Describing habitat and finding colour rings of Black-tailed Godwits (*Limosa limosa*) in

Parque Natural de l'Albufera, Valencia, Spain,

from 01 March-8 March 2020

Expedition report, University of Groningen & Global Flyway Network, The Netherlands

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This report

From 1 – 8 March 2020 we visited areas in Parque Natural de l'Albufera, southeast of Valencia. We recorded resightings of individual birds and described godwit habitat. In this report we present a daily overview of our findings with photos, locations we visited, numbers present and the first conclusions and recommendations. We thank Nacho Dies for his coordination skills and help with access to the Raco de l'Olla reserve; thanks to Javier Jiménez Romo for access to Tancat de Milia.

Information on Black-tailed Godwits

The Black-tailed Godwit (*Limosa limosa*; hereafter godwit) is a grassland breeding wader (Verstrael 1987; Thijse 1904). The current Dutch population is estimated at fewer than 35.000 breeding pairs (Kentie et al. 2016) and represents more than half of the total continental godwit population *Limosa limosa limosa* and 85% of the NW-European breeding population. 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). This is mainly caused a change in agricultural land use and urbanisation, and as a side effect increased depredation rates. Intensification and rationalisation of land use have led to degradation of the breeding habitat, resulting in low reproduction. The 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), which is annually the case for decades now. 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. 2013).

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 in the south-western part of Friesland, The Netherlands. Since then the research area has expanded to more than 11.000 hectares (Groen et al. 2012). A colour-marked population of godwits was set up to make them individually recognizable to study their breeding ecology, survival rates and migratory movements.

A Black-tailed Godwit with colour rings (photo: Henny de Groot)

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. Comparable research has already been done in Extremadura (Spain) and the Tejo/Sado estuaries near Lisbon (Portugal) since 2007 and in NP Doñana (Spain; since 2009). These are the most important stop-over sites in February.
Since 2013 yearly spring staging expeditions have been made to the L'Albufera estuary on the Spanish east coast. Here colour ring reading, counts and ring density sampling have been performed.

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., 2013).

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 and further. Big numbers of godwits also occurred in the inner Niger delta in Mali (Altenburg & van der Kamp 1985), but they probably belonged to the eastern European population. Recently, the wintering behaviour has partly changed with an increasing number of godwits deciding to winter in southern 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. The change in wintering grounds is remarkable and an important reason why we started to do (demographic) research in West-Africa. We know now that juveniles are more likely to make these kind of shifts than adults (Verhoeven et al., 2017), but not 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, they can

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.
We don’t receive many observations of colour-marked individuals from West-Africa but since we started regular expeditions in 2014, we have accumulated much information on individuals that cross the Sahara.
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?

Five important areas where many godwits can be observed during January-March: Extremadura (1), Donaña NP (2), Tejo-Sado estuaries (3), L’Albufera NP (4), Ebro delta (5).

Spring stopover in Iberia

Mainly from December onwards, Black-tailed Godwits leave their wintering areas in West-Africa to stopover areas in southern Iberia where they join the godwits that already moved there earlier or did not cross the Sahara at all. Here they are largely confined to three areas: Doñana NP and Extremadura in Spain and the rice fields surrounding the Tejo and Sado estuaries near Lisbon in Portugal, with smaller numbers passing through the Spanish east coast (especially L’Albufera and Ebro delta). Since 2007 these areas are visited by experienced volunteers and researchers from the University of Groningen in search for colour-ringed godwits. Resighting colour marked birds during the stopover period is important for several reasons:

1. If a godwit disperses outside our study area, the chance that it will be resighted elsewhere in The Netherlands is small. Without the resightings in the stopover area, we would assume that this individual is dead and therefore underestimate annual survival.

2. Secondly, with enough resightings in the Iberian Peninsula we can calculate seasonal survival. In other words, we can calculate in which period of the life cycle mortalities occur more often. Or we can find out if birds cross the Sahara have a different survival rate than birds that stay the entire winter in southern Europe.
3. By measuring the density of individuals with colour marks, we can monitor the population size of the western European part of the Black-tailed Godwit population. In 2016 we published a scientific paper about this, a true milestone summarizing 9 years of fieldwork in Iberia (Kentie et al., 2016).

