

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

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SUMMARY.—Over the last century, House Crows *Corvus splendens* have spread, primarily ship-assisted, to establish populations in 21 countries outside their native range, the Indian subcontinent. This spread is adversely impacting both humans and avifauna in the areas colonised. This paper is the fourth update on this global invasion. Though long established at many ports around the Indian Ocean, and making regular appearances in ones and twos on ships arriving in Australia, the species is now increasingly turning up in the Atlantic region, both on the east coast of the USA, in the Caribbean, and on European coasts; a breeding population has been established in Hoek van Holland since 1994. They are also extending their range in South-East Asia. Some extralimital colonies are spreading along neighbouring coastlines and overland into the interior, though their progress appears to be obstructed by arid depopulated zones such as the interior of Arabia and the Horn of Africa.

Though native to India, Pakistan, the Maldives and Sri Lanka, and Myanmar and western Yunnan, House Crow *Corvus splendens* has proved to be an invasive alien species, and is spreading progressively around the world. The first step was the deliberate release of House Crows in the late 1800s to Aden, Klang and Zanzibar, though subsequent spread has been ship-assisted. Their invasion west and south, to the Arabian Peninsula, Red Sea, East and southern Africa, Mauritius and the Seychelles, has been on ships originating from major ports in the Indian subcontinent, such as Mumbai and Colombo, but also from Aden, Suez and Zanzibar, which now possess large populations. They have also spread east throughout Malaysia and Singapore since its introduction in Klang.

Extralimital colonies usually become established from just 2–3 founder individuals which have arrived at a port, and over the course of 2–3 decades they achieve pest status as the population grows. Their adverse impacts include predation / harassment of native avifauna and livestock, food / crop theft, noise nuisance, fouling of human settlements and water tanks, and they are potential carriers of human and other animal diseases.

This paper is the fourth in a series that has reported the progressive global spread of the House Crow and provided further information on their status at sites where the species has become established (Ryall 1994, 1995, 2002). The present update draws on published records, information provided in correspondence, including in response to requests for information in journals, data sent to the House Crow Monitor website (www.housecrow.com), and a questionnaire by authorities in countries with introduced House Crow populations, issued by CR and Guntram Meier in 2007–08. Contributors' initials are given in the text and their names are presented under Contributors.

Europe

Netherlands.—The breeding population established in Hoek van Holland from a founding pair in 1994 has grown, reaching at least 11 in 2003 (Ryall 2003) and 28 by January 2008 (GO). Ottens & Ryall (2003) published a detailed review of occurrence in the

Netherlands up to 2002, including several reports of individuals many kilometres from the founder colony. Though some of these are attributable to birds from the Hoek van Holland, more distant records, e.g. from Kollummerland, Schiermonnikoog and Den Hoorn, probably represent additional ship-assisted arrivals. In 2004, a single House Crow was seen in central Rotterdam, another flew past at Bergambacht, c.20 km east of Rotterdam, and a third was at Noordwijkerhout, on the coast west of Leiden (www.birding.holland.com), perhaps suggesting spread from the founder population. In 2004 a satellite population was reported in Park Ockenburg, Den Haag, 17 km north of Hoek van Holland (Langley 2004), though the lack of recent reports (GO) suggests that this colony did not succeed.

Belgium.—On 21 May 2004, two House Crows were observed at the village of Wachtebeke, East Flanders (GO). Their closeness to several international ports, including Terneuzen (20 km distant), Vlissingen (38 km) and Oostende (60 km) suggests they arrived by ship, as the colony at Hoek van Holland is 100 km distant.

Poland.—A bird identified as a House Crow was photographed by MF on 29 April 2002 trying to take Black-headed Gull *Larus ridibundus* eggs at a fish pond at Palczowice, near Oświęcim, c.40 km west of Kraków. WS states that the record has been listed in Poland under Schedule E—‘species from captivity, as well as unintentionally introduced, which have not established self-supporting populations (unnatural occurrence)’. The bird was not recorded again and was assumed to be an escapee, though firm evidence was lacking (WS). Certainly, the fact that the location is c.500 km from the nearest coastline at Gdańsk makes it extremely unlikely that this bird arrived by ship.

