

Habitat use and Observations of Black-tailed Godwits between the Saloum and Senegal River delta's

Expedition report 5 to 16 November 2017, University of Groningen & Global Flyway Network, The Netherlands

November 2017

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Floodplains of the Saloum river west of Fayil

Introduction

The Black-tailed Godwit (*Limosa limosa*; BTG) is a meadow bird (Verstrael 1987; Thijse 1904). The current Dutch population is estimated at fewer than 35.000 breeding pairs (Kentie et al. 2016) and represents about half of the total continental European BTG population *Limosa limosa limosa*. However, the number of breeding pairs have declined rapidly over the last decades, as compared to the 120.000 pairs in the 1960s (Mulder 1972). Urbanisation and increased depredation rates play a role but this decline is mainly caused by a change in agricultural land use. Intensification and rationalisation have led to degradation of the breeding habitat, resulting in low reproduction. The major cause of the decline is the simple fact that the total population in the Netherlands cannot produce enough chicks for a stable population. (Vickery et al. 2001; Newton 2004; Tscharnke et al. 2005; Teunissen & Soldaat 2006; Roodbergen et al. 2012). After the breeding season godwits migrate to southern Europe (Spain and Portugal) and West-Africa where they stay for wintering. (Márquez-Ferrando et al. 2009; Hooijmeijer et al. 2011).

Demographic research Southwest Friesland

To measure the changes in population numbers and the causes, in 2004 the University of Groningen started a long-term research since 2004 in the south-western part of Friesland, The Netherlands. Since 2007 the research area has expanded up to 8400 hectares and since 2012 it increased again with another 3000 hectares (Groen et al. 2012). A colour-marked population of godwits was set up to make them individually recognizable. Godwits area not only colour-ringed in SW Friesland but we coordinate the ringing scheme for the The Netherlands. The knowledge that has been collected with this research has been implemented by policy makers and nature conservation organisations.

Migration and wintering sites Black-tailed Godwit

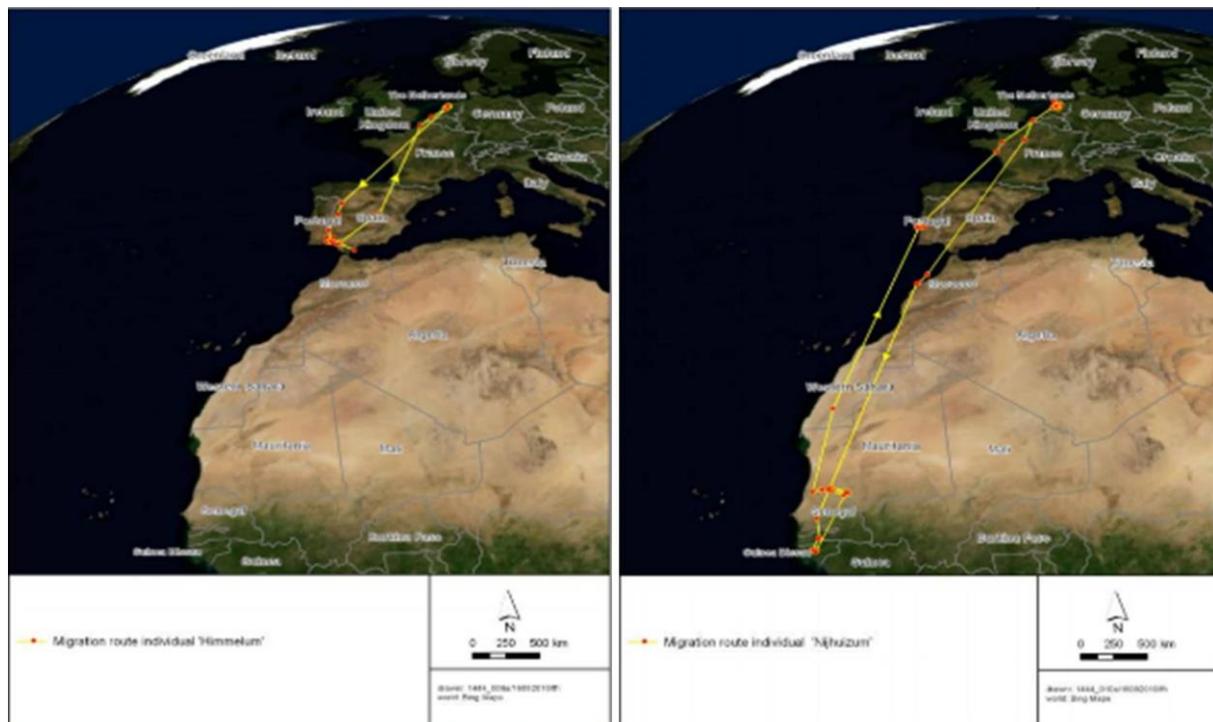
In 1983-1984 the wintering sites of godwits were explored for the first time. At that moment most godwits were wintering in rice areas along the West-African coast in Senegal, Gambia, Guinea-Bissau, Guinea and Sierra Leone. Big numbers of godwits also occurred in the inner Niger delta in Mali (Altenburg & van der Kamp 1985), but they probably belong to the eastern European population. Recently, the wintering behaviour has partly changed with an increasing number of godwits deciding to winter in South-Spain at National Park Doñana. In the 1980s during the first counts only 4% of the NW-European population used this area as a wintering site but recent estimations suggest a big change with up to 23% of the population wintering in Spain. The most important reason for this is probably the creation of new artificial fishponds and rice fields. It is remarkable that this increase is not driven by climatic changes in the Sahel zone of West-Africa (Márquez-Ferrando et al. 2013). For godwits, staying Iberia can be advantageous because they can skip a 3000 kilometre (v.v.) travel over the Sahara, a potentially dangerous migration route and save their fat stores for the next breeding season.

