

Further records and updates of range expansion in *House Crow Corvus splendens*

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Received 31 May 2015

SUMMARY.—House Crow *Corvus splendens* continues its ship-assisted global invasion, reaching locations further from its native range in the Indian Subcontinent. This report reviews the species' recent spread as well as changes in the status of existing introduced populations where information is available. With the collapse of long-standing eradication programmes in Kenya and Tanzania, and a spread to inland sites in both countries, it is inevitable that House Crows will colonise the heart of Africa. In South and East Asia too, the species is spreading unobstructed through the region. Nevertheless, there is now a growing recognition of the threats of invasive alien species in general, including House Crow, and a willingness by some authorities and funding bodies to prevent the species' proliferation. As a result, control programmes are now in operation at several locations where House Crows have established, and increasingly proactive approaches involving risk assessments, surveillance and action plans are being developed where a risk of invasion exists.

Native to the Indian Subcontinent, southern Iran, Myanmar and western Yunnan (China), House Crow *Corvus splendens* has, over the past century or so, shown itself to be an invasive alien species (IAS) that is progressively spreading globally. Initially, the spread was mediated by deliberate releases in Aden (Yemen), Zanzibar and Klang (Malaysia) as of the late 1800s, for the purpose of dealing with refuse and crop pests. However, this was soon superseded by ship-assisted range expansion, at first within the Red Sea, Indian Ocean and its islands, probably via ships from Mumbai and Colombo, but also from ports including Aden and Suez, which possess large House Crow populations.

House Crow is now widely recognised as an invasive species, introduced populations of which have serious adverse impacts on native birds and other small fauna through intensive predation, harassment of raptors and other larger avifauna (Ryall 1992a), crop raiding, predation of smaller livestock and as potential vectors of human pathogens (Ryall 1992b). The pest status of House Crows and related information are provided in detail in the CABI Invasive Species Compendium (CABI undated).

This report is the fifth review of the species' global expansion (see Ryall 1994, 1995, 2003, 2010) and presents new locations and significant changes of status of existing introduced populations.

Europe

Republic of Ireland.—A House Crow, the second for the country, was reported in the busy port of Cork on 5 September 2010. It was suggested by S. Dymond of the Port of Cork Company that it may have originated from the Hoek of Holland population as 5–6 ships make the 30-hour voyage from Rotterdam to Cork each week. The bird remained in the area and scavenged mainly around the local burger joint, sometimes being fed by passersby (RM). It also associated with Jackdaws *C. monedula* and Rooks *C. frugilegus*, as do House

Crows in Hoek van Holland. It was last reported on 21 July 2012 (BGS) and, as it attracted considerable attention among the birdwatching fraternity, was widely photographed.

UK.—A suspected House Crow was recorded (heard and distant view) in Belfast, Co. Antrim, (Birdguides 2012) on 5 January 2012, but was not observed again. This is at least the fourth unconfirmed report of the species in the UK.

Netherlands.—The population in Hoek of Holland has grown steadily to c.35 birds since the arrival of a pair in 1994. In 2012, following a risk assessment of potential negative impacts if left to proliferate (Slaterus *et al.* 2009), the government decided to eradicate the population. As of April 2015, 26 had been killed with an estimated five, now very wary, birds remaining (GO). Since their establishment in the Hoek van Holland, there has been evidence of a small number of additional arrivals (Ottens & Ryall 2003), reinforced in May 2012 by the appearance of a very pale grey-hooded bird at Hoek of Holland (GO) resembling *C. s. zugmeyer*, which race is native to Pakistan and south-east Iran, and is now widely established in parts of the Arabian Gulf. The founding pair and subsequent population there have all had the darker hood characteristic of nominate *splendens*. Two or three House Crows were seen in a residential part of The Hague in July 2012, but they were considered to be unrelated to the short-lived population present in the nearby Park Ockenburg in 2004 (WvY).

Cyprus.—One, the first for the island and the east Mediterranean region, was photographed on 19 September 2011 near the entrance to Zafer Burma Monastery, Apostolos Andreas, on the Karpas Peninsula (CR).

Middle East

The publication of *The atlas of breeding birds of Arabia* (Jennings 2010) provides an unrivalled account of the distribution of the species in the Arabian Peninsula, and reveals its continued spread through the coastal areas of the Gulf States, to most towns along the Yemeni coast, and along the Red Sea coast of Saudi Arabia. A control programme has been initiated in Jeddah, Saudi Arabia (Felemban 2011), and also at locations in the Arabian Gulf.

