Species	AEWA population	Bern App II	Bern App III	AEWA trend	IUCN (Red List)	Comments
Recurvirostra avosetta	Western Europe & North-west Africa (bre)		X	STA?	Least concern	1% biogeographic pop.
Recurvirostra avosetta	South-east Europe, Black Sea & Turkey (bre)			DEC	Least concern	Key wintering site in EAF
Charadrius hiaticula	Northern Europe/Europe & North Africa	X		FLU	Least concern	
Charadrius alexandrinus	West Europe & West Mediterranean/West Africa	X		UNK	Least concern	1% biogeographic pop.
Pluvialis squatarola	W Siberia & Canada/W Europe & W Africa		X	DEC?	Least concern	1% biogeographic pop.
Calidris alpina	Britain & Ireland/SW Europe & NW Africa	X		DEC	Least concern	1% biogeographic pop.
Calidris alpina	Baltic/SW Europe & NW Africa			DEC	Least concern	Key wintering site in EAF
Limosa limosa	Western Europe/NW & West Africa		X	UNK	Near threatened	1% biogeographic pop.
Limosa limosa	Iceland/Western Europe			INC	Near threatened	Key stop-over site in EAF
Limosa lapponica	Northern Europe/Western Europe		X	INC	Near threatened	
Tringa totanus	Northern Europe (breeding)		X	STA	Least concern	
Tringa totanus	Britain & Ireland/Britain, Ireland, France			DEC	Least concern	
Phoenicopterus roseus	West Mediterranean		X	INC	Least concern	1% biogeographic pop.
Himantopus himantopus	SW Europe & North-west Africa/West Africa		X	STA	Least concern	One of most imp. 5 sites
Platalea leucorodia	West Europe/West Mediterranean & West Africa		X	INC	Least concern	1% biogeographic pop.
Haematopus ostralegus	Europe/South & West Europe & NW Africa		X	DEC	Near threatened	
Glareola pratincola	Western Europe & NW Africa/West Africa		X	DEC	Least concern	1% biogeographic pop.
Charadrius dubius	Europe & North-west Africa/West Africa	X		STA?	Least concern	
Pluvialis apricaria	Northern Europe/Western Europe & NW Africa		X	INC	Least concern	
Vanellus vanellus	Europe/Europe & North Africa		X	STA	Near threatened	
Calidris canutus	NE Canada & Greenland/Western Europe		X	FLU	Near threatened	
Calidris alba	East Atlantic Europe, West & Southern Africa (win)	X		INC?	Least concern	
Calidris minuta	N Europe/S Europe, North & West Africa	X		INC?	Least concern	
Calidris ferruginea	Western Siberia/West Africa	X		INC	Least concern	
Calidris pugnax	Northern Europe & Western Siberia/West Africa		X	DEC	Least concern	
Gallinago gallinago	Europe/South & West Europe & NW Africa		X	DEC/STA	Least concern	
Numenius phaeopus	Northern Europe/West Africa		X	STA?	Least concern	
Numenius phaeopus	Iceland, Faroes & Scotland/West Africa			STA	Least concern	
Numenius arquata	Europe/Europe, North & West Africa		X	DEC	Near threatened	
Tringa erythropus	N Europe/Southern Europe, North & West Africa		X	STA?	Least concern	
Tringa nebularia	Northern Europe/SW Europe, NW & West Africa		X	STA	Least concern	
Tringa ochropus	Northern Europe/S & W Europe, West Africa	X		STA	Least concern	

(Cont.) Species	AEWA pop			AEWA trend	IUCN (Red List)	Comments
Actitis hypoleucos	No info		X	No info	Least concern	
Arenaria interpres	NE Canada & Greenland/W Europe & NW Africa	X		INC?	Least concern	
Anser anser	Central Europe/North Africa		X	INC	Least concern	1% biogeographic pop.
Mareca penelope	W Siberia & NE Europe/Black Sea & Mediterranean		X	STA	Least concern	1% biogeographic pop.
Anas crecca	W Siberia & NE Europe/Black Sea & Mediterranean		X	INC	Least concern	1% biogeographic pop.
Ciconia Ciconia	Iberia & North-west Africa/Sub-Saharan Africa		X	INC	Least concern	One of most imp. 5 sites
Ixobrychus minutus	W Europe, NW Africa/Subsaharan Africa	X		STA	Least concern	One of most imp. 5 sites
Ardea purpurea	West Europe & West Mediterranean/West Africa	X		INC	Least concern	1% biogeographic pop.
Egretta garzetta	Western Europe, NW Africa	X		INC	Least concern	One of most imp. 5 sites
Sternula albifrons	Eastern Atlantic (bre)	X		DEC	Least concern	One of most imp. 5 sites

