Stopover use by the Eurasian Spoonbill *Platalea leucorodia* of wetlands on the Basque coast (northern Iberia)

Juan Arizaga, Rafael Garaita, Héctor González & Maite Laso

The Eurasian Spoonbill is a species of conservation concern in Europe and thus a priority species from a management and conservation standpoint. Its North Sea population migrates along the Atlantic seaboard of Europe to its wintering areas in south-western Iberia and Mauritania. Spoonbills stop to rest and refuel in a number of wetlands situated along the northern Iberian coast. Detailed knowledge is still required for a better understanding of how these birds use these wetland areas. Our aim here was to explore and compare the use of the Basque coastal marshes (Txingudi and Urdaibai) by Spoonbills during the autumn migration. We used data collected with a single survey protocol during autumn migration in 2012 and 2013 at three sites: the Orueta Lagoon and the Lower Marsh at Urdaibai, and Txingudi. Overall, the only – and obvious difference – between Urdaibai (i.e. pooled data for Orueta and the Lower Marsh) and Txingudi was that Urdaibai hosted more Spoonbills. Within Urdaibai, however, the actual site hosting the greatest number of Spoonbills varied annually. Foraging rates were found to be higher at Orueta in 2012, although the causes of this difference are unknown. The proportion of Spoonbills foraging, sleeping/preening or flying at each site only varied in relation to the tide at the tidal site (Urdaibai-Lower Marsh, where proportionally more Spoonbills foraged, and fewer birds were sleeping/preening at low tide). The stopover duration was less than one day for >90% of birds and did not differ between sites. More research is still needed to understand why Txingudi was less used by Spoonbills than Urdaibai. Also of particular interest is the identification of the causes that may explain variations in foraging rates.

Key words: Eurasian Spoonbill, *Platalea leucorodia*, coastal marshes, conservation, foraging rate, migration, waterbirds.

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During migration, birds spend much of their time at stopover sites, where they rest and accumulate the fuel needed for the next stage of their journeys (Hedenström & Alerstam 1997). Understanding how birds use potential stopover sites on their route is therefore crucial from perspectives such as the ecology and evolution of migration, and the conservation and management of wild populations (Newton 2008, Chernetsov 2012).

The importance of a stopover site can be determined by parameters such as the number of migrants stopping over, their activity patterns and their foraging rates, and the duration of the stopover (Chernetsov 2012). The Bay of Biscay – and the Basque coast (northern Iberia) in particular – is situated in a strategic geographical area for birds migrating along the European Atlantic seaboard (Smit & Piersma 1989, Tellería *et al.* 1999, Wernham *et al.* 2002, Galarza & Tellería 2003). This coast has a number of estuarine are-

as, of which Txingudi and Urdaibai are the most important. Both these wetlands are included in the Ramsar list and are used by waterbirds as a stopover site, as well as by small passerine birds that take refuge in reedbeds *Phragmites* spp. and macrophyte vegetation (Grandío & Belzunce 1987, Galarza & Domínguez 1989, Arizaga *et al*. 2011a, b).

The Eurasian Spoonbill *Platalea leucorodia*; (hereafter, Spoonbill) breeds over a wide geographical area in the Palaearctic. In Western Europe it has a discontinuous breeding distribution, with large colonies in north-western Europe, on the Wadden Sea islands of the Netherlands, Germany and Denmark (as well as a number of other small colonies on the mainland of the Low Countries), and in north-west and southern France and southern Iberia (Máñez & Rendón-Martos 2009, Navedo 2013). It is a species of concern in Europe (Tucker & Heath 2004, Triplet *et al*. 2008) and thus is a priority species from a management and conservation standpoint.