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. The majority of continental black-tailed godwits breed in grassland meadows 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 and agricultural rice fields. On their migratory route black-tailed godwits pass through France and either stage or spend the non-breeding period in southern Spain and Portugal. Many will make the Saharan crossing to overwintering sites in West Africa, namely; the Senegal Delta and coastal region of Senegal, The Gambia, Guinea-Bissau, Guinea, Sierra Leone and central Mali.

Using remote sensing products (Modis EVI 16 day time series) and 7 years of good quality locations of black-tailed godwits (equipped with PTT satellite tags) we generated a spatially and temporally explicit habitat utilization model using Bayesian distribution analysis. 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), which are associated with open wetlands, low vegetation cover and shallow surface water (Howison et al. *in prep*). However, remote sensing data is difficult to interpret without accurate ground-truthing information. Additionally, godwits spend much of their time foraging either on the mudflats of saline mangrove wetlands or in wet rice fields, however little is known of the nature of the prey items at different times of the year. Since 2014 we have conducted a survey categorizing and describing habitats, measuring environmental variables such as water salinity and soil penetration pressure, feeding efficiency of the godwits and carefully searching the substrate to establish the identity of godwit prey items.

Literature

Gosney, D. 2011. Finding birds in Morocco: coast and mountains. Sheffield: Easybirder.

Groen, N.M., Kentie, R., Goeij, P. de, Verheijen, B., Hooijmeijer, J.C.E.W., Piersma, T.. 2012. A modern landscape ecology of black-tailed godwits: habitat selection in Southwest Friesland, The Netherlands. Ardea 100:19-28.

Hooijmeijer, J. C. E. W., Senner, N. R., Tibbitts, T. L., Gill, R. E. Jr, Douglas, D. C., Bruinzeel, L. W., Piersma, T.. 2013. Post- breeding migration of Dutch- breeding black- tailed godwits: Timing, routes, use of stopovers, and nonbreeding destinations. Ardea, 101, 141–152.

Howison, R.A., Hooijmeijer, J.C.E.W., Verhoeven, M.A., Loonstra, A.H.J., Olff, H., Piersma, T.. in prep. European godwits rely on disappearing types of wetland and are effective sentinels of land-use change in the Sahel. *Target journal: Nature Ecology and Evolution*

Kentie, R., Senner, N. R., Hooijmeijer, J. C. E. W., Márquez-Ferrando, R., Masero, J. A., Verhoeven, M. A., Piersma, T.. 2016. Estimating the size of the Dutch breeding population of Continental Black- tailed Godwits from 2007–2015 using resighting data from spring staging sites. Ardea, 104, 213–225. https://doi.org/10.5253/arde.v104i3.a7

Márquez-Ferrando, R. Hooijmeijer, J. Groen, N. Piersma, T. Figuerola, J.. 2011. Could Doñana, SW Spain, be an important wintering area for continental Black-tailed Godwits *Limosa limosa limosa*? Wader Study Group Bulletin 118: 82-86.

Mulder, T. De Grutto in Nederland. 1972. Wetenschappelijke mededelingen van de Koninklijke Nederlandse Natuurhistorische Vereniging. Nr.90. Hoogwoud: KNNV.

Newton, I. 2004. The recent declines of farmland bird populations in Britain: an appraisal of causal factors and conservation actions. Ibis 146: 579-600.

Roodbergen, M., van der Werf, B. & Hötker, H. 2012. Revealing the contributions of reproduction and survival to the Europe-wide decline in meadow birds: review and meta-analysis. Journal of Ornithology 153: 53-74.

Teunissen, W., Schotman., A., Bruinzeel, L.W., Holt, H. ten., Oosterveld, E., Sierdsma, H., Wymenga, E., Melman, D.,. 2012. Op naar kerngebieden voor weidevogels in Nederland. Feanwâlden: Sovon-rapport 2012/21, A&W rapport-1799, Alterra-rapport 2344.

Teunissen, W. & Soldaat, L.. 2006. Recente aantalsontwikkeling van weidevogels in Nederland. De Levende Natuur 107: 70-74.

Thijsse, J.P.. 1904. Het Vogeljaar, Nederlandse vogels in hun leven geschetst. Amsterdam: W. Versluys.

Thorup, O.. 2006. Breeding waders in Europe2000. International Wader Study Group 14.