Color legend

Also breeding pop.	Decreasing	Sp. cons. concern	IBA qualifying criterion

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Perhaps the most prominent threat to waders in the East Atlantic Flyway

At the end of January 2020, as migratory waders started to prepare for their northward journey to their breeding areas, the Portuguese Authority evaluating Environmental Impact Assessments (EIA) issued a favourable statement regarding the construction of a new commercial airport at the heart of the Tagus estuary, the most important wetland in Portugal for waders and other waterbirds.

Although imposing conditions (specifically, targeted compensation measures), this decision is a major blow to local and international conservation actions across the East Atlantic Flyway. Given the potential magnitude of the impacts and the high level of site-fidelity of species studied locally[1,2], this new threat is likely to have important consequences for many of the already declining populations using the Tagus estuary[3,4]. Since reading the EIA for the first time in July 2019, we (including colleagues and fellow 'waderologists' concerned about this development) have embarked on a journey that is far from over.

The Tagus estuary is a major hub in the East Atlantic Flyway (EAF), frequently hosting 200,000 waterbirds and estimated to hold 300,000 during migratory periods[5]. This vast wetland (320 km^2) encompasses multiple habitats used by waterbirds. These include intertidal flats, salt-marshes, salt-pans and rice-fields, all of which are subject to varying levels of human intervention. A section of the Tagus estuary is protected under national (Nature Reserve) and European legislation (Special Protection Area; SPA), and is also classified as an internationally important wetland under the Ramsar Convention and other international agreements. Under the treaty on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), Portugal is responsible for the conservation of several species that have their largest concentrations at the national level in the Tagus estuary[6,7]. Most important is the Black-tailed Godwit, with tens of thousands of individuals concentrating in the SPA's rice-fields during a key stage of the annual cycle[8], when they refuel on left-over rice seeds on the way to their breeding areas[9]. However, the Tagus is also important for wintering Dunlin, Avocet and Grey Plover as well as breeding Collared Pratincole, all of which are declining on the flyway. In addition, there is a wintering

Black-tailed Godwit flock near a high-tide roost within the Tagus estuary SPA, with Lisbon in the background, on the opposite bank of the estuary (photo: Ernst Schade ©ernstschade.com).

population of Kentish Plover for which the population trend is currently unknown. All of these species meet the Important Bird and Biodiversity Area (IBA) criteria on the Tagus estuary, as it hosts more than 1% of each biogeographic population – and this is also the case for Greater Flamingo, Eurasian Spoonbill, Greylag Goose, Eurasian Wigeon, Eurasian Teal and Purple Heron[10].

Technically, the proposed new airport infrastructure, which would expand the current capacity of, and operate in tandem with, the Lisbon airport, overlaps only slightly with the boundary of the Tagus estuary SPA. However, its location on the Montijo peninsula places it in the centre of this wetland, and aircraft would fly at low altitudes over parts of the SPA and Nature Reserve during approach and take-off (Fig. 1).

In addition to the flight aviation risk, the expected levels of noise are known to disturb birds, causing displacement flights from affected sites at decibel levels starting from 50–55 dB[11,12]. Based upon a single study[11], the EIA procedure only deemed the impact relevant when 25% of birds are likely to take flight (and another 25% display altered behaviours), which is predicted to occur at 65 dB. As compensation is only required for impacts *within* the SPA, placing a second airport in the Lisbon area, at the heart of the largest wetland in the country, translates to compensation for just 11.4 km^2 of intertidal feeding areas (20% of such habitat within the SPA) and *ca.* 4.6 km^2 of high-tide roosts[5]. A rigorous assessment, applying the precautionary principle, would at least consider 55 dB as having a relevant impact, particularly with regard to the protected area, which was established to safeguard the birds using this SPA. Whatever impact criteria are considered in the environmental assessment, in practice, about half of the intertidal area of the Tagus estuary will be affected by a noise level of 55 dB (Fig. 1), making it impossible to compensate impacts, even if the remaining intertidal was pressure free. Unfortunately, this is only one of the several limitations of the EIA, all of which were reported to the Portuguese Environmental Agency during the public consultation stage, with little to no effect.