The population that breeds in north-western Europe migrates along the Atlantic seaboard to its wintering areas in south-western Iberia and Mauritania (Galarza 1986, Navedo *et al*. 2010b, Garaita 2012). Spoonbills passing through northern Iberia stop to rest and refuel in a number of wetlands situated along the northern Iberian coast, above all in the marshes of Santoña (Navedo 2006, Navedo *et al*. 2010b) and, to a lesser extent, Urdaibai and Txingudi (Garaita 2012, Luengo & Arizaga 2012). Urdaibai is generally thought to host more Spoonbills than Txingudi (Garaita 2012, Luengo & Arizaga 2012), although comparisons between theses two sites using the same survey protocol have never been performed. Exploring why Txingudi plays a (theoretically) more marginal role as a stopover site for the species is crucial for properly quantifying the relative importance of each estuary for the species. Detailed knowledge of the use of these two sites by Spoonbills (i.e. the number of individuals present on land, activity patterns, foraging rates and stopover duration) is required for a better understanding of the differential use of Txingudi and Urdaibai. This is important from ecological (e.g. understanding stopover strategies and the relationship between stopover use and parameters such as survival or reproduction due to carry-over effects) (Alerstam & Lindström 1990, Chernetsov 2012, González-Prieto & Hobson 2013), management and conservation perspectives (e.g. the identification of target stopover places and conservation problems at particular sites) (Galarza & Dennis 2009, Zwarts *et al*. 2009).

Our aim here was to explore to what extent (1) Txingudi is less used than Urdaibai by the Spoonbills that choose to stop on the Basque coast and (2) how stopover parameters (activity patterns, foraging rates and stopover duration) vary between these two sites. For this purpose, we used data collected in 2012 and 2013 using a single common survey protocol.

Material and methods

Study area and data collection

Spoonbills were surveyed at three sites in Txingudi and Urdaibai: (1) Txingudi (42°20'52"N 1°47'45"W; ca. 25 ha), (2) Urdaibai-Orueta Lagoon (43°20'59"N 2°39'33"W; ca. 10 ha), and (3) Urdaibai-Lower Marsh (43°22'37"N 2°41'15"W; ca. 160 ha). At Txingudi, the survey was carried out at the Plaiaundi Ecological Park, the main area used by Spoonbills stopping at this site (Luengo & Arizaga 2012). Here, Spoonbills mostly stop in a lagoon with a relatively stable layer of brackish water. At Urdaibai, Spoonbills stop at the Lower Marsh and the Orueta Lagoon (Garaita *et al*. 2002, Arizaga & Azkona 2012, Garaita 2012); the former is tidal but the latter is stable with little or no tidal influence (only during spring high tides). According to an estimate based on birds marked with colour-rings (R. Garaita, unpubl. data), only 6.8% of Spoonbills use both sites in Urdaibai and so we considered these two sites as almost completely independent.

Data were collected in September (1–30) in 2012 and 2013. Although their autumn migration period in this area theoretically lasts from late-August to October, Spoonbills only occur potentially every day in September (Galarza 1986, Garaita 2012). Both at Txingudi and Urdaibai, the habitat use by waterbirds – and by Spoonbills in particular (Garaita 2012) – is expected to be clearly determined by the tides, which were thus key factors taken into account during the sampling protocol. Counts at each site

were conducted daily from points that allowed us to count all the birds stopping over at each site. At Txingudi, counts were carried out from two points (hides). At Urdaibai, counts at the Lower Marsh were carried out from an elevated zone (two points on the road Bi-3235) giving good views of the whole stopover area when Spoonbills decide to land in this part of Urdaibai (Garaita 2012), while at the Orueta Lagoon counts were made from an observatory. At each survey site, Spoonbills were observed with telescopes (×20–60) or binoculars (×8) and were surveyed during daylight hours on a daily basis for two hours (1 h before and 1 h after) each high and low tide, i.e. we thus surveyed for four hours per day and per site. Overall, we obtained 60 censuses per site and per year, corresponding to low and high tide counts for every day in September. This period is considered to be sufficient for assessing the number of Spoonbills that pass through each site (Navedo & Garaita 2012).