Conservation

The change in wintering grounds is remarkable and an important reason why we want to do (demographic) research in West-Africa. We want to find out if juveniles are more likely to make this shift than adults, how they develop their individual migration strategy and perhaps thereby change the migration pattern of the species. These changes can also have consequences for the survival rate of both adults and juveniles. Moreover can they lead to differences in reproductive success, for example due to differences in body condition upon arrival on the breeding grounds. Both are demographic parameters that can rapidly influence population dynamics. A better understanding of these processes is therefore also important from a conservation point of view; the Black-tailed Godwit qualifies since 2006 as “Near Threatened” on the IUCN Red List.

Until now, West-Africa is the only area along the migratory flyway from where we don't receive many observations of colour-marked individuals. Only small numbers of colour-ringed birds have

been reported, mainly by birdwatchers and, recently, by local scientists. Unfortunately the numbers of sightings are too small to make demographic comparisons between wintering sites.



Two migration routes of satellite tagged birds in 2009. The left map shows the route of an Iberian wintering bird. On the right an African wintering bird. Iberian wintering birds save a 6000 km flight and don't need to cross the Sahara twice. (Hooijmeijer et al. 2011).

Expeditions West-Africa and Iberia

In November 2014 the University of Groningen, in cooperation with Global Flyway Network and financially supported by Birdlife Netherlands, embarked upon their first expedition to the wintering grounds in West-Africa and since then we visited the area 2-3 times per year. We aim to set up a demographic research project in this area in close cooperation with local scientists, volunteers and conservation organisations. The most important goal of the first missions was to get a good overview of the wintering grounds, resighting conditions, local facilities and knowledge and to make a start with setting up a dataset of individually recognizable godwits that winter in West-Africa. Secondly we made a pilot study of habitat choice and prey choice. At this moment comparable research is done in NP Doñana (Spain), Extremadura (Spain) and the Tejo/Sado estuaries near Lisbon (Portugal). The last two are used as stop-over sites in February. Therefore it is mandatory to continue our research at all these locations to find links between wintering sites, stop-over sites and breeding sites. Research questions we want to get into in the future with our work in West-Africa, Spain, Portugal and the Netherlands are:

- What is the overall difference in adult mortality between birds wintering in West-Africa and Iberia? And where along the flyway do these differences occur?
- Can birds change their wintering strategy during their life? And is this age-dependent?
- Does reproductive success determine where birds winter?
- Has the wintering strategy consequences for their migration and breeding phenology? And are there consequences for their reproductive success?