Tscharntke T., Klein A. M., Kruess A., Steffan-Dewenter I., &Thies C.. 2005. Landscape perspectives on agricultural intensification and biodiversity - ecosystem service management. Ecology Letters 8: 857-874.

Verhoeven, M.A., Loonstra, A.H.J., Hooijmeijer, J.C.E.W., Masero, J.A., Piersma, T., Senner, N.R. 2018. Generational shift in spring staging site use by a long-distance migratory bird. Biology letters 14(2): 20170663.

Verstrael, T.J.. 1987. Weidevogelonderzoek in Nederland. 's-Gravenhage: Contactcommissie Weidevogelonderzoek.

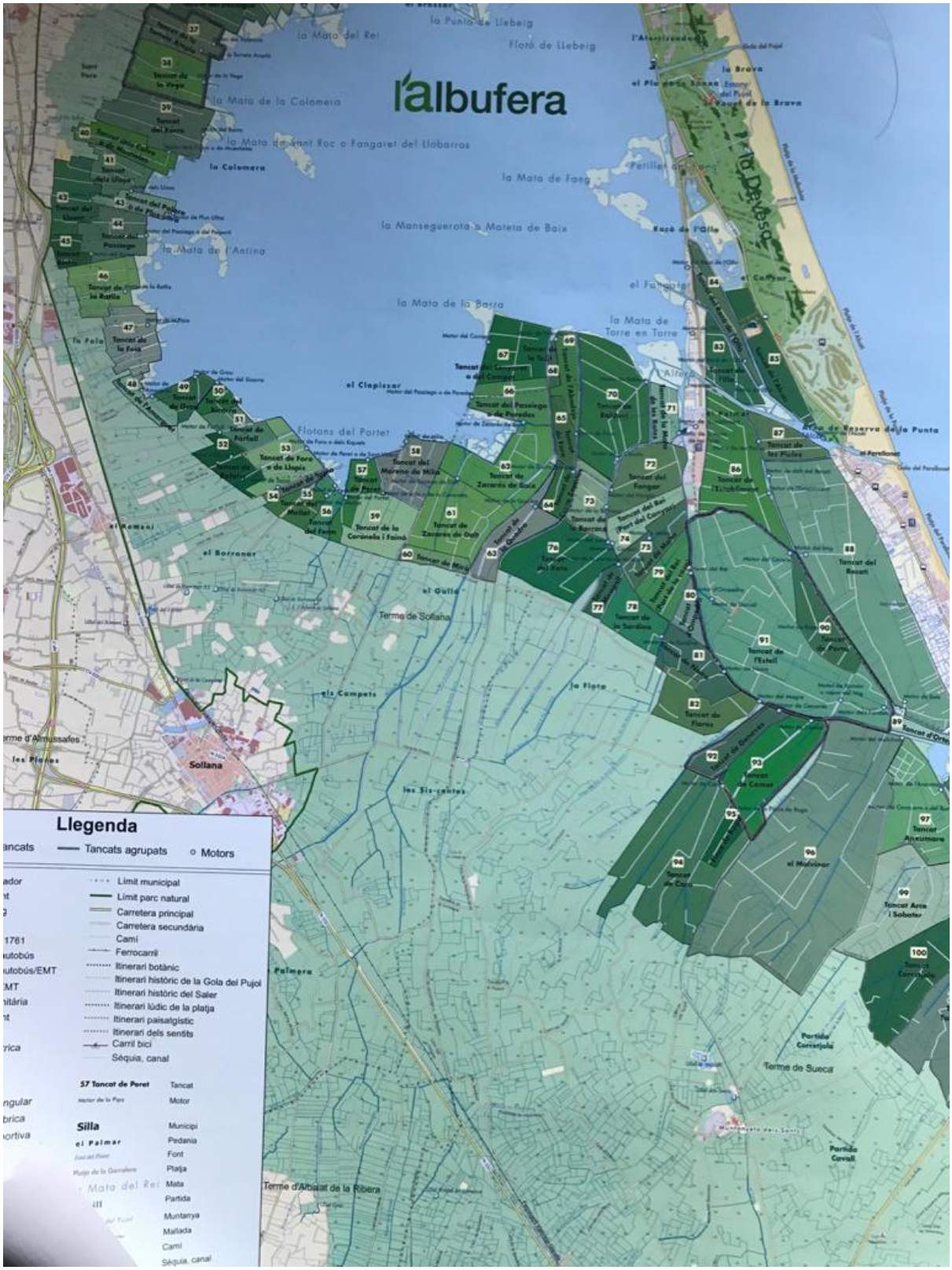
Vickery, J.A., Tallowin, J.R., Feber, R.E., Asteraki E.J., Atkinson, P.W., Fuller, R.J., Brown, V.K. 2001. The management of lowland neutral grasslands in Britian: effects of agricultural practices on birds and their food resources. J. Appl. Ecol.: 38: 647-664.

