



Challenges and opportunities for transboundary conservation of migratory birds in the East Asian-Australasian flyway

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Introduction

In October 2017, government delegates from over 120 countries convened at the 12th Conference of the Parties of the Convention on the Conservation of Migratory Species (the Bonn Convention) (CMS 2017). This is the first time the conference was held in Asia, the region with the fewest state parties (Caddell 2005). In contrast to Europe, Africa, and the Americas, where majority of countries are now signatories, only the Philippines has ratified the Convention in the East and Southeast Asian region. Yet, this part of the world overlaps with the migratory routes of over 700 bird species (Kirby et al. 2008), supports one-third of the global human population, and harbors a great diversity of languages, legal frameworks, and socioeconomic conditions. Although Asia's lack of representation in the Bonn Convention poses a major impediment to migratory bird conservation, many opportunities exist to advance migratory bird conservation work in this complex region.

Threats to Migratory Birds

The East Asian-Australasian Flyway (EAAF) (Fig. 1) is 1 of 4 globally recognized flyways for migratory waterbirds (Boere & Stroud 2006). Stretching from the Russian tundra to New Zealand's coasts, this flyway overlaps with 37 countries (BirdLife International 2010). Besides waterbirds, the EAAF is used by many species of migratory landbirds, including by more migratory species on the International Union for Conservation of Nature's Red List than any other flyway (15 songbirds, 1 bustard, and 4 birds of prey) (Yong et al. 2015). Threats faced by migratory species in the EAAF are multiple, complex, and formidable. Although hunting imperils some species, such as the Spoon-billed Sandpiper (*Calidris pygmaea*) and Baer's Pochard (*Aythya baeri*) (Figs. 1b & 1c) (Zöckler et al. 2010; Hearn et al. 2013), habitat loss remains a significant driver of decline for many waterbirds. The intertidal flats of the Yellow Sea that span the coasts of China and the Koreas contain critical staging

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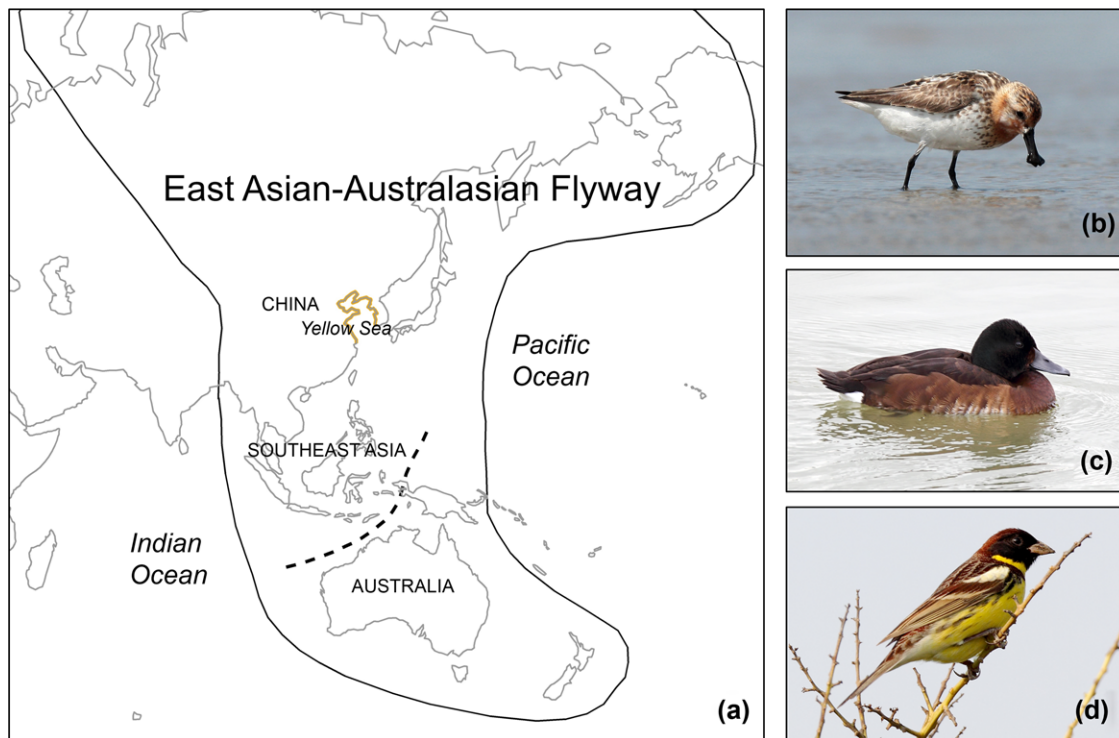