The following variables were recorded every 15 min (at 00, 15, 30, 45, 60, 75, 90, 105 and 120 min): (1) number of Spoonbills, (2) activity (foraging, sleeping/preening – hereafter, resting – and flying) and (3) foraging rate (number of items/minute/bird). For each site, tide and day we then calculated the number of Spoonbills observed (maximum number of Spoonbills at each site and survey day; when birds were moving, flying groups were counted and added to the total count of birds at the site) and the average percentage of Spoonbills involved in each activity, which thus allowed us to remove pseudo-replication. When studying the foraging rate, we tried to minimize repeated measures from single birds to avoid pseudo-replication. To estimate foraging rates individual Spoonbills (as many as possible in each visit) were surveyed for a maximum of 1 minute. Overall, 1,008 Spoonbills were surveyed (mean ± SD number of Spoonbills surveyed per day: 15.2 ± 18.6 Spoonbills; total surveyed birds: Txingudi, 164; Urdaibai-Lower Marsh, 50; Urdaibai-Orueta Lagoon, 794) and the number of prey items swallowed by each were counted. Additionally, we searched for colour-ringed Spoonbills – marked with colour-rings/flags at their natal sites, mostly in The Netherlands and France (Garaita *et al.* 2002, Lok *et al.* 2011, Garaita 2012) – to identify individual birds and thus be able to estimate their stopover duration.

Data analyses

To assess whether the average number of Spoonbills stopping in each site differed, we conducted a Generalized Linear Model (GLM) with the number of Spoonbills (counts) as the response variable, and year, tide and site as factors. We also included a quadratic effect of date in order to correct for any seasonal effect (there is a peak around mid-September) on Spoonbill numbers. We used a log-linear link function for the GLM with a negative binomial error-based distribution due to the high variance associated with bird counts (Figure 1).

To evaluate whether the activity patterns differed between sites we conducted Generalized Linear Mixed Models (GLMM) on the percentage of Spoonbills involved in each type of activity as a response variable, with tide and site as factors. Years were pooled in this case owing to the small sample sizes (the sample size in this case was not 60 days since there were days with no Spoonbills). As well, we nested date into year as a random factor. We used a linear link function with a Gaussian error-based distribution.

To test for site-associated variations in foraging rate we conducted an ANOVA on the foraging rate (item/minute) with site and year as factors, and to test whether the Spoonbills passing over our study site late in the season tended to forage at a faster rate, a phenomenon commonly observed in late migrants under greater time pressure (Newton 2008), date was included as a covariate. Tide was not considered here due to the lack of data for Urdaibai-Lower Marsh at high tide.

The stopover duration was calculated with data from the Spoonbills marked with colour-rings/flags (n = 118; Table 4). A good estimation of stopover duration requires the use of Cormack-Jolly-Seber models (Schaub *et al.* 2001) and we lacked sufficient data for this type of analysis. Alternatively, we estimated the minimum stopover duration (i.e. time elapsed between the first and last day in which a bird was seen at each site), an appropriate solution for Spoonbills under study at both Urdaibai and Txingudi since the resighting probability was relatively high (>90%; J. Arizaga, unpubl. data) and constant (for similar studies, see also Navedo *et al.* 2010a). Overall, the minimum stopover duration did not fit a normal distribution (K-S

test: $Z = 5.859$, $P < 0.001$) and so we conducted a Kruskal-Wallis test with site as a factor to test for site-associated variations in stopover duration. Years were pooled due to the relatively low sample size. Additionally, we ran a Chi-square test in order to test whether the proportion of Spoonbills stopping over >1 day differed between sites. Urdaibai-Lower Marsh was excluded from this analysis since all birds stayed in this site for less than 24 h. All statistical analyses were carried out with the software SPSS 21.0.

Results

The mean number of Spoonbills stopping over at each site ranged from 0.2 ± 0.1 (±SE) at high tide in Txingudi in 2012 to 11.8 ± 1.9 at low tide in Urdaibai-Orueta in 2012 (Table 1). At Txingudi and Urdaibai-Lower Marsh, we detected a high percentage (ca. 80%) of days with no Spoonbills, whilst at Urdaibai-Orueta this percentage was lower (ca. 40%) (Figure 1). Overall, days with flocks of >50 Spoonbills were very rare in the region (<2% at each site). According to the GLM, the number of Spoonbills varied in relation to year, tide and site (Table 2); specifically, the number of Spoonbills in 2012 tended to be higher at Urdaibai-Orueta (with no differences between Urdaibai-Lower Marsh and Txingudi), whilst in 2013 the number of Spoonbills at Urdaibai-Orueta was lower than at the other two sites at high tide. A similar pattern (although less marked, above all in 2013) was reported at low tide (Table 1; *a posteriori* tests are not shown).