Area Maps

Source: Ajuntament de Valencia i L'Academia Valenciana de Llengua, Mapa toponimic dels tancats de l'Albufera, edicion diciembre de 2013.

Map of the northern areas visited during the expedition

Map of the south-eastern areas visited during the expedition



Map of the southern areas visited during the expedition

Summary and background information of the l'Albufera Natural Park
The l'Albufera Natural Park, just south east of Valencia, is an important 14.100 ha wetland for many thousands of wintering and migrating waders and ducks along the Mediterranean coastline, including Black-tailed Godwits. They use the area during southward migration from June to September. In October numbers start building up and 200-300 birds spend the winter here; from early February numbers start to increase and they peak at about 3000 individuals in late February; by half March most birds have left.

The 3.114 ha freshwater lake Laguna de l'Albufera is the centre of the park; it is the remains of a brackish lagoon and surrounding marshlands, that sized about 30.000 ha in the 18th century. It is only 1,5 m deep and it is nowadays on all sides surrounded by rice field complexes, called tancats. In February and early March, Black-tailed Godwits forage in the lowest, wettest areas/ tancats near the lagoon. They follow the trail of recently ploughed fields, which makes it easy to predict where to spot them next. In the recently ploughed fields they find spilled rice grains, invertebrates and also a lot of earthworms. The tancats near the lagoons are ploughed latest by the farmers. Sometimes the drainage of the in wintertime flooded rice fields starts already in December, further away from the lagoon. This process continues towards the lagoon (lowest part of the Delta). Normally the rice fields are completely dry by half March; also because the drainage has been optimized in recent years, apparently one of the reasons why the abundance of earthworms has increased, because long-term flooding is detrimental to worm populations. After ploughing they stay dry until after the rice has been sown in late May nowadays. The new rice cultivars need less water and keeping the fields dry ensures less weed pressure. These dry conditions have led to serious declines in local breeding bird populations.

Ricefields surround the l'Albufera lagoon; by early March ploughing is almost finished.

A new threat is the landscape wide spraying of pesticides against mosquitos by airplanes or from helicopters. It is supposed to be a measure against tiger mosquitos but is also to please the tourist industry. Off course this has serious consequences for the food condition for birds because the non-stinging Chironomids are eradicated as well, depriving birds of a key food source.
Another important factor is the hunting pressure. The hunting season starts in October ends at the first weekend of February. According to local information, the hunting pressure is severe. This might have contributed to the strong decline in many waders and waterfowl in the past decades. It is experienced that there's not always adequate differentiation between non-protected and protected birds. This might mean that black-tailed godwits can also be shot. The Raco de l'Olla Reserve,