Figure 1. The (a) extent of the East Asian-Australasian Flyway (solid line) (dotted line, southeasterly migratory endpoints of most landbird species), (b) critically endangered Spoon-billed Sandpiper (*Calidris pygmaea*), (c) critically endangered Baer's Pochard (*Aythya baeri*), and (d) critically endangered (recently uplisted) Yellow-breasted Bunting (*Emberiza aureola*).

areas used by most EAAF shorebird populations (Barter 2002; MacKinnon et al. 2012). Yet, these areas are threatened by industrial-scale reclamation, especially on the Jiangsu Coast (Piersma et al. 2017). By the 2010s, over 65% of the 1.1 million ha of tidal flats present in the 1950s had been lost (Murray et al. 2014), and many shorebird taxa reliant on the Yellow Sea are estimated to have declined an average of 5.2% annually (Studds et al. 2017). Invasive plant species (e.g., smooth cordgrass [*Spartina* spp.]) spreading into intertidal flats has hastened the pace of habitat loss (Li et al. 2009). Likewise, the loss of coastal wetlands continues unabated across Southeast Asia, especially where agricultural expansion (Richards & Friess 2016), aquaculture expansion (Iqbal & Hasudungan 2012), sand mining (Strangio & Sokheng 2010), and coastal reclamation projects are planned or ongoing (e.g., Corrales 2013), all of which further threaten wintering waterbird habitat.

Compared with waterbirds, the threats landbirds face are even less understood. Habitat loss has been hypothesized to be a driver of decline for forest-dependant migrants such as flycatchers and thrushes overwintering in Southeast Asia (Yamamura et al. 2009). Evidence from temperate Asia reveals that many migratory passerine populations have declined even though there has been little habitat loss in their breeding grounds (Higuchi

& Morishita 1999; Tamada et al. 2014). Recent studies now show that hunting is a major threat to many migratory landbirds. The dramatic decline of the Rustic (*Emberiza rustica*) and Yellow-breasted buntings (*Emberiza aureola*) (Fig. 1d) provides classic examples of how unsustainable trapping for food and religious releases in Southeast Asia and southern China can affect even widespread and common migratory species (Gilbert et al. 2012; Kamp et al. 2015; Edenius et al. 2017).

Given knowledge of existing threats, research priorities in the EAAF should concentrate on 3 strategic directions. First, there is a need to monitor population trends of migratory species regionally with standardized and coordinated methods so that robust data sets can be obtained for assessment. Output from monitoring work should then feed into frameworks for implementing management and policy interventions tied to defined triggers (Lindenmayer & Likens 2010). Second, more ecological research on threatened species focusing on their migratory routes, stopovers, and habitat connectivity is needed (Hewson et al. 2016). Third, situation analyses are needed to understand how socioeconomic and cultural dimensions of threats such as hunting affect migratory species and how conservationists can better engage with stakeholders (e.g., Brochet et al. 2016).

Challenges and Opportunities

The foremost challenge in conserving migratory birds is the fact that their annual cycles spatially link sites and habitats across the breeding, passage and staging, and wintering grounds (Szabo et al. 2016a). However, a global analysis of important bird areas shows that the current extent of protected areas is adequate for only 9% of 1451 migratory bird species across all stages of their annual cycle (Runge et al. 2015). Habitat loss at some staging sites or the loss of key sites can thus severely affect flyway populations of migratory species (Studds et al. 2017). Additionally, the wintering distributions of many threatened species in Asia remain poorly known (e.g., Rufous-headed Robin [*Larvivora ruficeps*]), which hampers efforts to conserve them (Zhao et al. 2017).