Hungary.—A single was reported by FF in a car park in Budapest on 4 May 2002. It was suggested by FF that this and the Polish bird were the same bird. However, as pointed out by Ottens & Ryall (2003), this would have necessitated the bird flying a mean 50 km for six consecutive days, in a straight line, over mountainous terrain. Such behaviour seems quite out of character for a House Crow. An alternative explanation is that it was a misidentified hybrid Carrion Crow *C. c. corone* × Hooded Crow *C. c. cornix*.

Spain.—PH saw a single House Crow perched on a roof calling, at the seaside village of Parada, Cabo Fisterra, on 6 March 2004, which is close to a major shipping route to European ports. This constitutes the second report for the country.

Middle East

Israel.—In addition to the long-established population in Eilat, now numbering c.600, up to ten were seen regularly at Yotvata, 40 km to the north (OH), but according to the Yotvata Farm Office they are no longer present. Each winter, a further 200 were reported to move to Eilat from neighbouring Aqaba in Jordan and from Taba, across the border in Egypt (OH). OH suggested they might have been attracted by a greater availability of food there, in the form of crops, livestock barns and human refuse, but the movement no longer appears to be occurring. House Crows are frequently seen in Arava, north of Eilat (Roll *et al.* 2008), probably encouraged by refuse tipping in the surrounding desert. They are considered a pest in Israel, particularly due to the species' tendency to attack people eating in the open or passing close to nest sites, and control measures are being taken.

Socotra (Yemen).—A small population, peaking at 28 birds, established on Socotra in 1996 (Ryall 2002). Control measures took the form of trapping and a bounty system under which local children brought nests with young to the Socotra Conservation and Development Programme (Pitches 2009), which helped reduce the population to 13 centred on Hadibu. These were all shot by a marksman in May 2009 (OA-S). This is the second successful eradication of a breeding population, the first being in Seychelles in 1994 (Ryall

2002). Constant surveillance will be required to prevent them recolonising this biodiversity-rich island, given the regular shipping traffic from House Crow-infested Aden.

Kuwait.—A nesting pair was reported by Gregory (2004) on Kubbar Island, Kuwait's most important seabird colony. In view of the House Crow's status as a serious nest raider, control measures were planned. Gregory also mentioned reported breeding in the port of Shuwaikh, on the south side of Kuwait Bay. Despite the continued proliferation of House Crows in coastal towns and settlements throughout much of the Arabian Peninsula, the population in Kuwait remains small with, as of mid 2008, the highest recorded number being 18 (MP).

Afghanistan.—House Crow has been referred to as a vagrant to Afghanistan, e.g. Sayer & van der Zon (1981) reported one at Khowst, in eastern Afghanistan, in 1964, but evidence of residency was lacking. However, in 2002, the species was reported as uncommon at Torkham, Jalālābād, east of Kabul (Kullberg 2002).

Africa

Morocco.—A single adult seen in Tangier harbour on 25 December 2002, the first for Morocco, has been accepted by the Moroccan Rare Birds Committee (Bergier *et al.* 2005).

Egypt.—Established in Suez since the 1920s and thence along the Red Sea coast at least as far south as Quseir (Ryall 1994). The population in Suez is now large and Demey (2008) reported 3,811 leaving a single roost in July 2007. They were first reported in Sinai by Goodman & Meininger (1989), but are now established in several coastal towns there, including El Tur in the west (Robel 1996), Sharm El Sheikh in the south and Dahab on the Gulf of Aqaba (SBD). According to OH they are also present in Taba, further north on the latter coast near the border with Israel. Balmer & Murdoch (2009) reported a single House Crow just south of Sehel Island, Aswan, on 25 March 2009, which was wholly unexpected given that the main population around Suez is c.700 km to the north and the nearest populations, on the Red Sea coast, are c.200 km across desert.