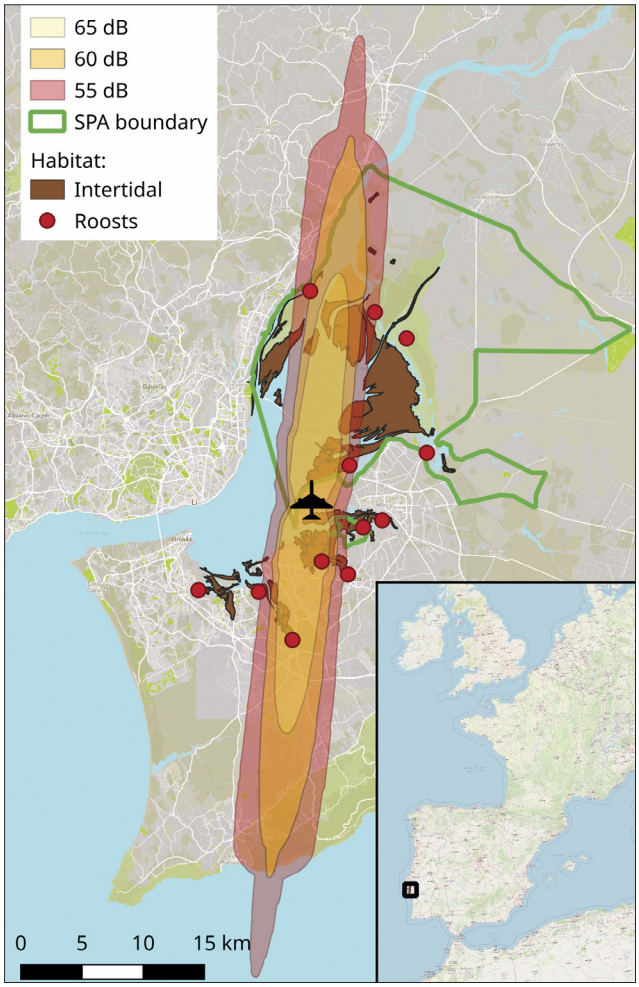

Fig. 1. Noise cone projection for the proposed new Lisbon airport located in the Montijo peninsula (aircraft icon), as reported in the EIA, given the orientation of the single runway and flight patterns (e.g. jet aircraft type, altitude). Three decibel levels are depicted from 55 dB (with reported effects on birds, including displacement flights) to 65 dB (when up to 50% of birds show abnormal behaviour)[11]; only the latter is considered as requiring compensation for impacts on habitats affected within the SPA boundaries (figure: Joshua Nightingale).

[1]Catry, T., J.A. Alves, J.A. Gill, T.G. Gunnarsson & J.P. Granadeiro. 2012. Sex promotes spatial and dietary segregation in a migratory shorebird during the non-breeding season. *PLOS ONE* 7: e33811.
[2]Lourenço, P.M., J.A. Alves, J. Reneerkens, J. Loonstra, P.M. Potts, J.P. Granadeiro & T. Catry. 2016. Influence of age and sex on winter site fidelity of sanderlings *Calidris alba*. *PeerJ* 4: e2517.
[3]Catry, T., J.A. Alves, J. Andrade, H. Costa, M.P. Dias, P. Fernandes, A. Leal, P.M. Lourenço, R.C. Martin, F. Moniz, S. Pardal, A. Rocha, C.D. Santos, V. Encarnacao & J.P. Granadeiro. 2011. Long-term declines of wader populations at the Tagus estuary, Portugal: a response to global or local factors? *Bird Conservation International* 21: 438–453.
[4]Lourenço, P.M., H. Alonso, J.A. Alves, A.T. Carvalho, T. Catry, H. Costa, J.S. Costa, M.P. Dias, V. Encarnação, P. Fernandes, A.I. Leal, R. Martins, F. Moniz, S. Pardal, A.D. Rocha & C.D. Santos. 2018. Monitoring waterbird populations in the Tejo estuary, Portugal: report for the decade 2007–2016. *Airo* 25: 3–31.
[5]Comissão de Avaliação. 2019. Processo de Avaliação de Impacte Ambiental n.º 3280. Aeroporto do Montijo e Respetivas Acessibilidades. *Parecer da Comissão de Avaliação*. [In Portuguese]
[6]Alves, J.A., M. Dias, A. Rocha, B. Barreto, T. Catry, H. Costa, P. Fernandes, B. Ginja, K. Glen, J. Jara, R. Martins, F. Moniz, S. Pardal, T. Pereira, J. Rodrigues & M. Rolo. 2011. Monitoring waterbird populations on the Tagus, Sado & Guadiana Estuaries: 2010 report. *Anuário Ornitológico* 8: 118–133.
[7]Alves, J.A., P.M. Lourenço, M.P. Dias, L. Antunes, T. Catry, H. Costa, P. Fernandes, B. Ginja, J. Jara, R. Martins, F. Moniz, S. Pardal, T. Pereira, M.J. Rainho, A. Rocha, J.C. Rodrigues & M. Rolo. 2012. Monitoring waterbird populations on the Tejo, Sado and Guadiana estuaries, Portugal: 2011 report. *Anuário Ornitológico* 9: 66–87.

