595	beginning of Typha area	Mauritania	17.01.2008	Franziska		
364	353501	1813590	bridge, were road ends; vis-a-vis of village Zire	Mauritania	17.01.2008	Franziska		
365	356832	1811828	first channel and fishing "village" from NP HQ	Mauritania	17.01.2008	Franziska		
366	351514	1809925	start of trip AL, CT, AE, BG to large area from W	Mauritania	17.01.2008	Franziska		
367	352076	1809662	FT, BB, TR & conservateur - dry	Mauritania	17.01.2008	Franziska		
368	348380	1796686	further - to Sporobolus areas near village Biret	Mauritania	17.01.2008	Franziska		
369	347920	1795181	further - to Sporobolus areas near village Biret	Mauritania	17.01.2008	Franziska		
370	347143	1794653	further - to Sporobolus areas near village Biret	Mauritania	17.01.2008	Franziska		

mark	x	y	remarks	country	date	author	potentially suitable, but now dry	quite suitable, but too small (?)
371	344419	1791099	further - to Sporobolus areas near village Biret	Mauritania	17.01.2008	Franziska		
372	349894	1813160	further - to Sporobolus areas near village Biret	Mauritania	17.01.2008	Franziska		
9	365074	1827815	"good vegetation", but many Tamarix, on the road	Mauritania	18.01.2008	Cosima		
12	356116	1822191	close to trapping site M2A	Mauritania	18.01.2008	Cosima		
377	362499	1825831	northern border of NP	Mauritania	18.01.2008	Franziska		
378	364136	1827078	channel and village close to dam	Mauritania	18.01.2008	Franziska		
379	377850	1830893	stop, pictures, in W Typha, in E semi-desert	Mauritania	18.01.2008	Franziska		
380	367866	1828035	exit to Keur Macène	Mauritania	18.01.2008	Franziska		
381	372133	1833788	road to Keur Macène	Mauritania	18.01.2008	Franziska		
382	373478	1835373	Dune in Keur Macène, view on Typha area, pics	Mauritania	18.01.2008	Franziska		
383	377283	1836250	secon dune, pics, also to N	Mauritania	18.01.2008	Franziska		
384	378731	1836245	village de Dara Wolof, point of return	Mauritania	18.01.2008	Franziska		
385	368261	1829950	area checked, close to village Keur Macène	Mauritania	18.01.2008	Franziska		
386	368769	1829967	in principle suitable but now dry	Mauritania	18.01.2008	Franziska	x	
387	356812	1822881	trapping site M2A	Mauritania	18.01.2008	Franziska		x
18	352239	1813745	village Zire	Mauritania	19.01.2008	Cosima		
19	355020	1821534	observatoire "ancien mirrador"	Mauritania	19.01.2008	Cosima		
20	355442	1821381	wet area near lake with many SW; CT and BB	Mauritania	19.01.2008	Cosima		
21	355446	1821317	Sciropus littoralis 1,20-1,60 m height	Mauritania	19.01.2008	Cosima		
25	355446	1819506	Sporobolus area, dry	Mauritania	19.01.2008	Cosima		
26	345705	1814778	weir	Mauritania	19.01.2008	Cosima		
388	355974	1822180	1 km SW of M2A, FT	Mauritania	19.01.2008	Franziska		
389	355805	1822254	1.2 km SW of M2A, vis-a-vis of Mirador, FT	Mauritania	19.01.2008	Franziska		
390	355327	1822769	1.5 km from M2A, between dune and bassin, in principle suitable but now dry	Mauritania	19.01.2008	Franziska		
391	356695	1810032	trapping site M1D (with highlights)	Mauritania	19.01.2008	Franziska		x
28	413264	1826277	Hotel Rosso	Mauritania	20.01.2008	Cosima		
100	413264	1826277	Hotel Al Asmaa	Mauritania	20.01.2008	Franziska		
392	385376	1826087	small areas, potentially suitable?	Mauritania	20.01.2008	Franziska		
393	398285	1825010	left savanna, right many trees	Mauritania	20.01.2008	Franziska		
394	407407	1826248	channel, weir, check	Mauritania	20.01.2008	Franziska		