Habitat study

Anthropogenic alteration of natural wetlands is having a major impact worldwide with consequences (both negative and positive) for migratory species such as continental black-tailed godwits. Godwits

are not confined to natural wetlands but frequently use these man-made habitats. The majority of the population breeds in intensively used grassland meadows for dairy production situated in North-west and Eastern Europe (March – July) after which they migrate southwards for the non-breeding period (mid July – February), finding forage resources within wetlands but also in fish ponds, salt pans and agricultural rice fields. The human population is converting landscapes to agriculture at large spatial scales, displacing natural species distributions and disrupting ecosystem processes. With the availability of high resolution land use datasets – both temporally and spatially - new tools are needed to analyze real time impacts of anthropogenic land use on ecological processes.

In our research group we have developed new techniques to assess spatial habitat utilization patterns of continental black-tailed godwits and the impact of agricultural land use intensity, both on the breeding grounds and at stop-over and wintering locations sites in Iberia and West Africa.

A gradient exists as you move from the Senegal Delta southwards towards Sierra Leone in intensity and magnitude of agricultural practices. In the north in the Senegal Delta we find large scale, irrigated rice farming with good infrastructure. A big effort is made there to become self-sustainable through rice agriculture. Several major wetland reserves have been set aside for biodiversity conservation. These reserves are also subjected to regulated water availability through annual controlled flooding. It is probably still one of the most important areas for Black-tailed Godwits in West Africa. When you go further south, much of the rice agriculture along the west coast of Senegal, Guinea Bissau, Guinea and Sierra Leone abuts onto marine mangrove wetlands. It is a huge area but has a much finer local scale, and rice cultivation is depending heavily on manual labor. In contrast to the overall increase of rice cultivation in Africa, the area of rice in the coastal zone of southern Senegal and Guinea Bissau in the 1980s was probably twice as large as in the early 2000s. In the Casamance in S Senegal, godwits are seen foraging in the wet rice paddies already during July and August as they are arriving at the end of their autumn migration south and when the rice is being sown. Godwits have advanced their arrival in this region probably due to the increased nest failures in the northern breeding grounds. An important consequence of this is that they cause damage to the newly established rice beds, by eating the rice or trampling seedlings. Farmers have to reseed or take labor-intensive measures like bringing seedlings that were cultivated close to the villages to the rice fields and plant them one by one.

So far we have concentrated our efforts to describe habitat use in West Africa in Senegal. We used remote sensing product Modis Enhanced Vegetation index that is made available at 16 day intervals and a resolution of 250m. The best image data from the 16 day cycle are merged, to reduce the amount of cloud interference. EVI is derived from the ratio between the Red, Near Infra red and Blue light bands and is used to quantify the concentrations of green leaf vegetation around the globe. It is a good measure for following cyclical patterns in landscapes since it is a proxy for biomass, plant productivity and water availability. We merged the EVI data with 3.5 years of good quality locations of black-tailed godwits (equipped with PTT satellite tags) to generate a spatially and temporally explicit habitat prediction model using MaxEnt modelling. We found that during the non-breeding period black-tailed godwits show a preference for stable habitats within a relatively low productivity range (EVI value 0.1-0.2), likely associated with open wetlands, low vegetation cover and shallow surface water. However, remote sensing data is difficult to interpret without accurate ground-truthing information. In this study we aim to conduct surveys along a north-south transect from the Senegal delta all the way to Southern Guinea Bissau categorizing and describing habitats important for black-tailed godwits. We expect it to be a powerful tool to get a better understanding of godwit movements in W Africa.