Of the many aspects imposed by this imminent threat that are difficult to grasp[13,14], two have particular relevance in the international arena. First, how can the board of the Institute for Nature Conservation and Forestry (the Portuguese authority for nature conservation), which is tasked with upholding international agreements and European regulations, agree that compensation is only required when at least 50% of the birds present display abnormal behaviour (with half of those taking flight). Why isn't this subjective criterion set at 10% or 0%, particularly given that only the SPA area is considered? It is surprising to note that, despite several tools being in place (e.g. Birds Directive) and international treaties being signed by range states (e.g. Ramsar, AEWA), not even large and internationally important protected areas in EU countries are secure. Conservation seems to be a battle just aimed at gaining a little bit more time.

Second, there is no consideration of the consequences of increasing disturbance on nearly half of the intertidal area of the Tagus estuary (20% of which is within the SPA and is currently particularly undisturbed compared to the remainder of the estuary), as well as increasing disturbance at several high-tide roost sites (Fig. 1). The commitments outlined in the Convention on Migratory Species, of which Portugal is signatory, cannot simply be ignored. Portugal has an obligation to its fellow states with whom it shares the responsibility to conserve and manage the migratory species it has the privilege to host. Countries investing in the conservation of species and populations that use the Tagus estuary may see their efforts go to waste, if this new disturbance depresses habitat quality with subsequent effects on demographic rates. Effectively managing and protecting migratory populations implies an integrated international approach and parties must hold each other accountable.

If the proposed commercial airport is placed in the Tagus estuary, we may witness unprecedented levels of 'invisible' habitat loss at a major site of the EAF. The subterfuge of *technically* not overlapping the SPA on the ground, while impacting it 'only' above ground, equates to ignoring the fact that birds move through the air. Of the proposed compensation measures, only two are directly aimed at wader habitat: (1) acquire and manage salt-pans in an area equal to that affected by noise levels of at least 65 dB within the SPA; and (2) 'recognize' one of the estuarine islands as roosting and feeding area for waterbirds. These proposed measures will not compensate even the impacts considered, because: (1) the largest area affected by noise is the intertidal wader foraging habitat (*ca.* 2.5 times larger than the high-tide roost), and therefore exclusively managing salt-pans, which operate mostly as high-tide roosts, will not replace the functional role of the impacted intertidal; and (2) the island to be 'recognized' has an area of only 3.9 km^2 and approximately half of it is under the influence of noise cones at 55 dB.

At a time when (human) air travel is at an unprecedented standstill, the international connectivity that migratory waders sustain is even more noticeable. However, and despite the reported issues by struggling airline companies and the dramatic reduction in commercial flights across the globe, in June the Portuguese Prime Minister and again in July the Minister of Infrastructures, have reiterated the intention to move forward with the new Lisbon airport as soon as possible. At the national level, the Portuguese Birdlife Partner, Sociedade Portuguesa para o Estudo das Aves, together with other environmental NGOs, has formally requested that the EIA procedure is assessed, arguing that it is invalid. Nevertheless, as we celebrate the 50th anniversary of our international group, we should also endeavour to stop perhaps the most prominent threat to the EAF.

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