Eritrea.—Present in Massawa since 1968 (Ash & Atkins 2009), but the species was not present there or elsewhere on the coast or the Dahlak Archipelago in 1962 (CM) and it was well established there and in Assab by the 1980s (Ryall 1994). YY has recently provided population estimates from these localities of 2,500–3,000 and 6,000–7,000, respectively. He also reported the birds as now present in small numbers in Tio and other small ports and on some offshore islands. House Crow roosts now number hundreds and they most probably breed on the island of Sheikh Said, 1.3 km off Massawa (EA).

Djibouti.—House Crows were first reported in Djibouti City in 1958 (Ryall 1994) and were very common by 1978, to the extent that several control campaigns have been attempted since. Ryall (2002) reported colonisation of coastal towns to the north and south. HR reports further spread to all coastal villages south to the border with Somalia, as well as the villages around Djibouti City, up to 26 km inland. Since at least 1998, the birds have reached Musha and Maskali islands, c.14 km off Djibouti port. These are important nesting sites for 15 bird species and a potential Ramsar site, and HR has observed heavy predation of chicks by House Crows during the breeding season (June–August) as well as of turtle hatchlings.

Somalia.—The Eritrea, Djibouti and Somali populations are now inter-linked and represent a serious pest problem (Redman *et al.* 2009). From the burgeoning population in the port of Berbera (Ryall 2002), they have spread to the city of Hargeysa (AJ), >100 km inland and, according to JM, have been present in the port of Bosasso since the late 1990s, which population is thought to have originated from Djibouti. AJ reports that they have now colonised almost all Somali coastal towns from Berbera west to the Djibouti border.

Of greater conservation concern is the occurrence of House Crows on the Saada Din archipelago off the north coast, close to the border with Djibouti, where the species is now frequent on the island of Jasiira Ceebaad (AJ). These islands are an important breeding area for terns, gulls and shorebirds, which could be seriously impacted by House Crows.

Kenya.—The species remains restricted to the coastal strip in Kenya, with a range similar to that described in the late 1980s (Ryall 1992b), from Msambweni in the south to Mambrui, 40 km north of Malindi, though the populations in those settlements within this range have grown substantially. However, House Crows have recently been reported on the island of Lamu in the extreme north (CJ), presumably having arrived by boat. Very large populations exist at the main human population centres around Mombasa and Malindi–Watamu. Inland, they remain restricted to c.50 km from Mombasa along the Nairobi Road. The increase is despite control programmes that operated from 1994 to 2005/6 (CJ) in Malindi–Watamu and Mombasa, which achieved major reductions in numbers at both locations, but the impetus eventually faltered due to a lack of access to the avicide, Starlicide.

Tanzania.—House Crows were first released on Zanzibar in the 1890s and by the 1970s had established in Dar es Salaam and Tanga on the mainland (Ryall 1994), where large populations are now driving the spread overland to other parts of the country. From Tanga, on the north coast, they have spread to Muheza, along the road to Segera (PN) and are in danger of reaching there and Korogwe, and thence to villages such as Kinole and Tegetero in the biodiversity rich Uluguru Mountains (CW). The first House Crow has been reported recently in Mtwara, c.300 km south of Dar es Salaam and close to the border with Mozambique (NB).

A large population now exists in Morogoro, having spread inland from the enormous population in Dar es Salaam (NB), from whence they have reached Mikumi (CW). Efforts continue to reduce the population in Dar es Salaam, where it is regarded as a serious pest and threat to native avifauna (NB). In April 2007, K. Berendse (*in* Wolstencroft 2007) reported seeing four at Dodoma airport, but these appear to have perished along with large numbers of Pied Crows *Corvus albus* during the periodic crow eradication exercise the authorities undertake there.