Overall (year, site and tide pooled), 39.6 ± 3.3% of the Spoonbills were observed foraging, 53.0 ± 3.2% resting, and the remaining 7.4 ± 1.8% flying. Flights were associated with small local movements or with the decision to leave the site (departures). The percentage of Spoonbills involved in each activity varied in relation to a site×tide interaction (Table 3); only at Urdaibai-Lower Marsh were no Spoonbills observed foraging and here too there was a higher proportion of Spoonbills resting at high tide (Figure 2). Moreover, a greater proportion of birds was observed in flight at Urdaibai-Lower Marsh at low tide, while no birds were observed in flight at Urdaibai-Orueta. No significant differences were observed for the rest of sites/tides (Figure 2).

Foraging rates differed in relation to site (marginally), year and the interaction between these factors (ANOVA: Site, $F = 2.716$, $P = 0.067$, $df = 2$; Year, $F = 5.460$, $P = 0.020$, $df = 1$; site×year, $F = 10.939$, $P < 0.001$, $df = 2$). Foraging rates were not affected by date ($F = 0.226$, $P = 0.635$, $df = 1$). Foraging rates in 2012 were higher at Urdaibai-Orueta than at the other two sites (Txingudi and Urdaibai-Lower Marsh; Figure 3); foraging rates were higher in 2013 than in 2012 (except at Urdaibai-Orueta).

Table 1. Daily number of Spoonbills stopping at three study sites on the Basque coast in September 2012 and 2013 at high (HT) and low (LT) tide. Sample size per cell was 30 days. SE = Standard error.
Nombre de becplaners censats cada dia als tres llocs d'estudi de la costa basca el setembre de 2012 i 2013 durant la marea alta (HT) i baixa (LT). La mostra en cada cas van ser 30 dies. SE = Error estàndard.

	2012		2013	
Site / Tide ***Lloc / Marea***	**Mean±SE** ***Mitjana±SE***	**Range** ***Rang***	**Mean±SE** ***Mitjana±SE***	**Range** ***Rang***
Txingudi *Txingudi*				
HT	0.2 ± 0.1	0-2	7.7 ± 2.5	0-51
LT	3.0 ± 1.9	0-50	4.4 ± 2.1	0-39
Urdaibai-Orueta Lagoon *Urdaibai – Llacuna d'Orueta*				
HT	10.3 ± 1.5	1-31	1.8 ± 0.9	0-20
LT	11.8 ± 1.9	1-44	3.1 ± 1.9	0-56
Urdaibai-Lower Marsh *Urbaibai - aiguamoll*				
HT	0.7 ± 0.6	0-18	7.1 ± 6.9	0-206
LT	2.7 ± 1.4	0-35	5.7 ± 5.2	0-156

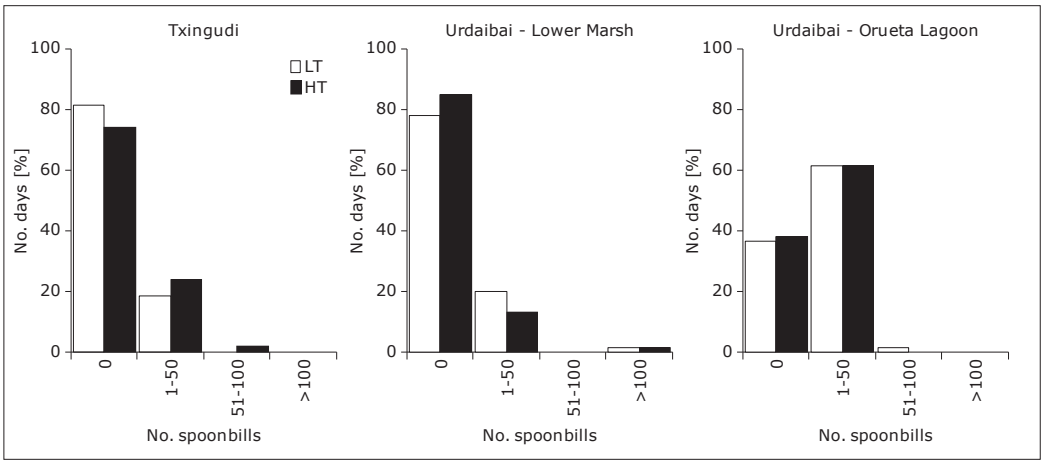

Figure 1. Percentage of days in relation to the number of Spoonbills stopping at each site at high (HT) and low (LT) tides. Data for the years 2012 and 2013 were pooled.
Percentatge de dies en relació al nombre de becplaners que estaven parats a cada lloc en moments de marea alta (HT) i baixa (LT). Les dades dels anys 2012 i 2013 s'han ajuntat.