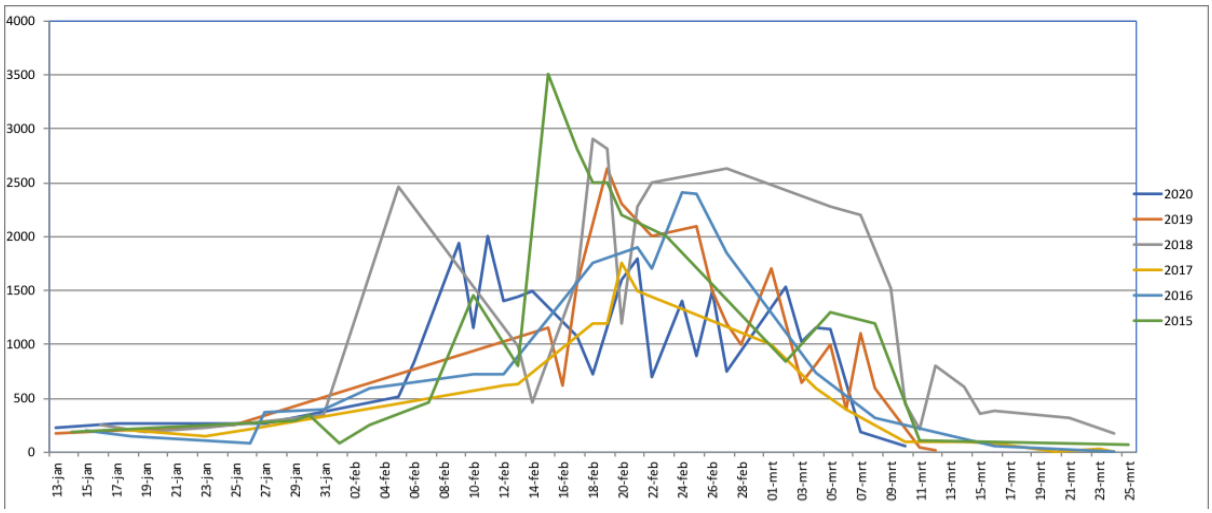
founded in February 1993, between El Saler and El Palmar is a safe haven. It is a small, new reserve created out of a former racecourse for horses. Most ricefields that are kept wet during winter are also used for hunting.

During this week we counted maximum about 1500 godwits, but ring reading suggested some turnover. The lower ring density later in the week suggested an influx of birds from Eastern Europe where less godwits are ringed. The east coast of Spain is known to be used more frequently by eastern godwit populations, where as most of the Dutch population passes through Portugal and western France. Icelandic godwits are rarely found in this area. In the morning most birds seemed to come together at the Raco de l'Olla Reserve but we have no indication that it was used as a night time roost; locations from birds with satellite transmitters suggest that the main roost could be at San Roc, an island on the west side of the Laguna. Artificial wetlands like Tancat de Milia and Tancat de la Pipa are also used for roosting, as -sometimes- are largely inundated tancats. In the course of the morning the godwits leave the Reserve and fly towards the tancats to forage but there are always a few hundred birds to be found there. Ring readings suggest a lot of exchange between the different suitable, freshly ploughed tancats and the Reserve. In this week we made 182 resightings of 31 individuals from our own scheme. Between January and March in total 52 individuals were recorded in the l'Albufera area (328 resightings), clearly indicating that there is considerable turnover. We also recorded circa 40 resightings from 7 birds from other schemes; the presence of 4 ringed Finnish birds confirms the eastern origin of some birds at this staging site. The godwits were regularly startled by Marsh Harriers especially when they were foraging close to the edges of the lake and along the reeds or in the Raco de l'Olla Reserve. Other raptors present in low numbers were Booted Eagle and Peregrine Falcon.

Flamingo's, stilts and godwits at Raco de l'Olla Reserve

Habitat use and exchange between tancats in winter 2020

Ground observations and satellite data have shown the following use of the area by godwits in winter 2020: The first arriving flocks in late January -which arrived two weeks earlier than usual, as they did in 2018- used inundated and consequently ploughed tancats in the southwest of L'Albufera. They started near the village of Bega del Mar, in an area which was actually wetted by the influx of water due to the storm ' Gloria'. From there the birds moved up to Tancat de El Mavinar, where resightings during daytime were reported from 6/2 until 10/2. Observers at Raco de L'Olla noted that in the period from 10/2 till 20/2 the godwits stayed in Raco de L'Olla most of the day, and satellite data showed the presence of the godwits in the evening in the tancats of El Malvinar and Caro (south of the lagoon). This raises the question whether they were foraging at night in the ricefields. From the 25th of February onwards, the birds moved up to the northwest of L'Albufera, in the ploughed tancats de Villalba. The foraging here was done during daytime as the presence at Raco de L'Olla during daytime returned to 'normal' as the birds roosted there from 7.20 up tot 10.00, returning to the reserve in smaller flocks during the day while being seen in the ricefields in between. A striking detail however, revealed by the satellite data of satellite bird Wolvegea, was that she visited Tancat de Baldovi in the evening (south of the lagoon, registered there from de 28th of February onwards) and at night time. We visited Baldovi, which was ploughed between the 27th of February and the 5th of March, every day at daytime but never saw any godwits there. During our presence the godwits foraged to the northwest and east of the lagoon. In Tancat de L'Escorredor Fondo, Tancat de Gambell and Tancat de la Modernista (northwest of the lagoon) a flock of 1200 birds foraged in recently ploughed fields. 600-800 birds foraged at recently ploughed ricefields at Tancat de Foia and Tancat de la Ratlla (east of the lagoon). It was striking to see how the birds prefer specific fields in these tancats. They spent -over days- more time in these specific paddies than they did in neighbouring ones…