Turkey.—Four, the first record for the country, were seen in flight and giving characteristic calls near Çannakale, on the Dardanelles, which is a busy shipping route, on 23 June 2015 (JH). They may well have originated from the population at Suez, Egypt. As the majority of ship-assisted introductions involve only one or two birds, the presence of four together indicates that a breeding population may have established in the Çannakale area.

Africa

Benin.—A single was first seen on 6 February 2010 in the gardens of the Presidency of Cotonou, just 500 m from Cotonou harbour (Demey 2010, Portier & Plomp 2014), where it was chased by a pair of Pied Crows *C. albus*. It was seen repeatedly over the next ten months and photographed. The bird was seen again on 16 September 2010 and subsequently, when it was again photographed (Demey 2011a,b). This is the first record for West Africa and anywhere on the Atlantic coast of the continent.

Kenya.—For more than 40 years the sparsely populated and arid Tsavo region has served as a barrier to the House Crow's spread inland by the massive populations in Mombasa and other parts of the coastal strip (Ryall 1992b, 2010). House Crows have, until recent years, been restricted to the Kenyan coast, penetrating only c.60 km along the Nairobi road from Mombasa. However, in the past five years or so, House Crows have been seen at sites much further inland. In 2011 c.10 were observed at Voi, approximately 160 km from

Mombasa, and, by December 2013, TI reported that this breeding population had grown to > 100. The species was also seen at Mtito Andei in 2011 (FR), 50 km nearer Nairobi, and one at Makindu (BF), 50 km closer still, while a month later 11 were counted (TI). Their presence in Makindu makes the establishment of a breeding population in Nairobi just a matter of time. A long-standing eradication programme in Malindi, a large coastal town north of Mombasa, which had reduced the number of House Crows to 30–40, had to be discontinued in 2005/06 due to a lack of availability of Starlicide, the most effective avicide (CJ). By 2010 the population had recovered to 2,200 birds.

Tanzania.—The highly successful eradication programme operating in Dar-es-Salaam and environs, which had destroyed some 1.2 million House Crows since its inception, collapsed in 2013 due to problems over funding (TBA 2015). In the subsequent two breeding seasons, the House Crow population has bounced back to a level that is likely to drive their spread inland with renewed vigour.

Namibia.—One, undoubtedly ship-assisted, near the entrance to Walvis Bay on 3 June 2011, is the first record for Namibia. A lone individual was also reported in May 2014 at Walvis Bay waterfront and again in late November (Demey 2015). Despite a period of three years between these records, it is probable that they relate to a single bird remaining in the area, but that interested reporters were absent (TH). In view of the reduction of the Durban and Cape Town populations in recent years, the bird probably originated not from nearby South Africa but rather from East Africa, the Arabian Peninsula or even the Indian Subcontinent.

Mozambique.—According to CB, House Crows have continued to increase their range and now occupy six port cities (from north to south, Pemba, Nacala, Quelimane, Beira, Maputo and Matola). In Maputo, though first reported there in 1976 (Ryall 2002), they remain largely restricted to the Sommerschield area, close to the seashore, where the population density is high (GA). Distribution in the city is currently being mapped as an adjunct to a control programme, which will then serve as a model to be replicated in other affected cities in Mozambique (CB).

South Africa.—A control programme in Durban has significantly reduced the species and it may be extirpated (DA). The main centre of population is currently at Richard's Bay, 200 km north of Durban, where control measures have now been implemented. In Cape Town, where numbers have also been reduced significantly, House Crows are now centred in the area of Khayelitsha and the international airport (sabap2.adu.org.za), and the long-standing control programme continues. In addition, a lone House Crow was recorded at the port of East London in the Eastern Cape on 15 June 2010 (Demey 2010).

Madagascar.—On 1 January 2014, two House Crows, the first reported in the country, were found in the harbour of Toamasina (Linders & Langrand 2014). Further investigation revealed at least 15 roosting communally in trees near the seashore. Fortunately, the serious potential risk to the unique fauna and fragile economy of this impoverished country of allowing the species to establish, has been quickly recognised. Island Conservation and Asity, the BirdLife International partner, are working with a pest control company to eradicate the incipient population (BW).

Indian Ocean Islands

Chagos Islands (British Indian Ocean Territory).—Two have been present on Diego Garcia since the early 2000s (Ryall 2010) and were seen periodically until February 2011 (Carr 2011). On 19 September 2012, a further individual was seen at the populated western end of the island, while the other two remained in an uninhabited forested area in the east and, uncharacteristically for the species, have never visited the area where human inhabitants

are based (Carr 2014). No breeding seems to have occurred despite a pair on the island for more than a decade, but the arrival of the additional bird may change this situation.