The stopover duration did not differ between sites (K-W: $\chi^2 = 2.394$, $df = 2$, $P = 0.302$) (Table 4) and the proportion of Spoonbills stopping for >1 day was not site-dependent ($\chi^2 = 0.417$, $df = 1$, $P = 0.676$).

Discussion

We observed variation in bird abundances in relation to site, year and tide. Only the Orueta lagoon hosted fewer Spoonbills at high tide in 2013. However, if we pool this lagoon and the Lower Marsh, overall Urdaibai hosted more Spoonbills than Txingudi and is thus of greater importance for this waterbird (Galarza 1986, Garaita 2012). Both the heterogeneity and the larger surface area of suitable habitat at Urdaibai (with a relatively large tidal marsh area and a small lagoon that Spoonbills also visit) may explain why Urdaibai is apparently more significant than Txingudi. However, the actual part of Urdaibai that hosted most Spoonbills varied annually. Although Orueta was reported to host increasing numbers of birds initially after it had been created (Garaita & Arizaga 2015), our results seem to indicate that annual variations are high and so it is impossible to affirm whether either site was in fact better (in terms of the number of Spoonbills) than the other. This finding, together with the fact that there is only limited movement of birds between these two areas at Urdaibai, suggests that this estuary should be considered as a single management and conservation unit for Spoonbills.

Table 2. Generalized Linear Model used to determine the effect of site, tide and year on Spoonbills counts at three study sites on the Basque coast. Also included is the quadratic effect of date on the number of Spoonbills.
Model lineal generalitzat utilitzat per determinar l'efecte del lloc, la marea i l'any en el nombre de becplaners censats al tres llocs d'estudi de la costa basca. Vam incloure també l'efecte al quadrat de la data.

Factors	χ^2	*df*	*P*
Site *Lloc*	30.181	2	<0.001
Tide *Marea*	24.208	1	<0.001
Year *Any*	15.748	1	<0.001
Site×Tide *Lloc×Marea*	5.785	2	0.055
Site×Year *Lloc×Any*	135.279	2	<0.001
Year×Tide *Any×Marea*	32.982	1	<0.001
Site×Tide×Year *Lloc×Marea×Any*	33.693	2	<0.001
Date *Data*	32.673	1	<0.001
Date^2 *Data^2*	39.099	1	<0.001

Factors	*F*	*df*	*P*
Foraging ***Alimentant-se***			
Site *Lloc*	8.727	2	<0.001
Tide *Marea*	0.061	1	0.805
Site×Tide *Lloc×Marea*	3.631	2	0.030
Resting ***Descansant***			
Site *Lloc*	0.650	2	0.524
Tide *Marea*	1.346	1	0.249
Site×Tide *Lloc×Marea*	7.578	2	0.001
Flying ***Volant***			
Site *Lloc*	17.679	2	<0.001
Tide *Marea*	2.850	1	0.095
Site×Tide *Lloc×Marea*	3.247	2	0.043

Table 3. Generalized Linear Mixed Model used to determine the effect of site and tide on the proportion of Spoonbills undertaking each type of activity. All models included a random effect of date nested into year. Years were pooled for the analysis.
Model lineal mixt generalitzat utilitzat per determinar l'efecte del lloc i la marea en la proporció de becplaners observats en cada tipus d'activitat. Tots els models van incloure la data com factor aleatori anidat dins de l'any. Els anys es van ajuntar.