Between 5 and 16 November 2017 we visited the most important areas in N-Senegal to record resightings of individual birds. And we visited the AEWA Black-tailed Godwit workshop to discuss the situation in the southern part of the flyway. In this report we present a daily overview of our findings with photos, locations we visited, numbers present and the first conclusions and recommendations.

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Acknowledgements

We are very grateful to Birdlife Netherlands for financial support for this expedition and really appreciate the invitation of Sovon/ Dutch Ministry of LNV to give a presentation at the AEWA Black-tailed Godwit Workshop. Thanks to Col. Issa Sylla and his driver Medoune we had excellent transport in the field. Khady Gueye helped preparing the logistics as did Idrissa Ndiaye who was also a great support during fieldwork. And thanks to Tom for your help as a volunteer and all your great pictures!

Daily reports

Sunday 5 November 2017

Today we travelled from the Netherlands to Dakar; we were picked up from the airport and had a brief meeting with Issa Sylla who is now the chef de mission in West-Africa of OMPO, Oiseaux Migrateurs du Paléarctique Occidental. Unfortunately Khady Gueye can't join us because she hurt herself after falling down the stairs. We slept in a pension in Dakar.



Arrival in Dakar

Monday 6 November 2017

We made an early start and after some shopping we headed south for the Saloum Delta where we arrived shortly after midday. The lagoon just outside Joal was full of terns and herons but no godwits were present, But at our "traditional" site Mammangueth we found 220 birds. We managed to read 8 ring combinations and several were seen here in previous years. Birds were resting in the shallow lagoons and regularly walked up the shore to forage in the grasslands on grass tubers like we have seen before at this site.



Joal, Mammangueth

We searched the delta for more godwits till dusk but only found a small flock of 50 birds just before Sambia Dia, resting and foraging in a coastal lagoon (1 ring combination read). The delta is still much

more flooded than in December 2016; this will probably mean that godwits will be more difficult to find because they have much more options to roost or forage. We spent the night at Palmarin.



Floodplains near Palmarin, Ngalo

Tuesday 7 November 2017

We started the day with checking the road between Palmarin and beyond Diakhanor. Between Diakhanor and Palmarin we found a nice flock of 200 birds that were foraging on Chironomids in a brackish lagoon close to the road. They were close enough to take some feeding protocols (3 birds: 53 in 3 min., 45 in 2 min., 31 in 2 min.); a few birds switched to grass nodules later. Most birds we see in this region seem to be in pretty good condition with abdominal profiles of 3 or 4 (on a scale of 1-5).

Godwits here seem to be very site faithful: we read 2 colour ring combinations, and again both birds were seen in the region in previous years. Beyond Diakhanor there was another small flock of 11 birds without rings between the mangroves. We decided to go back to the area between Samba Dia and Joal and found again the flock at Mammangueth. Behaviour was the same as yesterday and we did not find any new ring combinations. We took 2 feeding protocols of 2 birds foraging on nodules (5 in 1:35 and 4 in 0:50 seconds). The birds like to forage on nodules but are



Palmarin, Diakhanor

easily and frequently scared off by hunting harriers or people passing by; they don't have much overview between the still tall grass and this makes them quite skittish. In the afternoon we checked the floodplains of the Saloum river east of Diofior, where a satellite-tagged bird had been located recently. Thanks to this information we found a small flock of 30 birds in a freshwater marsh with waterlilies and *Juncus spec.* that was already drying up rapidly; without it, it would have been like searching for a needle in a haystack. Unfortunately we did not see the tagged bird nor any other ringed individual. We searched another stretch of the floodplains NE of Diofior where sat-tagged godwits had been located previously which turned out to be an area with small scale Salinas. No godwits were present now. We saw this afternoon at least 10 Montagu's harriers of all sexes and ages hunting for large grasshoppers apparently. We returned to Palmarin at dusk.