East Asia and Australia

South Korea.—A single, the first record for the country, was seen on Mungab Island on 7 May 2010 (Birds Korea 2010). It was subsequently fed and photographed by multiple observers until at least 25 June, with photographs posted at Birds Korea. Given the proximity of the island to busy shipping lanes and Incheon Port, it is probable that this individual's arrival was ship-assisted.

Malaysia.—The population in Kota Kinabalu, Sabah, first reported in 1997 but which numbered only *c.*4 birds by 2006 (Ryall 2010), had increased to at least 15 by April 2013 (CRy), centred mainly around the fish market and adjacent seafront.

Vietnam.—Six were observed on 14 December 2013 by TC in the vicinity of beach restaurants at Vung Tau, *c.*60 km south-east of Ho Chi Minh (Robson 2014), and close to the main shipping route passing into this major port. This is the first report for this country and the number involved suggests breeding has occurred.

Indonesia.—Following the report of a single at Belawan, on Sumatra, in 1998 (Ryall 2002), three were seen on 28 September 2005, one on 1 October 2005 and another on 25 November 2012 (van Balen *et al.* 2013). Though a small population seems to have persisted for ten years, it is surprising that it has not grown significantly, especially in view of the burgeoning population across the narrow Straits of Malacca in Peninsular Malaysia.

Australia.—On 12 October 2010, a lone House Crow was seen at Flying Fish Point, Innisfail in far northern Queensland, which is *c.*30 km north of the international shipping docks at Mourilyan Harbour (Preston 2010). Following much public interest, the bird was killed in December 2011, in line with official policy on preventing the species' establishment in the country. Although House Crows have arrived regularly over the past century, this record from north-east Australia is unusual as the majority have been in the west and south-east, reflecting the main concentrations of ship traffic.

The Americas

USA.—As reported previously (Ryall 2010), a pair was seen in late 2001 at Nokomis Beach, Sarasota, south-central Florida, and they bred successfully in 2003 with up to four being reported periodically until 2008 and again in 2012 (Greenlaw *et al.* 2014). Additionally, a lone individual was seen in the area in 2006 with two Fish Crows *C. ossifragus*. From 2009, a group of up to six was photographed in Palmetto, just 16 km north of Sarasota, which apparently relocated and disappeared from the area (BPr). B. Pranty, who has periodically monitored the two groups, is of the opinion that, in view of the distance between them, they have arisen through two separate introductions. Greenlaw *et al.* (2014) were of the opinion that they were ship-assisted introductions emanating from the large port of Tampa, as no House Crows are kept in captivity in the region.

Cuba.—The lone bird on Cayo Guillermo was first seen on 25 November 2007 by R. Ford (Kirkconnell *et al.* in prep., and not in April 2008 as reported in Ryall 2010). It was still present in mid-August 2011 (BZ). Interestingly, CK observed it on 17 March 2010 associating and probably roosting with Great Antillean Grackles *Quiscalus niger*, as did other observers on other dates.

Brazil.—In early November 2014, a single was seen by JAJ close to Guanabara Bay, near Itaboraí *c.*20 km north-east of Rio de Janeiro. This is close to a busy shipping route with the nearest port *c.*20 km away. The bird, probably nominate *splendens*, was photographed

feeding on a dead rat. This is only the second record for South America, the first being in Punta Arenas, Chile, in 1993.

Discussion

The House Crow's invasion across the globe continues with breeding populations now found at ports and coastal locations in 28 countries outside their native range, and ship-assisted arrivals of lone birds or small groups in an additional 23 countries. The rate and distance of spread from their home range is extending with increased global trade, faster ships and large introduced populations at international ports, such as Aden (Yemen), Suez (Egypt), Mombasa (Kenya) and in the Arabian Gulf, which can act as secondary points of embarkation by House Crows. As a result, there have been further transatlantic arrivals in Florida, Cuba and Brazil.

In East and South-East Asia, however, the House Crow's spread is for the most part more stepwise, in the form of overland expansion through the Thai-Malay Peninsula (Wells 2007), and shorter-range ship-assisted spread to nearby islands and mainland sites. In the past two decades Phuket (Thailand), Sumatra and Borneo have been colonised, and more recently Vietnam. With House Crows breeding in Singapore and Hong Kong, lone birds arriving in South Korea and previously in Taiwan (Ryall 2010), surely the Philippines or other sites in Indonesia or China will be next in line.