mark	x	y	remarks	country	date	author	potentially suitable, but now dry	quite suitable, but too small (?)
395	413289	1825793	petrol station	Mauritania	20.01.2008	Franziska		
397	420289	1828474	on road leaving Rosso, new road, rice fields	Mauritania	20.01.2008	Franziska		
398	437476	1829121	along Senegal river, rice fields	Mauritania	20.01.2008	Franziska		
399	444847	1832547	along Senegal river, rice fields	Mauritania	20.01.2008	Franziska		
400	451784	1835038	further on road to Lac Rkis	Mauritania	20.01.2008	Franziska		
401	458171	1838961	further on road to Lac Rkis	Mauritania	20.01.2008	Franziska		
402	459333	1840289	further on road to Lac Rkis	Mauritania	20.01.2008	Franziska		
403	461391	1841293	favourable area close to road, stop of one car	Mauritania	20.01.2008	Franziska		x
404	459169	1846018	further on road to Lac Rkis	Mauritania	20.01.2008	Franziska		
405	457879	1848845	stop near small lake (part of Lac Rkis?)	Mauritania	20.01.2008	Franziska		
406	454784	1845825	stop, very heterogeneous	Mauritania	20.01.2008	Franziska		
407	458326	1848440	crossing of roads	Mauritania	20.01.2008	Franziska		
408	461951	1852359	stop, very wet, ruffs	Mauritania	20.01.2008	Franziska		
409	467145	1857434	river is dry	Mauritania	20.01.2008	Franziska		
410	470418	1863328	point of return - no roads	Mauritania	20.01.2008	Franziska		
411	476667	1866052	new dike?	Mauritania	20.01.2008	Franziska		
412	480737	1869029	new dike?	Mauritania	20.01.2008	Franziska		
413	481493	1872253	road	Mauritania	20.01.2008	Franziska		
414	457414	1838981	road	Mauritania	20.01.2008	Franziska		
415	455096	1837297	road	Mauritania	20.01.2008	Franziska		
101	446527	1834787	"Torsten Pipi"	Mauritania	21.01.2008	Franziska		
416	459038	1839890	start of potentially suitable wetland	Mauritania	21.01.2008	Franziska		
417	464059	1843121	road close to river, wetland grazed, only narrow edges suitable	Mauritania	21.01.2008	Franziska		
418	464291	1842473	small wetland, now dry	Mauritania	21.01.2008	Franziska		
419	464408	1842144	stop close to area that looked suitable from a distance - checked by Alex - dry	Mauritania	21.01.2008	Franziska		
420	465215	1843113	stop, Ibrahima asked locals, wetland belt along river = dry	Mauritania	21.01.2008	Franziska		
421	465759	1843341	further along river on road	Mauritania	21.01.2008	Franziska		
422	465789	1843319	further along river on road	Mauritania	21.01.2008	Franziska		
423	466912	1843671	further along river on road	Mauritania	21.01.2008	Franziska		

mark	x	y	remarks	country	date	author	potentially suitable, but now dry	quite suitable, but too small (?)
424	469119	1843311	further along river on road	Mauritania	21.01.2008	Franziska		
425	471538	1842502	further along river on road	Mauritania	21.01.2008	Franziska		
426	473173	1842328	point of return of trip to W, dry area	Mauritania	21.01.2008	Franziska		
427	471800	1842608	crossing, decided to dry further N	Mauritania	21.01.2008	Franziska		
428	471836	1844295	point of definite return	Mauritania	21.01.2008	Franziska		
429	461845	1842111	rice fields - wetlands between Senegal river and Lac Rkis probably all dry/transformed	Mauritania	21.01.2008	Franziska		
430	455223	1845609	further to search for wetlands	Mauritania	21.01.2008	Franziska		
431	454049	1844340	further to search for wetlands	Mauritania	21.01.2008	Franziska		
432	453597	1843659	further to search for wetlands	Mauritania	21.01.2008	Franziska		
433	453041	1843598	close to part of lake (?), intensively grazed	Mauritania	21.01.2008	Franziska		
434	452869	1843499	Benedikt checked wetland, small area (1 ha), with oscillating vegetation layer, camels nearby, two Sedge Warblers	Mauritania	21.01.2008	Franziska		x
435	451714	1841172	further to search for wetlands	Mauritania	21.01.2008	Franziska		
436	451240	1839225	further to search for wetlands	Mauritania	21.01.2008	Franziska		
437	450843	1839372	almost stuck in dunes, depression between dunes terrestrialised, with Typha and trees	Mauritania	21.01.2008	Franziska		
438	451320	1836950	small wetland on return trip, waders	Mauritania	21.01.2008	Franziska		
439	432964	1830991	close to Rosso, vegetation 120 cm, dom. Cyperus, dry, < 20 ha, with Barbary Falcon on power line	Mauritania	21.01.2008	Franziska	x	
440	413967	1828615	N of Rosso, left from road Typha, right rice fields	Mauritania	21.01.2008	Franziska		
441	412435	1831626	point of return to Rosso (key...)	Mauritania	21.01.2008	Franziska		
442	413818	1831056	return trip, N of Rosso	Mauritania	21.01.2008	Franziska		
443	413819	1831056	return trip, N of Rosso	Mauritania	21.01.2008	Franziska		
444	413819	1831056	return trip, N of Rosso	Mauritania	21.01.2008	Franziska		
105	363783	1809197	Djoudj NP HQ	Senegal	22.01.2008	Franziska		
445	398339	1822492	trip Rosso-Djoudj HQ	Senegal	22.01.2008	Franziska		
446	396764	1822006	channel, bridge	Senegal	22.01.2008	Franziska		
447	392690	1822692	here dry rice fields	Senegal	22.01.2008	Franziska		
448	387073	1821787	here dry rice fields	Senegal	22.01.2008	Franziska		