Maximum numbers of spring staging Black-tailed Godwits in l'Albufera Natural Park between 2015 and 2020 (Ref.: www.birdingalbufera.es).

Satellite data of Wolvegea led us to ricefields in between the Sequia de Penjat and Sequia de Benifaio, where she was registered at night (!) from the 4th of March onwards. Visiting this location we found flocks of 200 godwits in fields which were still inundated (5-8 cm). We were surprised to see the birds foraging intensively and retrieving rice kernels as well as big worms! As the ricefields in the Northwest dried quickly -ploughing ended at La Modernista on the 4th of March- bird numbers there dropped and increased in Tancat de la Foia en Tancat de la Ratlla. Ploughing in Tancat de la Foia finished on the 4th of March, as it started on the 3rd of March in Ratlla and was finished there in the afternoon of the 5th of March. On the 6th of March we received the information that the fields in

the North(west) had dried up, which we saw had also happened in the Southwest. The ricefields in between the Sequia de Penjat and Sequia de Benifaio were wet/ inundated as were some paddies along the road that runs north of these paddies.
We also checked on a daily basis the conditions of the fields in the Northeast and Mideast of the Laguna. Here we found suitable, recently ploughed fields in Tancat de Sarier, Tancat de Noia and Tancat de Patim. No birds were found here. Almost all tancats between Sarier and Tancat de La Ratlla were ploughed already and had dried up. No suitable habitat was available here for the godwits.

The ricefields in between the Sequia de Penjat and Sequia de Benifaio were still inundated.

Daily reports

Sunday 1 March 2020, 20 C, 4 SW, 50% clouds
Today we flew from Amsterdam to Valencia. In the late afternoon there was just enough time to get a first impression of the area and find a flock of 136 birds, with 2 RuG-ringcombinations near El Saler, Tancat de l'Escorredor Fondo. The birds were foraging on rice in a wet ploughed field. Almost all the rice fields in that area had been ploughed and >90% was drying up, although the soil was still humid. In the wet fields hundreds of Little Egrets and thousands of different gull species were foraging and resting. We continued and checked the rice fields behind El Palmar. The conditions were quite similar but we found no godwits.

Monday 2 March 2020, 19 C, 7-9 W, 50% clouds
In the early morning we drove to the Raco de l'Olla Reserve where we were warmly welcomed by Nacho Dies and 2 colleagues. Nacho coordinates all the ringreading of godwits in the area and is one of the driving forces in the L'Albufera region behind the excellent website www.birdingalbufera.es. He took us to an excellent bird hide on the north side of the reserve. From there we had excellent views on a lagoon with several small islands. On those islands we found 1500 roosting godwits under great ring reading conditions: close and most of the legs visible. But for the birds the conditions were far less favourable: wind force 9 with gusts of 11! The birds had problems to stand up and were sometimes blown over. At 11:00 we had scored close to 20 combinations including transmitter bird Wolvegea, several codeflags and 3 Finnish birds. By that time we had bad light conditions and after a tour around the lagoon we continued scanning the rice fields. Just after mid day we found a foraging flock of 592 birds at the same location in Tancat de l'Escorredor Fondo. We took soil samples, measured salinity (3.52 mS), scored intake rates (6,2 preys/ min; n=5) and substrate penetrability (100% penetrable). We read several ring combinations, some the same as this morning, and continued along the north edge of La Laguna de L'Albufera, checking many tancats. The upper ones had almost all already been ploughed and were quite dry but the closer we came to the edge of the Laguna, the more wet places and unploughed fields we found. These comprised less than 10 % of the present rice fields. The ploughing attracted thousands of gulls and ibises but at Tancat de Ratlla we found also a flock of 690 godwits that were resting and later also foraging. We scored several ring combinations, again some that we had seen this morning at the Reserve. The Reserve is not used at night time but mainly functions as a morning roost before the birds leave to the rice fields. We finished the day with more than 30 resightings; not bad at all given the stormy conditions!