House Crow has a varied history on Pemba Island. On the basis of an unpublished communication from J. G. Williams in 1962, Long (1981) reported House Crows as present on Pemba, but Pakenham (1979) and subsequent visitors did not record them there. However, in mid 2007, AH reported *C. splendens* as common at Wete port, in the north of the island, roosting in the mangroves. Apparently they had been there for at least three years and have increased and spread inland to other settlements, where they are reported to take chicks of domestic fowl. AH (*in* Wolstencroft 2007) also reported a small but growing population at Chake-Chake, in the centre of Pemba, which might have come from Weshu port. J. Bishop (*in* Wolstencroft 2007) found them common at Unguja. These birds probably arrived by ship from either Zanzibar, c.50 km distant, or Tanga, c.60 km away, and present a serious threat to the island's endemics, e.g. Pemba Green Pigeon *Treron pembaensis*, Pemba Sunbird *Cinnyris pembae* and Pemba White-eye *Zosterops vaughani*. Fortunately, measures are being taken to eradicate the population. House Crows are also long established and numerous on the small island of Chumbe, off western Zanzibar (FL).

Mozambique.—House Crows have spread further since my previous reports (Ryall 1994, 2002) and were seen in Beira and Nacala in 2006 (CB).

Indian Ocean Islands

Seychelles.—Since the eradication of the breeding population in 1994 (Ryall 2002), a number of single individuals have been reported, most probably new ship-assisted arrivals

(Skerrett *et al.* 2001). As of February 2008, the last House Crow on Mahé had been shot by a police marksman (NS).

Chagos Islands (British Indian Ocean Territory).—A single was seen some years ago and by late November 2008 two were present (GM). In view of the large amount of US military ship traffic from Bahrain, Aden and Singapore to Diego Garcia, the main island, there is a high risk of further occurrences of ship-assisted House Crows in the archipelago.

Mauritius.—The long-established population continues to be centred in Port Louis, and Feare & Mungroo (1990) described the species' spread to surrounding settlements. They are also seen occasionally over forest in the south-west of the island (R. J. Safford *in* Lever 2005).

Réunion.—According to Cheke & Hume (2008), two House Crows were seen together in 2004 in the north of the island at the capital and main port, St-Denis, and were assumed to have 'hitched' a ride on a ship from Mauritius. Both were eventually shot by officers from the Forestry Department (Cheke 2008; ML) and no further House Crows have been seen on the island subsequently (AC).

Rodrigues.—Two were seen at Port Mathurin in mid 1995 (MMr) and it was reported that the local authorities, being aware of their pest status on Mauritius, intended to shoot them.

Andaman Islands.—The species' history on this archipelago is particularly interesting. As described in Ryall (1994) a deliberate introduction attempted in the 1860s, to clear refuse, failed. However, small numbers were reported in the main port, Port Blair, in 1988 (Pittie 1988). As of 2007, the population has expanded substantially and House Crows gather in large numbers at fish landing centres near the town. MC reports that House Crows are present in most urban centres in the Andamans now and they have also spread to larger settlements further north in the archipelago, at Rangat and Maya Bandarup to Diglipur on North Andaman. They are also present further south, at Hud Bay on Little Andaman (MC).

East Asia and Australia

Malaysia.—Wells (2007) provided a detailed account of the origins, status and overland spread of the House Crow from its introduction in Klang in the late 1800s to other parts of the peninsula. They colonised George Town, Pinang Island, and by 1953 had established in Butterworth on the opposite mainland. They had spread to Kulim by 1983, to the Merbok estuary by 1991, with small groups in Alor Setar by the late 1990s and on Langkawi Island by 1995. Their spread had reached Kuala Lumpur by the 1960s and the Negeri Sembilan coast and Melaka in 1972, where it is now abundant, and to Tanjung Karang and Kajang town by 1983. They reached Johor Baru from Singapore in the early 1960s and thence along the coast to Kota Tinggi by 1998. In the north they have also recently spread into Thailand.

There are also a few reports from Malaysian Borneo. In Sabah, a single House Crow was observed by an expedition of the Western Foundation of Vertebrate Zoology at an abattoir in Papar on the west coast in 1983 (Sheldon *et al.* 2001). In addition, SH reported seeing a single on three occasions in July 1997 and two on 7 August 1999 in the capital, Kota Kinabalu. Whether these birds originated from self-introduction, deliberate introduction or escape from captivity is unknown, though the first is most probable, given that the widespread population in Peninsular Malaysia would facilitate ship-assisted introduction. According to Mann (2008), these birds were erroneously reported as Slender-billed Crow *C. enca* in Smythies (1999). A local birdwatcher, AS, reports there having been several around Kota Kinabalu for 'several years'. A detailed survey of the city by CR in June 2006 revealed

only four birds—a breeding pair, a subadult and a juvenile being fed, all of which roosted in an avenue of trees close to the fish market.