mark	x	y	remarks	country	date	author	potentially suitable, but now dry	quite suitable, but too small (?)
449	381982	1828441	here dry rice fields	Senegal	22.01.2008	Franziska		
450	380376	1829944	here dry rice fields	Senegal	22.01.2008	Franziska		
451	376512	1828526	stop, zone de chasse, not NP	Senegal	22.01.2008	Franziska		
452	374612	1826505	channel, border of NP	Senegal	22.01.2008	Franziska		
453	374889	1825957	stop, Torsten worked here in 2007	Senegal	22.01.2008	Franziska		
454	368136	1825840	trip Rosso-Djoudj HQ	Senegal	22.01.2008	Franziska		
455	366101	1824027	trip Rosso-Djoudj HQ	Senegal	22.01.2008	Franziska		
456	363855	1823975	trip Rosso-Djoudj HQ	Senegal	22.01.2008	Franziska		
457	363643	1822214	Debi	Senegal	22.01.2008	Franziska		
458	360999	1816998	trip Rosso-Djoudj HQ	Senegal	22.01.2008	Franziska		
459	360888	1814721	trip Rosso-Djoudj HQ	Senegal	22.01.2008	Franziska		
460	362968	1813099	trip Rosso-Djoudj HQ	Senegal	22.01.2008	Franziska		
102	373513	1815733	trapping site Grand Lac, end of net	Senegal	25.01.2008	Franziska		
103	373813	1815672	trapping site Grand Lac, start of net	Senegal	25.01.2008	Franziska		
461	373837	1815626	water level transect for Cosima	Senegal	25.01.2008	Franziska		
462	373805	1815577	water level transect for Cosima	Senegal	25.01.2008	Franziska		
463	373775	1815529	water level transect for Cosima	Senegal	25.01.2008	Franziska		
464	373737	1815492	water level transect for Cosima	Senegal	25.01.2008	Franziska		
465	373701	1815451	water level transect for Cosima	Senegal	25.01.2008	Franziska		
466	373670	1815417	water level transect for Cosima	Senegal	25.01.2008	Franziska		
467	355412	1779965	trip Djoudj HQ-Dakar	Senegal	26.01.2008	Franziska		
468	352032	1708376	vultures on trip Djoudj HQ-Dakar	Senegal	26.01.2008	Franziska		
106	438415	1835056	--- planned to visit 20.01.2008 ---	Mauritania		Franziska		
107	432232	1832948	--- planned to visit 20.01.2008 ---	Mauritania		Franziska		
373	367472	1828084	--- planned to visit 18.01.2008 ---	Mauritania		Franziska		
374	364659	1829341	--- planned to visit 18.01.2008 ---	Mauritania		Franziska		
375	374714	1828862	--- planned to visit 18.01.2008 ---	Mauritania		Franziska		
376	739354	1832094	--- planned to visit 18.01.2008 ---	Mauritania		Franziska		



## VII – New satellite image analysis

### Using remote sensing Earth Observation to identify potential wintering sites of the globally threatened aquatic warbler

Graeme Buchanan

#### 1. Abstract

Knowledge of species distributions is vital for their conservation. Previous studies have identified areas of west Africa which could be occupied by the globally threatened aquatic warbler during the non breeding season. However, these have been very broad, and have not necessarily differentiated between different types of land cover at the spatial resolution needed for targeting field surveys or conservation management. To address this shortfall we undertook two basic analyses to identify specific areas that may potentially be occupied by wintering aquatic warblers. Using recent bird records and 1 km resolution SPOT-Vegetation data, we produced models of putative wintering distribution around the Senegal river basin. Distribution was predicted by maximum entropy modelling using logistic regression. While a paucity of data prevented a full test on independent data the models appeared to have a high degree of accuracy, with AUC / ROC values of over 0.95 in both cases. Although caution is needed due to a small number of locations at which birds were present, confidence in this map is increased by its apparent identification of areas where birds have been recorded in the past as mapped as suitable habitat. We suggest field surveys should be targeted towards sites along the Senegal river, and a number of marshes away from the river, including some which birds have previously been recorded at.

#### 2. Introduction

The aquatic warbler *Acrocephalus paludicola* is an Afro palearctic migrant, currently classed as Vulnerable (IUCN 2008). Its habitat associations during the breeding season are well known, but the extent of the lowland marshes, especially open sedge and fen mires that birds breed in declined during the latter part of last century, although key sites now benefit from some degree of protection (Aquatic Warbler Conservation Team 1999). However, its wintering areas remain poorly known, although recent studies have attempted to identify candidate areas (Schaffer et al 2007, Walther et al 2007, Pain et al in prep).

Accurate and up to date species distribution maps are essential for conservation, allowing as they do conservation management, such as habitat protection or restoration, to be targeted. This is a particular concern for aquatic warblers as it is believed that habitat loss in wintering areas may now be the greatest threat to the species (*check this ?*). Recent field surveys have highlighted the importance of areas within the Djoudj Important Bird Area in western Senegal (AWCT 2008). However, such conventional field surveys are time and resource consuming and identifying potential wintering distributions of the aquatic warbler by field surveys alone could require more resources than are currently available. Previously, bio climatic and stable isotope analyses have suggested the wintering distribution of this species is within sub Saharan west Africa, especially in the areas around and including Senegal, Mauritania and Mali (Walther et al 2007, D. Pain pers. comm.). However, due to the nature of the data on which they are based, these analyses have been restricted to identifying broad, extensive areas that may be suitable. Refining these distributions to something that can be used to identify patches of suitable habitat, rather than broad regional distributions, has clear advantages for the conservation management of this species, enabling the targeting of resources.