The appearance of House Crows in Cyprus in 2011 and in western Turkey in 2015 represent the first reports for the eastern Mediterranean region although, in the west, singles were reported at Gibraltar in 1991 and Tangiers 2002 (Ryall 1994, 2010). Considering the proximity of the burgeoning population at Ismailiya and Suez, northern Egypt, it would not be surprising if colonies became established at other east Mediterranean coastal sites such as Port Said, Alexandria (Egypt), Haifa (Israel) and Beirut (Lebanon). If a breeding population is left to proliferate in western Turkey it will threaten further invasion into the Near East and Europe.

Madagascar has long been a high-risk location for invasion (Ryall 1994) due to its direct shipping connections to major House Crow populations in East Africa, the Arabian Peninsula and Indian Subcontinent. The arrival of House Crows onto this large, relatively poor island would have enormous socio-economic impacts due to crop-raiding and predation of livestock, including poultry, and young sheep and goats (Ryall 1992b), of the numerous subsistence farmers. The unique biodiversity too would be greatly impacted, exacerbated by the degree of habitat fragmentation allowing House Crows, colonising human settlements, access into all but the few large remaining tracts of forest. The rapid response of the authorities to prevent this dire scenario by expediting an eradication programme and surveillance system is most encouraging.

Less hopeful is the situation on the African mainland. The spread inland of House Crows in East Africa, assisted by the collapse of control programmes in Kenya and particularly Tanzania, into the fertile, heavily populated heartland of Rwanda, Uganda and beyond, presages massive socio-economic impacts and biodiversity loss.

At the same time as House Crows are proliferating, however, there is a growing recognition of the threats posed by Invasive Alien Species (IAS) to biodiversity and national economies. Thus, action to control House Crows within their introduced range is gaining impetus. This is less due to an increased desire in affected countries to take action, which has always existed, but more an increased willingness of funding bodies to support IAS eradication programmes, something they had no appetite for 10–20 years ago.

House Crow control programmes are now operating in the Netherlands, Israel, Jeddah (Saudi Arabia), Hong Kong, Singapore, Durban, Cape Town, Richards Bay and elsewhere —

and are planned in Madagascar and Mozambique—yet long-standing programmes in Kenya and Tanzania have collapsed. Given this rise in awareness it is all the more surprising that no action has apparently been taken to tackle those in Florida.

Another positive trend is the development of more proactive strategies involving risk assessments (e.g. Slaterus *et al.* 2009, Csurhes 2010), public information, and surveillance and response systems to provide early warning and action if House Crows arrive. This approach has operated successfully for decades in Australia and for more than two decades in the Seychelles. Although it has not arrived in New Zealand, Fraser *et al.* (2015) recently modelled the species' potential distribution if it became established in that country, which will act as an excellent basis for the development of contingency plans. In the UK too, a proactive strategy involves a risk assessment, identification leaflet and action plan (NNSS undated).

There now seems little to stop House Crows from invading the heart of Africa and much of coastal South and East Asia, with potentially severe impacts on both biodiversity and local economies. However, it is probable that islands and some other locations such as Europe, the USA and Australasia, where resources are available, may be maintained free of House Crows in the long term through surveillance and periodic control measures.

Request for information

All records of new locations around the world or which update information on existing House Crow populations, including numbers, activities, food sources and possible origins with dates, would be gratefully received and can be sent via House Crow Monitor (www.housecrow.com) or to colryall@btinternet.com.

Acknowledgements

I am indebted to the contributors listed below for providing records of House Crows, either directly or via the above website. BGS = Birdguides Sightings, BF = Brian Finch, BPr = Bill Pranty, BW = Bill Waldeman, BZ = Bernard Zonfrillo, CB = Carlos Bento, CK = Chris Kehoe, CJ = Colin Jackson, CM = Clive Mann, CR = Colin Richardson, CRy = Colin Ryall, FR = Fiona Reid, GA = Gary Allport, GO = Gert Ottens, JAJ = José Almir Jacomelli, JH = Joel Horman, NB = Neil Baker, RM = Ronan McLaughlin, TC = Tony Clancy, TH = Trevor Hardaker, TI = Titus Imborna, WvY = Wim van Yperen.

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Ryall, Colin. 2016. "Further records and updates of range expansion in House Crow *Corvus splendens*." *Bulletin of the British Ornithologists' Club* 136(1), 39–45.

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