Thailand.—Peters (1962) suggested that the race *C. s. insolens* in south-west Thailand might have been introduced, presumably from neighbouring Myanmar, but Lekagul & Cronin (1974) described it as a rare resident. Whether native or not, the House Crows which have recently colonised Phuket (see below) appear to be *C. s. protegatus* (CR) of Sri Lanka and south-west India, but also introduced into Malaysia and Singapore, rather than the darker *C. s. insolens* of neighbouring Myanmar. This suggests that the Phuket birds originate from the northward spread in Malaysia (Wells 2007) or, possibly, from ship-assisted introduction via Colombo. A House Crow was seen in Krabi on 5 June 2001 (BCST 2001), at least three at the Phuket recycling centre on 26 April 2003 (BCST 2003) and three in Muang District, Phuket on 5 October 2004, where a small population is now established around the municipal rubbish tip (BCST 2004). In October 2007, covering the waste had reduced the numbers at the recycling centre to one (phuketbirder.blogspot.com/2007_10_01_archive.html). In 2006, the resident population of House Crows in Phuket, seen usually around the city dump, numbered *c.*15 (BCST 2006). Two others were at Darn Sadao, Hat Yai (Songkhla), on the east coast, on 5 November 2004 (BCST 2005).

Singapore.—Peh & Sodhi (2002) observed that, prior to the 1980s, House Crows had been mainly coastal in distribution, in docklands, rivers and canals, coastal parks and on offshore islands, but in recent years had become common in urban areas. Wee (1999) attributed the recent increase to the development of new housing estates. Wells (2007) reported a record from the island of Senang in Singapore. However, numbers have now reached at least 20,000 occupying 25 roosts in tall trees, such that they have achieved pest proportions (SKL) and the authorities are undertaking a control programme. Numbers are swollen by birds arriving from neighbouring Malaysia (Wells 2007, which see for more detail). Brook *et al.* (2003) estimated the population at 130,000 birds.

Hong Kong.—Twelve House Crows were recorded in ones and twos between the mid 1970s and 1998 (Leven & Corlett 2004). Viney *et al.* (1996) noted their presence in the territory but regarded them as escaped captives. The population had clearly grown as flocks of 10–20 were seen regularly in the area (Fung 2000). Nevertheless, Carey *et al.* (2001) did not consider the species to be established in Hong Kong. M. Kilburn (pers. comm.) reported observing them regularly around the port area since late 1998. By 2004, a population of *c.*100 was present in urban Kowloon, centred on the container port and associated cargo-handling facilities (Leven & Corlett 2004), with roosts in large trees in various small city parks. The latter authors expressed concern about the threat that this rapidly growing population could eventually pose to other wildlife, such as the nearby egret, particularly as the birds were probably already too numerous to easily eradicate. The population was estimated at 200–250 in 2003 (Lee & Choi 2005). According to Lee & Chow (2007), the population numbered 210 centred mainly on Stonecutters Island, Sham Shui Po Park, Tai Hang Tung, Yau Yat Tsuen, Kowloon Tsai Park, Tung Chau Street Park, and Lai On and Lai Kok Estates. They pointed out that the control programme implemented since 2004 had dispatched 830 crows, thereby stemming the hitherto rapid population growth.

Taiwan.—VY reported that several single House Crows were seen on the island of Kinmen, west of Taiwan, near the Chinese mainland, since the first record in 1980 (Ryall 2002), but that the last record was of a single in southern Taiwan.