Stormy conditions for on 4 March 2020 at Raco de l'Olla Reserve

Tuesday 3 March 2020, 19 C, 4-6 Bft, 40% clouds

Today we did the same tour around the Laguna as yesterday. We started early at Raco de l'Olla Reserve where we found the same number of birds as yesterday (about 1500). As it was less windy, more birds were standing on one leg, making ring reading a bit more difficult. At night there are no godwits present in this area but at dawn flocks come flying till about 8:00. When they arrive, they bath, preen and rest. It is unclear if they come from a night time roost or if they have been foraging at night (but they are not muddy when they arrive like when you see them foraging in the rice fields). Do they come together to exchange information on where to forage during the day? After 8:30 birds started to leave, often after having been disturbed by for instance a raptor, but a few hundred can be found there the whole day. It is unclear if these are the same individuals all the time or if they are replaced by others. At 10:30 all remaining birds were sleeping and we left to do a tour around the Laguna. At the Tancat de Baldovi, the farmer was still ploughing the fields and no godwits were present. We continued and found them again at the west side of the Laguna at Tancat de la Foia. Here, 380 birds were present, foraging on a freshly ploughed rice field. We noticed that they were eating a lot of worms and easily found some in thick clumps of mud in the field. They seem to be some kind of yellowish/ brownish earth worm, up to 6 cm long. Four out of 5 one minute foraging protocols contained at least 1 worm and 5 other prey items. The length of the worms was up to 80% of the bill length, but most where 20% of bill length. The smaller worms were eaten in once, the larger took several probes and swallowing movements. The worms were taken at maximum depth; most often the whole bill and the head (up until the eye) went into the soil. We found it remarkable that the worms were searched for visually, while foraging the godwits were not probing often, and when they did it was very shallow (1 to 2 cm). We are not sure what the other food items are: they could likely be spilled rice kernels that become available after ploughing but we also saw some Chironomids in the exposed mud; or are they even after small larvae of the Louisiana crayfish *Procambarus clarkia*? We took some mud samples and scored abdominal profiles to get an idea of the condition of the birds (average 2,42 on a 1-5 scale where 5 is very fat; n=107). We scored some ring combinations that we had already seen this morning and took a ring density sample: with 1 RuG ring on 380 birds, density was low. Could it be that we had an influx of less ringed eastern European birds? Salinity measures showed that the water was fresh (around 1500 micro S).

We continued but found no birds at Tancat de Ratlla (NW corner) or at Tancat del Sarier in the NE corner of the Laguna. At both sites the water was equally fresh as at Foia. At the end of the day we found a group of 600 at the same site in l'Escorredor Fondo. They really favoured on freshly ploughed rice parcel and foraged both in the wet and slightly drier parts. In the latter we saw them eating predominantly earth worms whereas in the water they often found smaller prey items. We finished the day again with about 30 resightings each (of all schemes).

Crayfish and worms make a feast for 1000's of ibises, gulls and godwits foraging on ploughed rice fields.

Wednesday 4 March 2020, 23 C, 3-5 Bft, 10% clouds
Before we went to Raco, we first measured the salinity of the Laguna, which turned out to be fresh (1863 micS). At Raco de l'Olla we a similar sized group as the previous days with mainly the same individuals. At 9:00 the remaining 900 birds were all asleep and we drove to l'Escorredor Fondo where 600 were present. We checked for rings and noted some of the individuals we had seen earlier this morning in the Reserve. After that we tried to get a boat ride to San Roc, an island in the western part of the Laguna. From satellite locations we already knew that this island is mainly used as a night time roost but we hoped to see what the conditions were like over there. Unfortunately, the wind picked up again making it impossible to out there safely. We decided to complete the tour around the lagoon like the previous days. A big group of 820 birds was at Ratlla and Foia but ring density was low again. The birds were foraging on fields that had been ploughed in the past days, together with thousands of small gulls, herons, ibises; we did not see any cleptoparasitism. At Sarier and l'Escorredor Fondo no birds were found but we found 1200 back at the Reserve where they were mainly preening and chattering. When it started to get dark, some birds were leaving, probably on their way to San Roc for the night. Today we scored 31 resightings of 15 individuals of the RuG-scheme and several foreign godwits.