Palmarin, Diakhanor



Floodplains of the Saloum river east of Diofior

Wednesday 8 November 2017

Two transmitter-birds were located in the NE part of the Saloum-delta at Fayil near Fatick yesterday according to the satellite locations and we tried to find them this morning. We found 38 godwits in a freshwater depression but no tagged bird. As we later found out, both birds had departed last night. The depression is connected to a branch of the river during the rainy season but dries out in the course of the winter and falls dry completely by February. Godwits were seen foraging on Chironomids and grass nodules; according to the time of the satellite locations the small lake might be used as night time roost as well. We had hoped for more birds but were lucky to read at least 1 ring combination.



We started the long drive up north around midday and arrived at the Guembeul Reserve south of Saint Louis around 5 pm. We checked some areas outside the reserve but only found godwits when they started to arrive at a night time roost just before dusk in the Cuvette de Ngaye-Ngaye. Due to distance and poor light, we only managed to read 1 combination but counted 410 godwits, arriving

from the direction of the Reserve. Most birds started to sleep immediately upon arrival but some foraged on Chironomids (1 bird: 44 preys swallowed in 2 min.). Hopefully we will manage to find more rings tomorrow morning when we will visit the reserve with conservator Pope Yamar Niang.



Floodplains of the Saloum river west of Fayil

Thursday 9 November 2017

We met the new commander of the PN de Langue de Barbarie Col. Daha Kane and after exchanging information we went off to find Pope. In the early morning we soon found back the flock we saw the night before at the roost. They were resting and foraging in the Guembeul Reserve on both Chironomids (bird 1: 22; 2: 57; 3: 46; 4:45 prey items per 2 min.) and nodules (bird 1: 11; 2: 6; 3:8 nodules per 2 min.). With some patience it was possible to get really close to them and we managed to read 7 Dutch and 2 German ring combinations. All except 1 had been seen in West Africa before in the past 3 years.



Cuvette de Ngaye-Ngaye

The PN de Guembeul also has a new commander: Col. Ibrahima Ndao who gave us a ring he found last year in Niokolo Koba; so for sure not a godwit!

We left Guembeul to pick up Idrissa Ndiaye in Saint Louis and moved on to the Mboubene Ricefields just outside the city. At this site transmitter-bird Seisbierrum was present for some weeks and we managed to find her back; she was in good condition, despite the low fat score (2). This was a new site we never would have found without the help of transmitter information. Godwits were not foraging in the ricefields but in an intermittent wetland that had already dried up considerably. They seemed to be looking for Chironomids (bird 1: 19 in 2min.). Another ring combination and a codeflag were read here. We headed for the Biological Station in the last hour of light and met Marc van Roomen (Sovon) and Wilmar Remmelts (Dutch Min. of Economic Affairs) on the way there. They are here for the AEWA workshop on Black-tailed Godwits in Dakar next week. Both will also stay at the Biological Station and join us tomorrow in the field. On the way we passed Ndigue where we saw lots of godwits in the past but the area is completely dry now in preparation for rice agriculture; another natural wetland outside the Djoudj Reserve is going to be sacrificed due to agriculture! Our analyses show the importance of these intermittent wetlands while the intensely used rice fields in the Senegal delta are largely avoided by godwits (and probably other waterbirds). We arrived in the dark at the Biological Station where we introduced to the commander; apparently there was a major shift in the upper commandment of the national parks!



Réserve Naturelle de Guembeul



Mboubene Ricefields near St Louis

Friday 10 November 2017

Today Marc and Wilmar joined us in the field. We started at the Biological Centre mudflats to check godwits from the roof. A group of 260 birds was present but unfortunately >95% was foraging in deep water on Chironomids; we waited for 45 min. but they kept on foraging without a pause. Intake rates were high (Bird 1: 66 per 2 min.; 2: 82; 3: 73; 4: 81). At first we checked the eastern shoreline of the Grand Lac in the Djoudj NP but found only 1 bird!