The lower numbers of Spoonbills present at high tide suggests that, unlike the marshes at Santoña, the studied coastal marshes are not obligate (or preferred) target stopover places for this species (Navedo 2006). The Basque coast only has small estuaries with little suitable habitat for waterbirds, above all at high tide. Furthermore, these areas suffer from frequent human disturbances owing to activities such as shellfishing, tourism and walking (Garaita *et al.* 2002, Navedo & Herrera 2009, Garaita 2012, Navedo & Herrera 2012) that can cause waterbirds resting in these sites to depart. Thus, our study sites were less important for Spoonbills when the potential available surface area was at its smallest (high tide), which is indicative of a potential conservation/management problem in estuaries as small as the two studied sites. Additionally, it is also worth noting that the

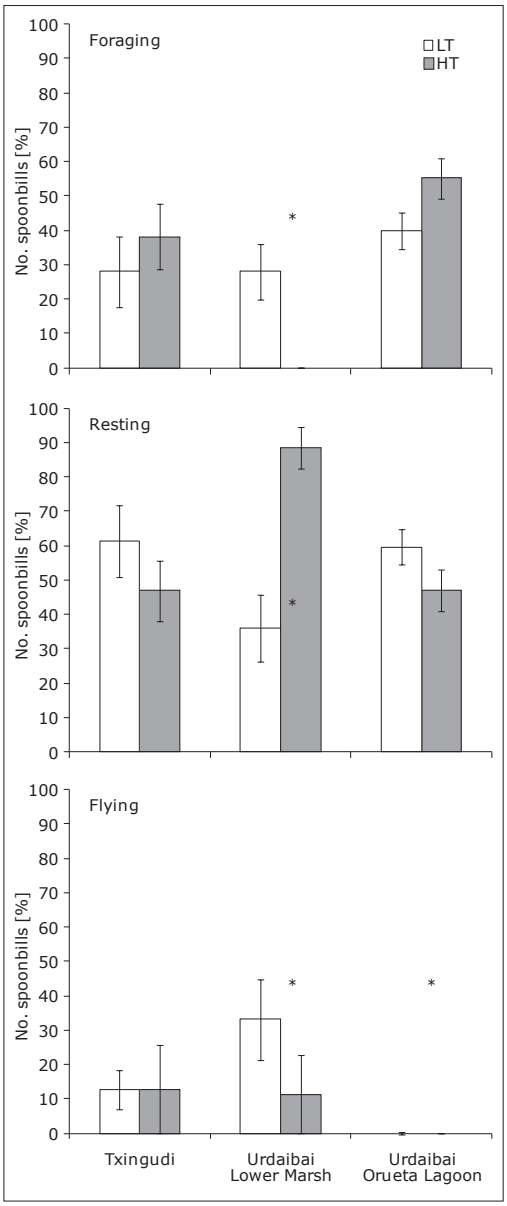

Figure 2. Observed percentage (mean ± SE) of Spoonbills observed foraging, resting or in flight at the three sampling sites at Txingudi and Urdaibai at high (HT) and low (LT) tide. Significant differences are marked with an asterisk (*).
Percentatge (mitjana ± SE) dels becplaners observats alimentant-se, descansant i volant als tres llocs mostrejats de Txingudi i Urdaibai en marea alta (HT) i baixa (LT). Les diferències significatives es mostren amb un asterisc (*).

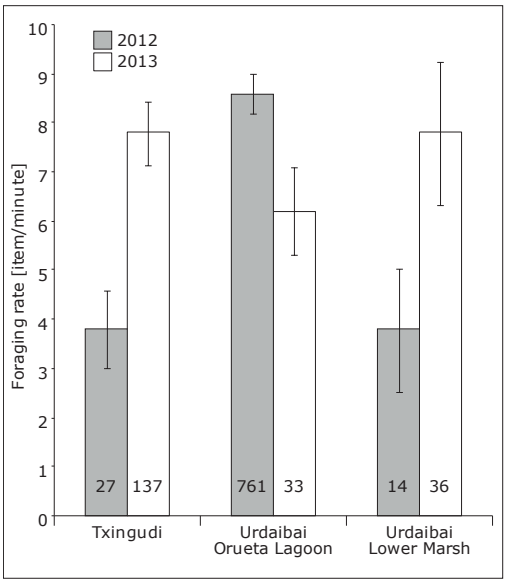

Figure 3. Mean (±95%CI) foraging rates of individual Spoonbills stopping at three study sites on the Basque coast. Sample sizes are given within bars.
Taxa mitjana (±interval de confiança del 95%) d'alimentació dels becplaners aturats als tres llocs d'estudi de la costa basca. El nombre d'individus mostrejats s'indica dins de cada barra.