A quiet evening for the godwits at Raco de l'Olla Reserve

Thursday 5 March 2020, 23 C, 4-6 Bft, 30% clouds
We strongly have the impression that some birds might have left the area. In the morning and evening we only found about 600 birds at Raco de l'Olla where we did not score any new birds. Our next stop was at Tancat de Milia. This is a rice field at the borders of the Laguna that has been converted into a natural water purification area with ponds and helophytes, managed in a way to increase biodiversity as well. It is almost like an oasis in the bare rice field landscape with many passerines and waterfowl. Godwits also use this area, especially in summer when the rest of the area is dry or covered with rice plants; night time presence during spring staging has also been assessed. We found no godwits but according to the manager, Javier Jiménez Romo, they had been there recently. Around the Laguna are several sites and plants to increase water quality and nowadays the sewage water from the surrounding villages is no longer directed through the Laguna. This has increased water quality but water quantity is as much a problem since the two mains rivers no

longer reach the Laguna because they are either diverted or dry before they reach the coast because of increased water use upstream. Eutrophication is still an issue and no doubt run off water from the ricefields with a lot of nutrients from artificial fertilizers is a major cause. We continued our tour and found a few hundred individuals at Ratlla and Foia but they seem to have lost interest in Escorredor Fondo. No surprise when you seen how fast the ploughed fields dry out, enforced by the strong winds. The next stop was at a wet rice field SE of El Palmar, where Wolvegea had been last night, according to the satellite locations. And indeed, when we checked the 225 birds that were present, Wolvegea was one of them. They were actively foraging and we saw them eating lots of earthworms again. But they were catching them from under water! The field had not been ploughed yet and was covered with 5-10 cm water. The water was slightly salty (2-3 mS) like most places on the eastside of the natural park, probably because of upwelling salt water from the sea. The saltiest places we found were however at the Reserve with levels of 30 mS, which is comparable to sea water. The tancats in the NE are least saline (about 1500 microS). We left the area and found the birds back at the Reserve where they were roosting. The total number of godwits in the area might be less than 1000 now but we still scored a comparable number of resightings as yesterday.

The natural water purification area at Tancat de Milia

Friday 6 March 2020, 23 C, 6 Bft, 60% clouds
On our final day in Albufera we started in the Raco de l'Olla Reserve where we found about 1200 birds. Nacho Dies told us he had seen the first birds arriving at 7 am. It remains a mystery why the birds use the Reserve so frequently. It is not the night time roost and they do not forage there. The night time roost at San Roc is for instance much closer to the favorite foraging grounds at Ratlla and Foia but still we had to conclude form resightings that godwits crossed the lake to roost during daytime at the Reserve, a place that is enclosed by a sand ridge and high reeds and bushes and therefore not a place where you can see raptors coming from a distance. We witnessed a surprise attack by a Booted Eagle and a Peregrine and Marsh Harriers frequently made the birds go up in the air.
We continued through the southern tancats towards the inundated rice field SE of El Palmar where we found godwits yesterday. There was again a group of circa 130 godwits foraging there. We finished our visit at Foia and Ratlla where we scored the last rings of this trip in a group of 800 godwits. After that, Jos brought René to the airport. He continued to the rice fields near Zaragoza and René went home after a great week of exploring the Albufera!

Measuring salinity and soil resistance at Tancat de l'Escorredor Fondo

Saturday 7 March 2020, 16 C, 6-7 Bft, 20% clouds
Today Jos checked the agricultural area NE of Zaragoza along the Ebro river. From satellite images it was clear that the agriculture in this area is making use of irrigation and the size of the parcels near the river suggested that it could be rice. That turned out to be a miscalculation: it were all crops like wheat and Luzerne and cattle in some places. Obviously no godwits were found. He drove back to Valencia and left Spain on an early flight in the next morning.

Worm eating godwits in the ricefields, 26 Feb 2020 Tancat de Villalba. Photo's: Pedro Marin Prado