We continued through the extensive ricefields NW of Ross Bethio to check 2 sites that were frequently used by satellite birds in 2016. The first site was a big deception: it had been drained and was completely turned over in preparation for rice agriculture (funded by the EU.....). The second site was not much better; a small wetland was left over but the rest had also been converted to rice agriculture. Godwits were seen neither here, nor on the way back to the Biological Centre where we arrived 17:30. The flock was still present but still foraging. We waited till the last light and finally more and more birds started roosting in slightly shallower water: shallow enough to read 3 ring

combinations before it became too dark. From a ring-reading perspective not a very good day but it was impressive and scary to see how fast agriculture is changing the appearance of the Senegal delta. We slept again at the Biological Centre.



Destroyed wetland NW of Ross Bethio....funded by the EU

**PROJET DE PROMOTION DU PARTENARIAT RIZICOLE
DANS LE DELTA DU FLEUVE SENEGAL
3P.R.D**

REPUBLICAUN DU SENEGAL
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DANS LA ZONE DE GOROM AVAN

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Saturday 11 November 2017

After a quick check of the mudflat at the Biological Centre (200 birds present but almost all in belly-deep water) and some Chironomid intake rate samples (Bird 1: 61 per 2 min.; 2: 31; 3: 53; 4: 74) we headed for the Tocc-Tocc Reserve near Rosso in the NW corner of Lac de Guiyeres. On the way we passed by the Mbwar Marshes and despite there was sufficient water, no godwits were present. We did not see any godwits in the ricefields either. Perhaps this has also to do with the enormous effort that is made to scare off Quelia finches that try to eat rice with flags, scarecrows, horns, yelling, drumming, gunshots etc. The parallel with the situation we have in The Netherlands with the increase of geese following the intensification of dairy farming grassland is striking! We picked up the conservator of the Reserve Ousseynou Niang in Ross Bethio and he would accompany us the entire day. In the ricefields around Tocc-Tocc we could not find any godwits but they were present in a basin that is used to drain the water from the ricefields before the harvest: Marais Sapel. We found



Nice flock at Marais Sapel

our first flock of 150 birds and read 2 ring combinations and took 2 intake rate samples on Chironomids (Bird 1: 19 per 2 min.; 2: 27). We also read 7 Dutch Spoonbill-combinations. Our next stop was at an intermittent wetland next to the Reserve. Ousseynou told us that this is not part of the Reserve and that hunters use this area. Birds were indeed skittish here! The wetland was drying out rapidly but he told us that measures to rewet it had been sabotaged by neighboring farmers that feared their crops would be drowned. He hopes that in the future a dam will be made between the wetland and the farmlands so that he can create more optimal wetland conditions. We ran in to the water to get a bit closer but half of the 300 birds that were present immediately flew away. Still we got 4 combinations at this site. We returned to the Marais Sapel and saw there the same birds of this morning confirming that birds in the area use both places.

We decided to go back in the late afternoon to see if birds would return to the wetland next to the Reserve and indeed between 17 and 19 pm about 750 birds. Some birds from very high suggesting they came from far to use this place as a night time roost. Two thirds of the birds were actively foraging on Chironomids (Bird 1: 15 preys per 2 min.; 2: 17; 3: 15; 4: 16) but much less successful than at sites we visited earlier. We closed the day with 15 ring combinations read; not bad at all after the deception of yesterday!



Lunch in the rice fields at Tocc-Tocc Reserve

Sunday 12 November 2017

Today we travelled back to Dakar and we did not expect to do any fieldwork today. But fortunately on the way there we ran into a group at the reservoir of the Mboubene ricefields where a group of about 90 birds was very efficiently foraging on Chironomids (Bird 1: 83 preys per 2 min.; 2: 98; 3: 77). Scanning the group for rings we suddenly noticed there was an antenna sticking out one of the tails! It was a transmitter bird from the Haanmeer in SW Friesland. It appeared to be in an excellent condition with a fat score of 4. Two more ringed birds were present in this group. Moreover we also managed to read 10 combinations of Spoonbills that were ringed in The Netherlands. A great closing of a week in the field! When we arrived in Dakar we checked Technopole wetland but no godwits were present. The water level was low and the site is more and more used as a dump for construction materials. In the evening I joined the party of delegates that is here for the AEWA workshop on Black-tailed Godwits on 13 and 14 November. It is nice to see and meet again so many people from all along the flyway.