The potential for remote sensing data to assess the suitability of land cover for birds at a range of resolutions is increasingly being utilized (e.g. Osborne et al 2001, Jeganathan et al 2004). It can be

used to assess the suitability of land cover across areas that are more extensive than can be surveyed using conventional methods (e.g. Buchanan et al 2005). Variation in the spatial resolution of these data mean they can be used to make predictions that have greater spatial accuracy than is possible using stable isotopes or bioclimatic modeling. However, to take advantage of the spatial accuracy of remote sensing data it is advantageous to have reliable, contemporaneous, spatially explicit species presence records to train models linking species to satellite data in order to produce putative distributions (??). Walter et al (2007) suggested that the existing historical records of the species (Schaffer et al 2006), are not sufficiently reliable or suffer from uncertainties over the spatial accuracy, making their suitability in producing models based on remote sensing data with appropriate spatial resolution (e.g. 1 km or less) is debatable.

Recent survey work in western Senegal and Mauritania which has collected data on presence or absence of aquatic warblers at almost 150 sites for within the area previously identified as potential wintering area. Accurate geo references are available for these surveys. Here we use these new data in conjunction with 1 km resolution SPOT Vegetation satellite data to model the putative distribution of the species. Distribution maps were produced using maximum entropy modeling, based on the presence only data together with randomly generated pseudo absences (Philips et al 2006) and logistic regression (using presence and putative absences, collected during field surveys). While these maps are produced from the same presence data, they use different modeling approaches and different putative or pseudo absence data, meaning that their comparison may identify areas to which field surveys could be targeted. The use of multiple modeling methods may increase the accuracy of predicted distributions maps (see Arouja and New 2007).

### **3. Methods**

#### **Bird data**

Bird data was collected in January and February 2007 and 2008. In 2007, surveys used mist nest to determine whether birds were present (AWCT 2008). In 2008 surveys were undertaken using a mixture of mist netting and visual surveys where habitat looked to be highly unsuitable (Lars pers com).

#### **Remote sensing data**

The 36, 10 day maxima NDVI (Normalized Difference Vegetation Index) data derived from Spot VGT covering 2007 were obtained from [www.vito.vgt.be](http://www.vito.vgt.be). Principle components analysis was used to reduce these 36 bands, and we selected the first four components that together explained 88 % of the variation in the data for further analysis. Principle component analysis was judged suitable as we were not trying to assess the habitat preferences of the birds, but rather just produce maps of potentially suitable habitat, and also wanted to reduce the number of variables being considered.

#### **Data analysis**

##### **Maximum entropy models**

Models were produced using Max Ent (Phillips et al 2006). The nine locations at which warblers were known to be present were used to train the model. Because of the small sample size we only included the two most important of the four principle components in the models.

##### **Logistic regression models**

In addition to the nine points where birds were recorded, there were 138 additional points where birds were apparently absent, assessed by either field surveys of no birds being caught in nets. At each of these 147 points the values for the first four Principle components were extracted. Using Proc logistic in SAS 9.x (SAS institute), logistic regression models were built with presence or absence as the

dependent variable and the principle component values and their quadratic terms for curvilinear relationships used as the co variates. All potential combinations of variables were tested and the model with the smallest AIC value was identified as the best fit model. The parameter estimates from this model was used to predict chance of occurrence (suitability) for the whole of the focal area.

## 4. Results

### Maximum entropy models

Despite only being based on nine sample points, the maximum entropy model appeared to perform well, with the model having an ROC value of 0.98. This model was based on only PC2 and PC3 which had a gain of 2.42 together. Using the optimum cut of (0.47), the model predicted that only 1.2 % of the area under consideration may be suitable (Figure 2), and most of this suitable habitat was along the Senegal river. In addition to these areas there were smaller, more isolated areas of habitat away from the river that were also identified as apparently suitable. The efficacy of the model was assessed using the historical records of aquatic warblers (Walther et al 2007). Due to uncertainty over the accuracy of the coordinates of all of these records an arbitrarily defined 5 km buffer was drawn around them. Some 60 % of these buffers contained at least some habitat identified as suitable (Figure 2), with higher values than the overall average for the terrestrial habitat (0.242 vs 0.055), suggesting that the model was identifying areas of habitat that are, or have been, suitable for aquatic warblers.