To overcome these challenges, intergovernmental co-operation and coordinated action is needed (Runge et al. 2015; Szabo et al. 2016b). Currently, the Bonn Convention, through its agreements and memoranda of understanding, is the leading multilateral platform for coordination of conservation across countries (Caddell 2005). However, the scope of regional cooperation within the EAAF remains limited because there are only 7 Party states. Such gaps may be partially addressed by other multilateral instruments or existing bilateral migratory-bird agreements (Scott 1998). That the Conference of the Parties of the Bonn Convention took place in Asia this year (CMS 2017) and is expected to do so again in 2020 presents crucial windows of opportunity to showcase to regional governments how this international instrument can strengthen migratory species conservation. Complementing the Bonn Convention are regional initiatives that link government and civil society organizations, thus strengthening transboundary cooperation. The East Asian-Australasian Flyway Partnership and the Arctic Migratory Bird Initiative are 2 such initiatives that, by prioritizing migratory taxa, have mobilized resources and political support to drive establishment of working groups focused on threatened species, illegal hunting, and regional networking (Johnston et al. 2015; EAAFP 2017).

Within the EAAF, there is also considerable scope to conserve migratory birds at the national level. Efforts to conserve migratory birds in China will have the greatest impact because it is the single largest country in the flyway and contains diverse conservation pressures (Zhang et al. 2017). Currently, 1.39 million ha (approximately 23.99%) of coastal wetlands in China receive some protection (The Paulson Institute et al. 2016; Zhang et al. 2017), and policies (including China's 13th Five-Year Plan and the Ecological Protection Red Line) are in place to further strengthen this protection. With government support, efforts to nominate a network of coastal sites around the Yellow Sea as World Heritage Sites are underway (UNESCO WHC 2017a), paralleling a similar effort in South Korea (UNESCO WHC 2017b). The State Forest Adminis-

tration has also strengthened the enforcement of wildlife protection laws to address illegal hunting of migratory birds (Shang 2016). Indonesia, where the migratory end-points of many species overlap (Yong et al. 2015), saw the recent establishment of a national multi-stakeholder partnership to advance conservation efforts for migratory birds (Ministry of Environment and Forestry, Republic of Indonesia 2017). Collectively, these developments may provide the momentum to drive similar efforts across the EAAF.

As key migratory bird habitat continues to be lost, there is an increasing urgency to conserve what is left. An exigency for migratory bird conservation is for governments to recognize that the ecology of migratory species differs from non-migratory species and thus different planning and prioritization approaches are required. Because biodiversity conservation in Southeast Asia has traditionally prioritized charismatic mammals, forest-dwelling, or endemic species (e.g., Sodhi et al. 2010), there is a need to assess how legislation and protected-area networks established for these can also benefit migratory species. Additionally, increased participation and commitment of EAAF countries to intergovernmental treaties or bilateral agreements will be critical next steps in strengthening transboundary collaboration to conserve migratory birds (e.g., Szabo et al. 2016b), which in turn needs to be backed by active research and standardized monitoring work.

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Literature Cited

- Barter MA. 2002. Shorebirds of the Yellow Sea: importance, threats and conservation status. Wetlands International global series 9. International Wader Studies 12. Wetlands International, Canberra.
- BirdLife International. 2010. Spotlight on flyways. BirdLife International, Cambridge, United Kingdom. Available from <http://www.birdlife.org/datazone> (accessed September 2017).
- Boere GC, Stroud DA. 2006. The flyway concept: what it is and what it isn't. Pages 40–47 in Boere GC, Galbraith CA, Stroud DA, editors. Waterbirds around the world. The Stationery Office, Edinburgh.
- Brochet AL, et al. 2016. Preliminary assessment of the scope and scale of illegal killing and taking of birds in the Mediterranean. Bird Conservation International 26:1–28.
- Caddell R. 2005. International law and the protection of migratory wildlife: an appraisal of twenty-five years of the Bonn Convention. Colorado Journal of International Environmental Law and Policy 16:114–156.
- Corrales N. 2013. Environmental groups oppose proposed Manila Bay reclamation project. The Philippine Inquirer, 18 November 2013.