**AEWA Black-tailed Godwit International Working Group Workshop Dakar
Monday and Tuesday 13-14 November 2017**

The workshop was held at the residency of the Dutch ambassador in Dakar and was meant to give an overview of the status of Black-tailed Godwits along the flyway outside their breeding range. After my key note presentation there were contributions from Iberia, Morocco, Mauritania, Senegal, Gambia and Guinea Bissau. In Iberia the situation for godwits is more or less okay. There is plenty of habitat available and the only concern are disturbance by hunters (and perhaps some illegal hunting) and climate change. Climate change might influence the quality of rice fields for godwits: less rain makes them too dry to forage for godwits and causes passerines to eat the rice before the godwits arrive. And in dry years the water of the Tejo is too saline to be used for irrigation. The situation will be mainly consolidated as long as rice and fish farming will be supported by the EU. In Morocco habitat loss is the main concern but there is also some illegal hunting. Godwits and their habitats are mostly protected by law but many sites have already suffered from agricultural practices like drainage and crop conversion from grasslands to arable land in the past. The remaining sites are vulnerable and droughts like in the past 2 years make them almost completely unsuitable for godwits. In Mauritania the situation has improved since the installation of the inlets in the late 1990's that flood the Diawling wetlands. But invasive plants, insufficient water management and extension of rice cultivation are worrying. In the intermittent wetlands in S Mauritania the drought (climate change?) is giving serious problems the last 2 years as is disturbance by hunting. Also in Senegal (legal!) hunting is recognized as an increasing (?) problem as is habitat loss by rapid expansion of intensive rice cultivation in combination with the use of pesticides. The opposite is happening in Guinea Bissau where extensively used ricefields are abandoned. The main reason is rural depopulation and lack of management of the protective outer dikes against the salt water of the neighboring mangrove wetlands. Salinization as a result of insufficient rainfall is another reason for abandonment. A new strategy might bring help: it is probably better nowadays to make an opening in winter in the outer dike so that salt water can be transported out easier after flooding than to rely on desalinization by rainwater. Hunting is also a growing problem here. In the past guns and cartridges were simply too expensive to be used for a relatively small bird as a godwit but the import of cheap Chinese fire-arms and ammunition might change this rapidly. Problems like in the Casamance between rice farmers and early arriving godwits after a failed breeding season are unknown from Guinea Bissau.

So habitat loss is recognized by all countries as the main problem but causes are highly diverse. Hunting is also a (growing?) concern as is lack of knowledge. Information on key sites and population numbers at those sites is often sparse (only a midwinter count), incomplete, outdated and there is lack of knowledge on habitats used and foraging ecology (is rice really a good alternative for animal prey). My suggestion that many of these gaps of knowledge can be resolved by a clever combination of the use of transmitters, satellite imagery, ground truthing and input of local observers was adopted by most participants. Capacity building and raising awareness are also important issues and we have examples that these might also benefit from scientific programs when implanted smartly.

Wednesday 15 November 2017

Today we gave a presentation at the International School in Dakar about how Black-tailed Godwits connect our two countries. The children were amazed by the life of godwits. In the evening we flew back and arrived on the 16th in the afternoon in The Netherlands.



Delegates of the AEWA Black-tailed Godwit Workshop

Conclusions

Like in December 2016, when we visited the same areas as this time, we did not see a single godwit eating rice. No ricefields were mown yet but the first ones started to become yellow, suggesting that the seeds are ripening. The Quelia finches definitely thought they were ready to be consumed and massive flocks were in a continuous fight with local farmers that tried to scare them off, mainly in the intensively used, large-scale, irrigated rice fields in the Senegal delta. Most godwits were seen foraging on Chironomid larvae (apparently) and some on grass rhizomes.