### Logistic regression analysis

The best fit logistic regression model, based on the selection of all combinations and selection of the model with lowest AIC (38.81), contained principle components 1, 2 and 3. The predictive performance of this model appeared to be high, since it had an ROC of 0.96, with an optimum cut off of 0.39. Using this approach only 0.2 % of the area was predicted to be suitable (figure 3) with suitable areas generally being those identified by the maximum entropy model (figure 2); something that would be expected given they were based on the same positive records. Again, the values predicted by this model within 5 km buffers of previous records were higher than those across the study area as a whole (0.34 vs 0.01), with 55 % falling in suitable areas, indicating again that the model was to some extent describing habitat that is, or has been, suitable for aquatic warblers.

### Combined models

The maps were combined (multiplied together) to produce a map of areas identified as suitable by both locations, with values less than the optimal thresholds were given a value of zero. The resultant maps highlighted a number of areas along the river that may be suitable, together with a number of other areas further away from the river. According to this map, only about 990 km<sup>2</sup> of the area was suitable habitat.

## 5. Discussion

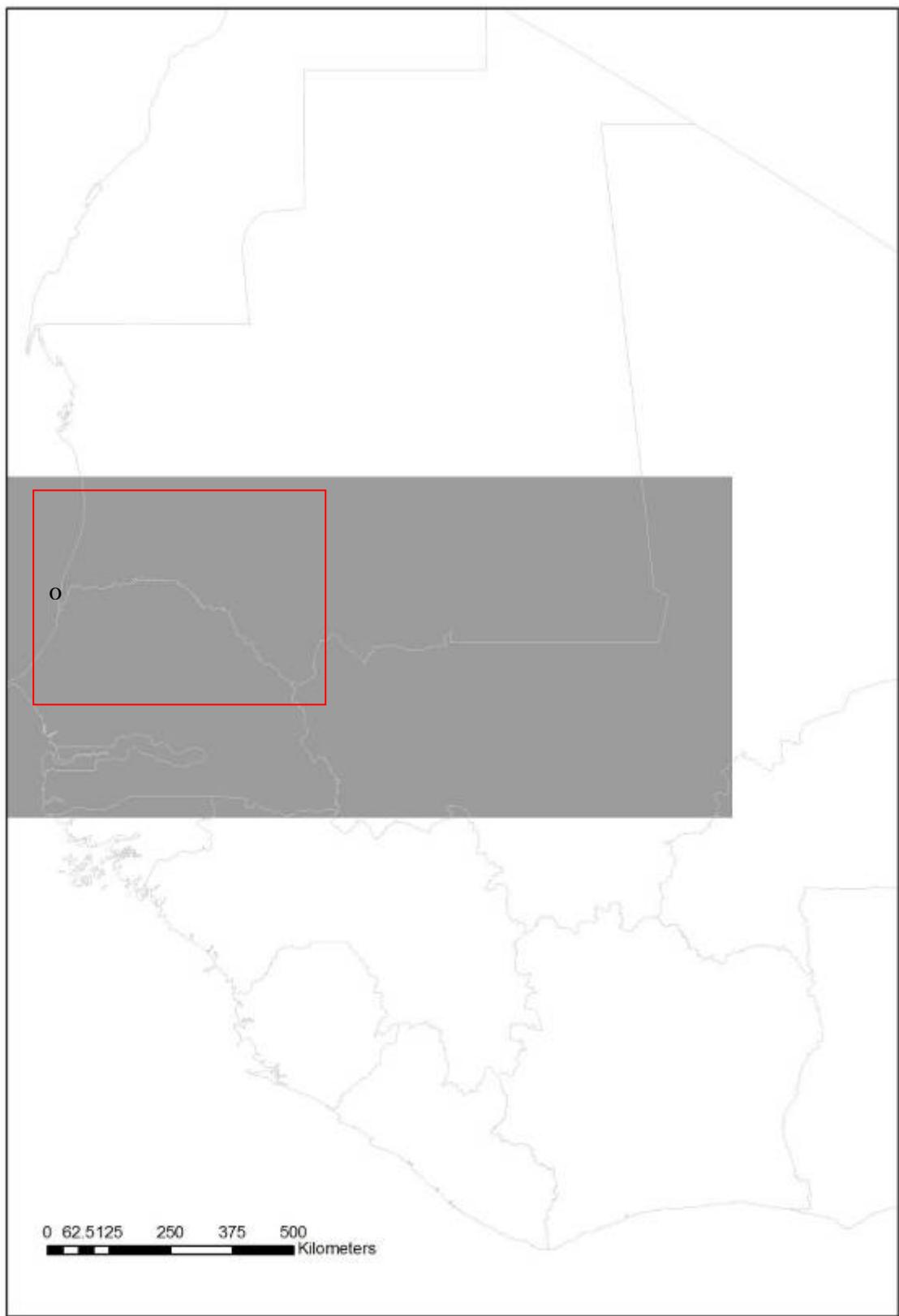
The maps produced by our analyses, while admittedly based on a small number of data points, indicate that the area of potentially suitable habitat for aquatic warblers is very small. The scale at which the analysis was undertaken (1 km) means that it should be possible to target field work to the areas identified to confirm, by ground based surveys, whether or not the birds do occur in these areas. Importantly, the small spatial area from which the bird presence data were collected means that caution is required in interpreting these results. No attempt has been made to account for spatial autocorrelation and as such, the maps could perhaps be considered as maps identifying areas of habitat similar to those in the Djoudj IBA where the data was collected, rather than as maps of all areas that may be suitable for aquatic warblers. However, the assertion that the maps are a suitable tool for conservation in identifying potential wintering sites is supported by the fact that within half of the

locations where aquatic warblers have previously been recorded (based on information in Walther et al 2007) there were areas identified as suitable habitat.