Spoonbills that stop along the coast of northern Iberia tend to depart at high tide (Navedo *et al.* 2010b) and so, in theory, fewer Spoonbills will be at our study sites at this point in the day. Thus, the tidal Basque coastal marshes are more attractive for the Spoonbills at low tide, which is when potential conflict with human activities is at its greatest.

The time budget invested in each type of activity was only influenced by the tide at the tidal site, where birds were observed to feed and fly less and rest more at high tide. This type of behaviour matches the activity patterns reported at other tidal marshlands for waders and waterbirds (Burger *et al.* 1977, Turpie & Hockey 1993, Rogers *et al.* 2006).

Foraging rates also varied greatly depending on site and year, thereby suggesting the existence of a dynamic scenario affected by food availability – i.e. if the foraging rate is positive (e.g. Alerstam *et al.* 1992) or negative (e.g. Jeschke *et al.* 2002) – or Spoonbills' physical condition, which can also affect foraging rates (Bibby & Green 1981, Lourenco *et al.* 2010). Nevertheless, we lacked data on both food availability and Spoonbills' condition and so have no proper way of discussing which factors explain the higher foraging rate at Orueta in 2012. Furthermore, our sample was biased due to the larger size of the data set from this site and so the other sites could thus be under-represented. In the future, more detailed research on this aspect is called for to help understand the way in which our study sites are used by foraging Spoonbills.

Stopover duration was similar at all sites and <24 h, indicating that Spoonbills use the Basque wetlands as stopover sites, *sensu* Warnock (2010), but not as staying sites like Santoña (Navedo 2006). Our small sample size prevented us from estimating stopover duration using an approach such as the Cormack-Jolly-Seber models (Schaub *et al.* 2001). However, our data are quite explicit and reveal that all study sites are mostly used only for one-day stopovers.

Table 4. Minimum stopover duration (mean, median and ranges) and percentage of Spoonbills observed to stop for >1 day at the three study sites during the autumn migrations of 2012 and 2013. Stopover duration was determined only from marked Spoonbills.
Duració mínima de la parada migratòria (mitjana, mediana i rang) i percentatge de becplaners observats en parades de >1 dia al tres llocs d'estudi durant la migració de tardor de 2012 i 2013. La durada de la parada es va determinar utilitzant únicament els becplaners marcats.

Site ***Lloc***	**Sample size** ***Mostra***	**Mean ± SD (days)** ***Mitjana ± SD (dies)***	**Median (days)** ***Mediana (dies)***	**Range (days)** ***Rang (dies)***	**>1 day (%)** ***>1 dia (%)***
Txingudi *Txingudi*	30	1.1 ± 0.1	1.0	1-2	10
Urdaibai - Orueta Lagoon *Urdaibai - llacuna d'Orueta*	64	1.1 ± 0.1	1.0	1-2	6
Urdaibai - Lower Marsh *Urdaibai - aiguamoll*	24	1.0 ± 0.0	1.0	1-1	0

We do not know the causes underlying this behaviour and so here we can only suggest possible hypotheses that will need to be tested. First, the small size of these marshlands and the degree of human disturbance (e.g. García 1996, 2000, Garaita 2010, 2012) could mean that for Spoonbills these sites are not suitable for stopovers of more than one day (Navedo & Herrera 2012). The creation of the Orueta lagoon, where human disturbance is very low, has encouraged some Spoonbills to stay for longer, and some birds have even summered and wintered (Arizaga & Azkona 2012, Arizaga *et al.* 2014). A second hypothesis concerns the geographical location of our study site. In terms of the Eastern Atlantic flyway that connects the Spoonbill breeding colonies along the North Sea with their wintering quarters in southwestern Iberia or Africa, the marshes at Santoña are better situated (less of a detour) than the more easterly Basque wetlands (Navedo 2006, Navedo *et al.* 2010b), although their true respective importance will depend partially on the Spoonbill's previous stopover site on the Atlantic coast of France. A final hypothesis suggests that small wetlands such as Txingudi and Urdaibai are likely to be more affected by yearly and/or seasonal variations in food availability, thereby making them less attractive for Spoonbills that need stopover places with good foraging opportunities (Chernetsov 2012).