- CMS (Convention on the Conservation of Migratory Species of Wild Animals). 2017. Convention on the conservation of migratory species of wild animals. CMS, Bonn, Germany. Available from <http://www.cms.int/en/legalinstrument/cms> (accessed September 2017).
- EAAFP (East Asian-Australasian Flyway Partnership). 2017. The partnership. EAAFP, Incheon. Available from <http://www.eaaflyway.net/about/the-partnership/> (accessed September 2017).
- Edenius L, Choi CY, Heim W, Jaakkonen T, De Jong A, Ozaki K, Roberge JM. 2017. The next common and widespread bunting to go? Global population decline in the Rustic Bunting *Emberiza rustica*. *Bird Conservation International* **27**:35–44.
- Gilbert M, Sokha C, Joyner PH, Thomson RL, Poole C. 2012. Characterizing the trade of wild birds for merit release in Phnom Penh, Cambodia and associated risks to health and ecology. *Biological Conservation* **153**:10–16.
- Hearn R, Tao X, Hilton G. 2013. A species in serious trouble: Baer's Pochard *Aythya baeri* is heading for extinction in the wild. *BirdingAsia* **19**:63–67.
- Hewson CM, Thorup K, Pearce-Higgins JW, Atkinson PW. 2016. Population decline is linked to migration route in the Common Cuckoo. *Nature Communications* **7**:12296.
- Higuchi H, Morishita E. 1999. Population declines of tropical migratory birds in Japan. *Actinia* **12**:51–59.
- Iqbal M, Hasudungan F. 2012. The rapid decline of the Black-headed Ibis *Threskiornis melanocephalus* in Indonesia. *BirdingAsia* **18**:72–75.
- Johnston V, et al. 2015. Arctic migratory birds initiative (AMBI): workplan 2015–2019. Conservation of Arctic Flora and Fauna, Akureyri.
- Kamp J, et al. 2015. Global population collapse in a superabundant migratory bird and illegal trapping in China. *Conservation Biology* **29**:1684–1694.
- Kirby JS, Stattersfield AJ, Butchart SH, Evans MI, Grimmett RF, Jones VR, O'Sullivan J, Tucker GM, Newton I. 2008. Key conservation issues for migratory land- and waterbird species on the world's major flyways. *Bird Conservation International* **18**:49–73.
- Li B, et al. 2009. *Spartina alterniflora* invasions in the Yangtze River estuary, China: an overview of current status and ecosystem effects. *Ecological Engineering* **35**:511–520.
- Lindenmayer DB, Likens GE. 2010. The science and application of ecological monitoring. *Biological Conservation* **143**:1317–1328.
- MacKinnon J, Verkuil YI, Murray N. 2012. IUCN situation analysis on East and Southeast Asian intertidal habitats, with particular reference to the Yellow Sea (including the Bohai Sea). Occasional paper of the IUCN Species Survival Commission 47. International Union for Conservation of Nature, Gland, Switzerland.
- Ministry of Environment and Forestry, Republic of Indonesia. 2017. Keputusan Direktur Jenderal: Kemitraan Nasional Konservasi Burung Bermigrasi dan Habitanya. Kementerian Lingkungan Hidup dan Kehutanan Direktorat Jenderal—Konservasi Sumber Daya Alam dan Ekosistem.
- Murray NJ, Clemens RS, Phinn SR, Possingham HP, Fuller RA. 2014. Tracking the rapid loss of tidal wetlands in the Yellow Sea. *Frontiers in Ecology and the Environment* **12**:267–272.
- Piersma T, Chan Y-C, Mu T, Hassell CJ, Melville DS, Peng H-B, Ma Z, Zhang Z, Wilcove DS. 2017. Loss of habitat leads to loss of birds: reflections on the Jiangsu, China, coastal development plans. *Wader Study* **124**:93–98.
- Richards DR, Friess DA. 2016. Rates and drivers of mangrove deforestation in Southeast Asia, 2000–2012. *Proceedings of the National Academy of Sciences of the United States of America* **113**:344–349.