At this time of the year, the natural freshwater water bodies that remained after the last rains in September, were starting to dry up and in a month time only very few remain. This might be an important driver of movements, at least within Senegal. Shallow water will remain available only within the major reserves and in the retention basins within the rice fields that are filled prior to the harvest when the ricefields are drained to accommodate the use of heavy machinery. It would be interesting to learn more about the pesticide loads in these water bodies and how these affect prey availability for godwits.

It is for sure that natural wetlands in the Senegal delta outside the reserves are disappearing rapidly due to agricultural conversions, leaving behind fewer habitat every year. Several sites that were used by godwits until last year, were now completely dry and unsuitable. We hardly found any godwits outside the direct vicinity of the reserves in the delta like Djoudj and Tocc-Tocc.

Like in other years, having birds with satellite transmitters really made a difference in finding the right locations to look for godwits and this is how we discovered new sites in the Saloum delta near Fatick. We were quite happy with 42 sightings of birds of our own scheme and 1 British and 7 German birds within 6 days of field work. Many of them have been seen in West Africa previously, confirming site fidelity.

The AEWA workshop was a good way to meet many people that are involved somehow with this species and to explain the study we do here. Habitat loss in West Africa was recognized as a serious problem for godwits as is hunting, but the main causes of population decline should be addressed in Western Europe. It is good to work on capacity building and improving awareness but at short notice new techniques combining the use of satellite transmitters and imagery can help to make a major step forward in identifying present key sites, regional populations numbers and connectivity between the most important habitats.

Blacktailed-Godwit ringed in the UK

	Left tibia	Right tibia
	YR	RL(E)
Age/sex	Adult	Female

Record no.	Type	Date	Location	Activity	Country	Observer
1	N	13/05/2015	Nene Washes - Low Wash 2015	Breeding	UK	Sabine Schmitt, Mark Whiffin
2	CR	03/01/2016	Technopole wetland, Dakar, Senegal	Non-breeding	Senegal	Bram Piot
3	CR	04/01/2016	Technopole wetland, Dakar, Senegal	Non-breeding	Senegal	Bram Piot
4	CR	06/02/2016	Porto Alto, Ponte de Erva/Giganta ricefields	Non-breeding	Portugal	Wim Tijssen, Haije Valkema
5	CR	28/04/2016	Nene Washes - Low Wash	Breeding	UK	Mark Whiffin
6	CR	29/04/2016	Nene Washes - Low Wash	Breeding	UK	Mark Whiffin
7	CR	16/11/2016	Technopole wetland, Dakar, Senegal	Non-breeding	Senegal	Khady Gueye
8	CR	20/11/2016	Technopole wetland, Dakar, Senegal	Non-breeding	Senegal	Khady Gueye
9	CR	20/11/2016	Technopole wetland, Dakar, Senegal	Non-breeding	Senegal	Bram Piot, Cyril Schonbachler
10	CR	26/11/2016	Technopole wetland, Dakar, Senegal	Non-breeding	Senegal	Wim Mullie, Theo Peters
11	CR	10/12/2016	Technopole wetland, Dakar, Senegal	Non-breeding	Senegal	Jos Hooijmeijer
12	CR	13/02/2017	Giganta, Tagus Estuary, Setubal, Portugal	Non-breeding	Portugal	Wim Tijssen
13	CR	15/04/2017	Nene Washes - Low Wash	Breeding	UK	Mark Whiffin
14	CR	17/04/2017	Nene Washes - Low Wash	Breeding	UK	Mark Whiffin
15	CR	12/05/2017	Nene Washes - Low Wash	Breeding	UK	Mark Whiffin
16	CR	06/11/2017	Joal, Senegal	Non-breeding	Senegal	Jos Hooijmeijer