In conclusion, we observed that Urdaibai tends to host more Spoonbills. At the tidal site Spoonbills invested less time feeding at high tide. Foraging rates differed clearly according to the site and year, suggesting thus a rather fluctuating scenario (at least in terms of foraging conditions). Stopover duration was very low (<24 h) and highlights the relative lack of importance of these Basque costal marshes, which may just be used as emergency stopovers during adverse weather (Overdijk & Navedo 2012) or as simple stopover sites *sensu* Warnock (2010).

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Resum

Ús dels aiguamolls de la costa basca (nord d'Ibèria) pel Becplaner *Platalea leucorodia* durant la migració postnupcial

El Becplaner és una espècie amenaçada a Europa, motiu pel qual és prioritària des del punt de vista de la gestió i la conservació. La població del Mar del Nord migra a través de la vessant atlàntica d'Europa per arribar a les seves àrees d'hivernada al sud-oest de la península Ibèrica o Mauritània. Els becplaners que passen pel nord d'Espanya s'aturen per descansar i/o acumular reserves als aiguamolls que hi ha al llarg de l'esmentada ruta. El coneixement sobre l'ús d'aquests llocs és fonamental per determinar la seva importància relativa per al Becplaner. L'objectiu d'aquest article és explorar i comparar l'ús que fa el Becplaner de les zones humides que hi ha a la costa basca (Txingudi i Urdaibai) durant el període de pas postnupcial. Amb aquest objectiu es van prendre dades durant el període de pas de 2012 i 2013 mitjançant l'aplicació d'un mètode de cens comú a tres punts de mostreig: la llacuna d'Orueta i els aiguamolls d'Urdaibai i Txingudi. En conjunt, Urdaibai (llacuna d'Orueta i aiguamoll) va acollir més becplaners que Txingudi. A Urdaibai, tot i això, el nombre de becplaners va variar entre zones segons l'any. La taxa d'alimentació va ser més alta a la llacuna d'Orueta el 2012. La proporció de becplaners alimentant-se, descansant o volant va variar segons la marea només en la zona (maresma d'Urdaibai) influenciada per aquest factor (en marea baixa veiem que va augmentar la proporció d'aus alimentant-se i disminuir la d'aus descansant). La durada de les parades en la migració va ser inferior a un dia en >90% dels exemplars i no va variar entre zones. Seria convenient conèixer en detall les causes que expliquen l'ús més marginal de Txingudi per part dels becplaners.

Resumen

Uso de los humedales de la costa vasca (norte de Ibèria) por la Espátula Euroasiática *Platalea leucorodia* durante la migración posnupcial

La Espátula Euroasiática es una especie amenazada en Europa, por lo que es prioritaria desde el punto de vista de la gestión y la conservación. La población del Mar del Norte migra a través de la fachada atlántica europea para alcanzar sus áreas de invernada en el suroeste de Iberia o Mauritania. Las espátulas que pasan por el norte de España se detienen para descansar y/o acumular reservas en los humedales que hay a lo largo de esta ruta. Es fundamental conocer el uso de estos sitios para determinar su importancia relativa para

la Espátula. El objetivo de este artículo es explorar y comparar el uso que hace la Espátula de los humedales que hay en la costa vasca (Txingudi y Urdaibai) durante el periodo de paso posnupcial. Para ello se tomaron datos durante el periodo de paso de 2012 y 2013 mediante la aplicación de un método de censo común a tres puntos de muestreo: la laguna de Orueta y la marisma en Urdaibai y Txingudi. En conjunto, Urdaibai (laguna de Orueta y marisma) acogió más espátulas que Txingudi. En Urdaibai, no obstante, el número de espátulas varió entre zonas según los años. La tasa de forrajeo fue más alta en la laguna de Orueta en 2012. La proporción de espátulas alimentándose, descansando o volando varió según la marea sólo en la zona (marisma de Urdaibai) influenciada por este factor (en marea baja aumentó la proporción de aves alimentándose y disminuyó la de aves descansando). La duración de las paradas en migración fue inferior a un día en >90% de los ejemplares y esto no varió entre zonas. Sería conveniente conocer en detalle las causas que explican el uso más marginal de Txingudi por las espátulas.

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