- Runge CA, Watson JE, Butchart SH, Hanson JO, Possingham HP, Fuller RA. 2015. Protected areas and global conservation of migratory birds. *Science* **350**:1255–1258.
- Scott DA. 1998. Global overview of the conservation of Arctic migratory breeding birds outside the Arctic. Wetlands International Publication 45. CAFF technical report 4. Conservation of Arctic Flora and Fauna, Akureyri.
- Shang WB. 2016. Resolute action on illegal hunting of migratory birds gain momentum. State Forestry Administration, The People's Republic of China. Available from <http://www.forestry.gov.cn/main/146/content-914424.html> (accessed September 2017).
- Sodhi NS, Posa MRC, Lee TM, Bickford D, Koh LP, Brook BW. 2010. The state and conservation of Southeast Asian biodiversity. *Biodiversity and Conservation* **19**:317–328.
- Strangio S, Sokheng V. 2010. Sand exports go on unabated. The Phnom Penh Post, 11 May 2010.
- Studds CE, et al. 2017. Rapid population decline in migratory shorebirds relying on Yellow Sea tidal mudflats as stopover sites. *Nature Communications* **8**:14895.
- Szabo JK, Battley PF, Buchanan KL, Rogers DI. 2016a. What does the future hold for shorebirds in the East Asian-Australasian Flyway? *Emu* **116**:95–99.
- Szabo JK, Choi CY, Clemens RS, Hansen B. 2016b. Conservation without borders—solutions to declines of migratory shorebirds in the East Asian-Australasian Flyway. *Emu* **116**:215–221.
- Tamada K, Tomizawa M, Umeki M, Takada M. 2014. Population trends of grassland birds in Hokkaido, focusing on the drastic decline of the Yellow-breasted Bunting. *Ornithological Science* **13**:29–40.
- The Paulson Institute, The Convention on Wetlands Management Office of the People's Republic of China, The Institute of Geographical Science and Natural Resources Research of the Chinese Academy of Sciences. 2016. Blueprint of coastal wetland conservation and management in China. The Paulson Institute, Chicago, Illinois. Available from <http://www.paulsoninstitute.org/wp-content/uploads/2016/08/Wetland-Report-EN-Final.pdf> (accessed October 2017).
- UNESCO WHC (UN Educational, Scientific and Cultural Organisation World Heritage Convention). 2017a. The Coast of the Bohai Gulf and the Yellow Sea of China. UNESCO, Paris.
- UNESCO WHC (UN Educational, Scientific and Cultural Organisation World Heritage Convention). 2017b. Southwestern coast tidal flats. UNESCO, Paris.
- Yamaura Y, Amano T, Koizumi T, Mitsuda Y, Taki H, Okabe K. 2009. Does land-use change affect biodiversity dynamics at a macroecological scale? A case study of birds over the past 20 years in Japan. *Animal Conservation* **12**:110–119.
- Yong DL, Liu Y, Low BW, Espanola CP, Choi CY, Kawakami K. 2015. Migratory songbirds in the East Asian-Australasian Flyway: a review from a conservation perspective. *Bird Conservation International* **25**:1–37.
- Zhang L, et al. 2017. Formulating a list of sites of waterbird conservation significance to contribute to China's Ecological Protection Red Line. *Bird Conservation International* **27**:153–166.
- Zhao M, Alström P, Hu R, Zhao C, Hao Y, Lei F, Qu, Y. 2017. Phylogenetic relationships, song and distribution of the endangered Rufous-headed Robin *Larvivora ruficeps*. *Ibis* **159**:204–216.
- Zöckler C, Syroechkovskiy EE, Atkinson PW. 2010. Rapid and continued population decline in the Spoon-billed Sandpiper *Eurynorhynchus pygmeus* indicates imminent extinction unless conservation action is taken. *Bird Conservation International* **20**:95–111.