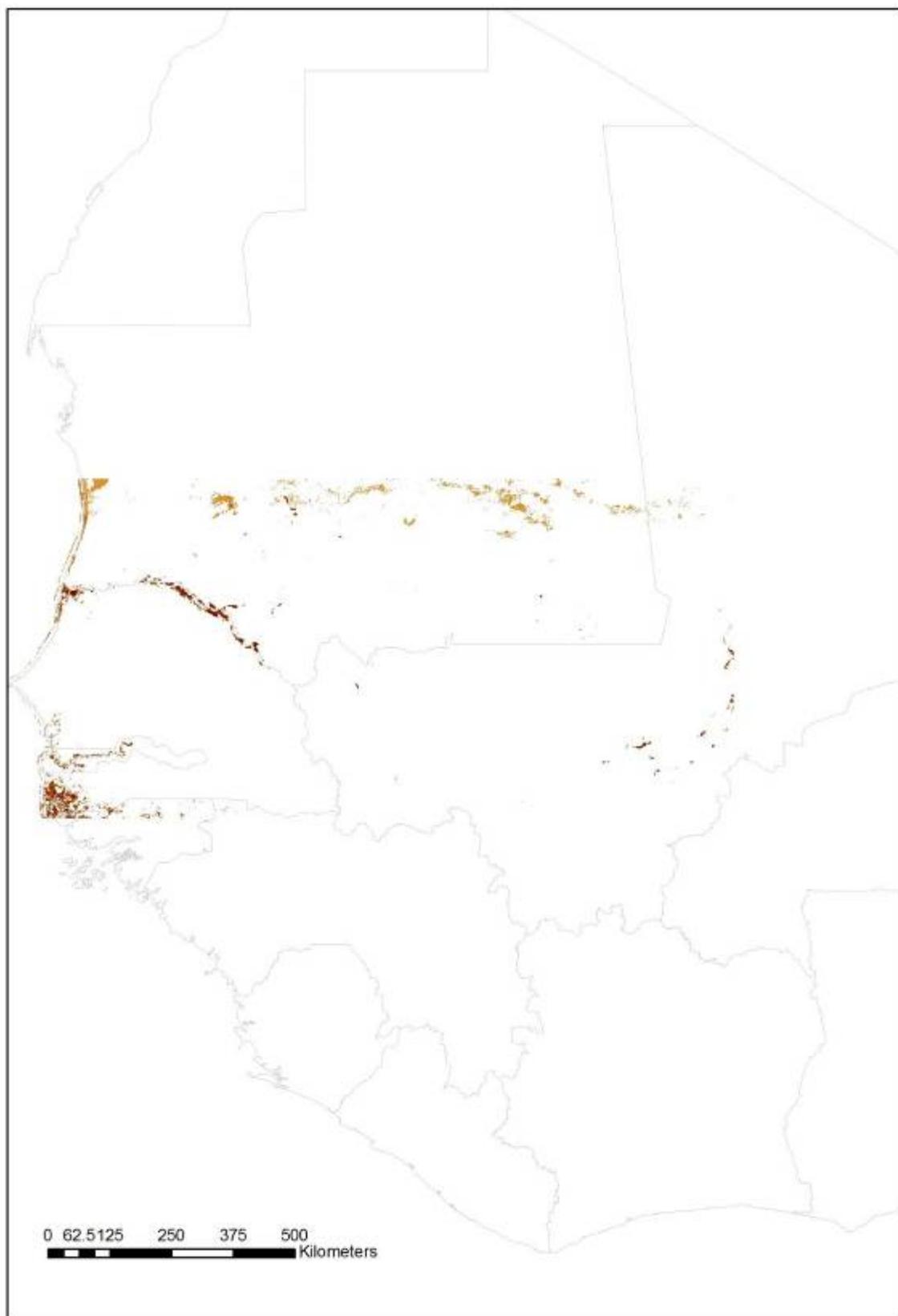
Previous attempts to model the potential distribution of the species have concentrated on broad scale analyses (Scheffer et al 2006, Walther et al 2007, Pain et al in prep), rather than attempting to identify particular locations that may be of importance. Consequently, while these approaches have provided very useful data on the potential extent of occurrences, they have not actually been able to make practical, spatially explicit predictions. The approach that we have adopted, modelling the distribution of at finer spatial scales and hopefully identifying the characteristics of habitats which birds are using, such as wetlands, was suggested as a step forward by Walther et al 2007. The areas identified as potentially suitable were located along the Senegal and Niger rivers, and also cover a number of inland water bodies such as ?? (Figure 2,3, 4). While this is to be expected given that all of the training data came from a wetland site, it does add more support the consensus that wetlands are of importance of the species in winter (e.g. Schaffer et al 2006). Importantly the maps did not predict suitable habitat along the entire length of the river. This suggests the models, especially by the logistic regression model, were describing subtle variation in the remote sensing data that corresponded to particular habitats. Of course, our approach does not attempt to actually identify in any detail the characteristics of the habitats with which aquatic warblers may be associated or dependent upon. Instead, it identifies where habitat similar to that identified as important by AWCT (2008) is distributed.