Australia.—In Western Australia, two House Crows were seen on Rottnest Island, off Perth, in 2006 (MM). The following year another two were seen on the Angel Platform, an offshore gas rig, and another travelled by boat the 140 km from the rig to Cape Lambert, near Port Samson in northern Western Australia (Pownall 2009), and another was present

at nearby Karratha in 2010 (MM). The birds were thought to have ridden on the rig when it was towed from Malaysia (MM). The former birds were shot in mid-December 2008 (LW) but, to date, the Karratha bird has evaded destruction (MM). In eastern Australia, a single House Crow was seen over several months from March 2008 at Dee Why in north-east Sydney (LW), but the local authority intended to shoot it.

The Americas

USA.—A pair was discovered at Nokomis, near Sarasota, Florida in late 2001. They bred in 2003 when a nest with three young was photographed (Pranty 2004), one of the birds later being electrocuted when it hit a power line. No House Crows were located during a visit to the site in early 2009 (BP), suggesting that the remaining birds had relocated or died out. In May 2008, a single House Crow was seen over eight days in coastal woodland near Johnson's Bayou at Hackberry Ridge, Louisiana (Anon. 2008) and it was suggested that due to its tameness and signs of feather wear the bird had been caged in the recent past. The coastal location suggests a ship-assisted arrival. The bird disappeared thereafter.

Cuba.—A single House Crow was seen by AP on 26 March 2008 at Cayo Guillermo on the north coast (Kirwan *et al.* 2008). The bird remained all day around an open-air cafe feeding on scraps, but was not seen again subsequently (AP). As this is close to a major shipping route the bird was probably ship-assisted.

Discussion

House Crows have now colonised ports and coastal towns in 21 countries outside their native range and, in addition, have arrived ship-assisted in a further 16 countries, but without having established breeding populations. The spread continues unabated and is, in fact, accelerating, occurrences extending increasingly far from the species' native range, in part due to the large introduced populations in Aden and Suez, which act as secondary foci for spread, along with an increase in the amount and speed of modern international shipping. Indeed, an observed increase in the rate of invasions of a range of other species has been attributed to the expansion of global trade (Jenkins 1996, Ruiz & Carlton 2003), much of it maritime.

Despite House Crows having been self-introducing around the Indian Ocean and Australia for around 100 years, it was only in 1971 that the first was reported in the Americas, in New Jersey (Ryall 1995), but since then there have been 4–5 reports in the USA and others in Chile, Barbados (Ryall 2002) and Cuba (this paper).

The spread of populations around the Indian Ocean rim has, with only a few exceptions, been restricted to coastal areas where human populations are concentrated. In fact, in the Middle East, the Horn of Africa and Kenya, the species' overland spread has been limited by arid and unpopulated hinterlands. However, Tanzania lacks such a barrier, which suggests that their spread west overland, now c.250 km from their point of arrival in the country, will continue and provide a conduit for the species to spread to Rwanda, Uganda and beyond. The sterling efforts being made to eradicate House Crows from Dar es Salaam and ultimately elsewhere in Tanzania (NB) could yet prevent the species from invading the interior of Africa. In South Africa, too, effective control measures have halted the expansion of populations in Durban and Cape Town, thereby reducing the risk of House Crows reaching ports on the west coast of Africa, as well as stemming their spread to the interior of the country.

In South-East Asia, the House Crow's colonisation of the Thai-Malay Peninsula and surrounding islands, described in detail by Wells (2007), will doubtless be followed by

invasion of Laos and Vietnam. In addition, they are well established in Hong Kong and increasing in Borneo. Even in Europe the inaction of the authorities in the Netherlands to eliminate the colony in Hoek van Holland—an easy task when two arrived in 1994—is permitting the House Crow population to increase rapidly and there are already signs of the birds spreading.

The poverty, overcrowding and accumulation of human refuse that accompany rapid human population growth around cities in the developing world greatly facilitate the proliferation of House Crows. The predictable adverse effects, including a decline in native avifauna, killing of young livestock and poultry, crop raiding and food theft, and potential spread of human disease (Ryall 1992a,b), will exacerbate the plight of communities who already have very little. Nevertheless, it is possible to reverse the trend. Two introduced populations of House Crows, albeit small ones on islands, have been eradicated, on Seychelles and Socotra, and control programmes in South Africa have met with great success. Others would also have succeeded had they received greater support from international agencies.

Contributors

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