The approximate area of interest in this current study was identified from previous studies on aquatic warbler distribution (Pain et al in prep, Schaffer et al 2006, Walther et al 2007). Limiting the area of interest reduced the area over which the models were being applied, and over which the pseudo absence data was being generated (see ). Consequently, there was limited opportunity to identify novel areas that could be considered as suitable wintering sites. However, the area identified as potentially suitable around the border between Senegal and Guinea-Bissau was outside of the areas identified by Walther et al 2007 as being suitable according to a bioclimatic model, and there were apparently no records from this area (Schaffer et al 2006). However, the area may support some areas of suitable habitat, if the birds migrate this far south. Comparison of both predicted maps, which is potentially a conservative analysis, suggested there was about 1000 km<sup>2</sup> of suitable habitat. Based on the population density estimate of AWCT 2008 of 0.5 – 1.0 birds ha, this would mean the population within the area sampled was between 50 000 to 100 000 birds, which is more than the estimated 22 – 30 000 birds (Birdlife web site). However, if we consider only the area around the Senegal river basin (figure 1) the estimated population is between 33 500 – 67000, the lower end of which approaches the upper end of the breeding population estimate.

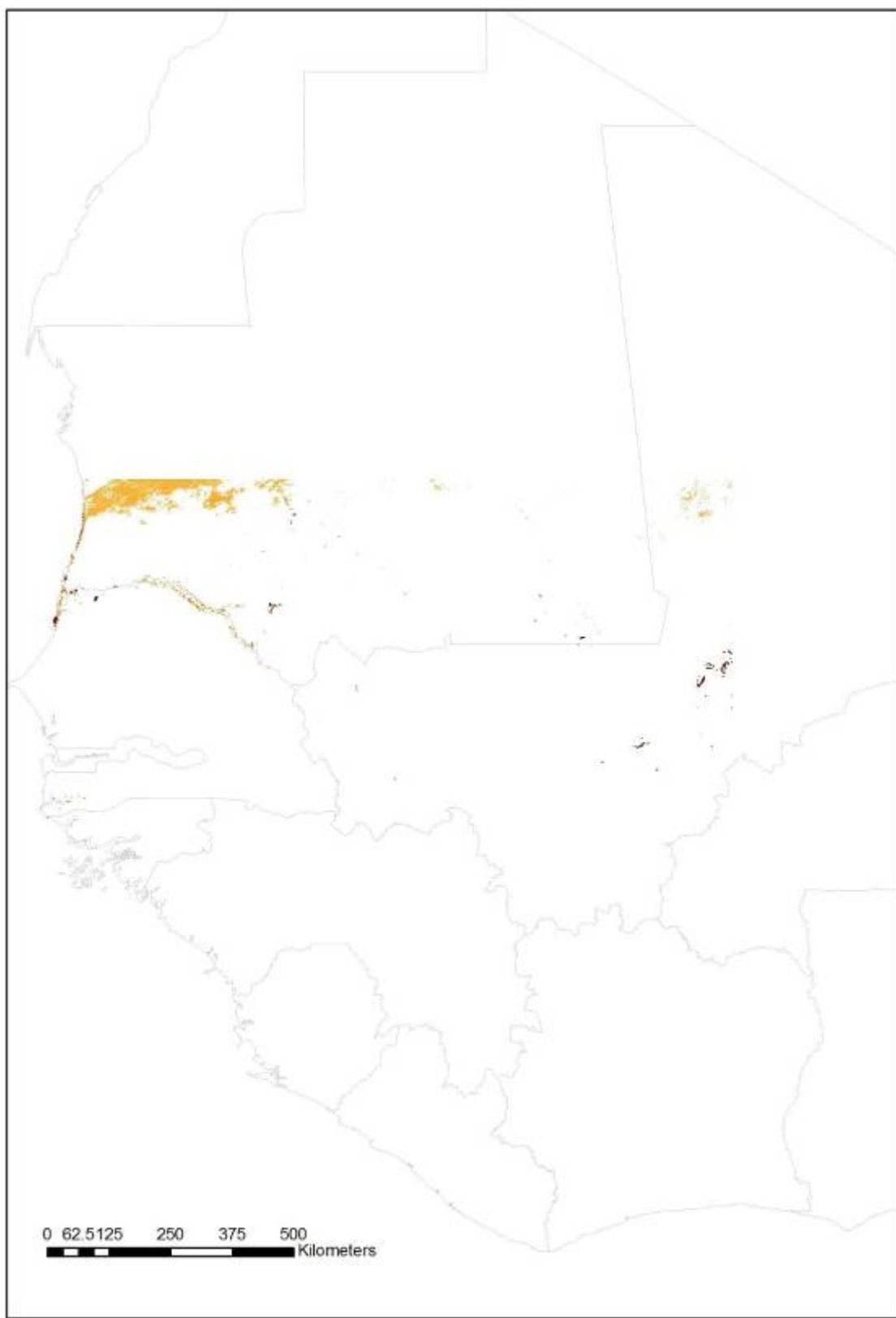
Summarising paragraph here – need for field work to check sites. Need more data from field.



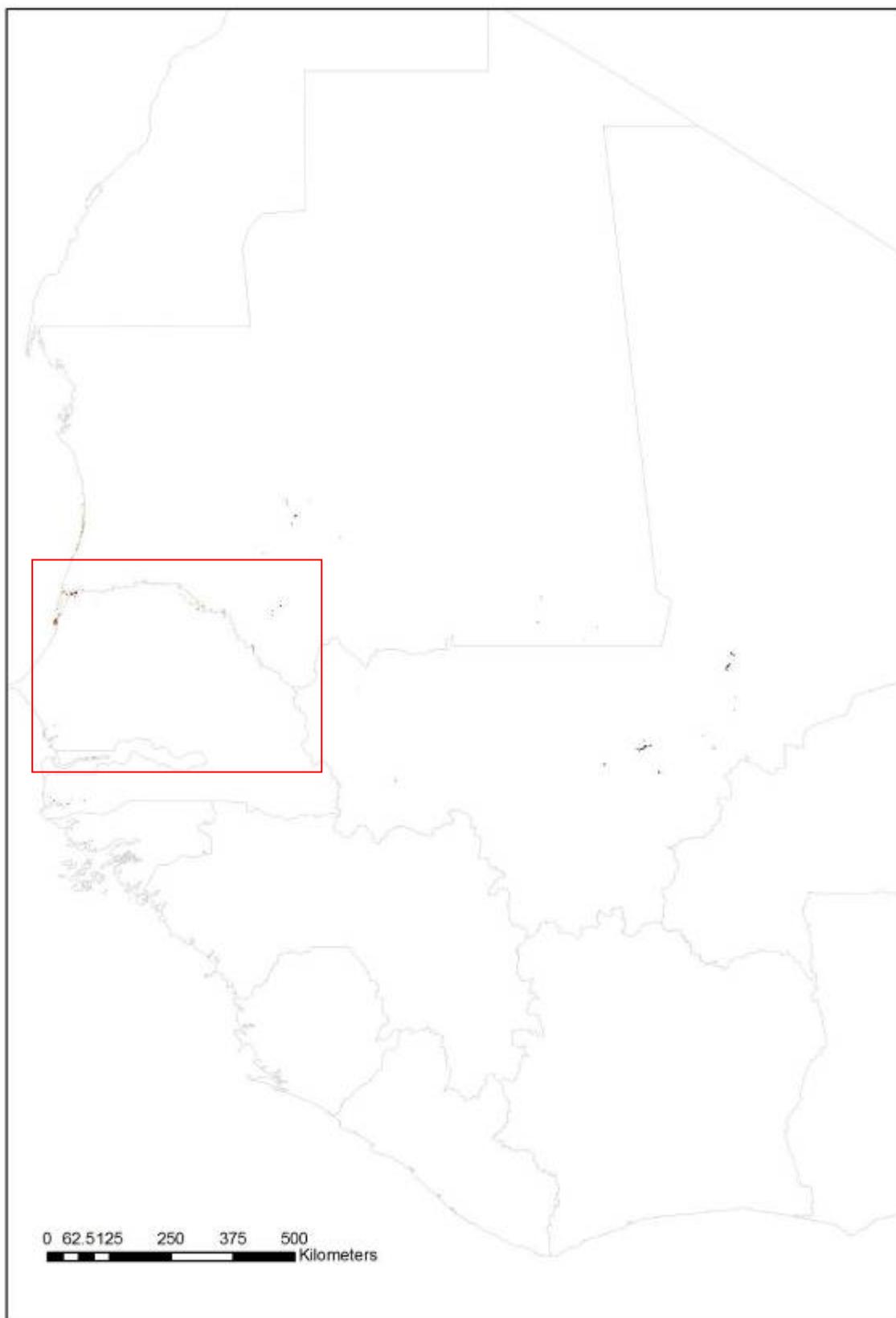
**Figure 1** – grey indicates area considered in modeling. Djoudj (where data collected from) shown as o. Red box indicates arbitrarily defined Senegal basin.



**Figure 2** – Potential distribution of aquatic warblers, predicted from maximum entropy models. Darker colours indicate greater probabilities. Only values above optimum threshold shown.



**Figure 3** – Potential distribution of aquatic warblers, predicted from logistic regression model. Darker colours indicate greater probabilities. Only values above optimum threshold shown.



**Figure 4** – Combined potential distribution of aquatic warblers, predicted from maximum entropy and logistic regression models. Darker colours indicate greater probabilities. Only values above optimum threshold in both models shown.