Is the global decline reflects local declines? A case of the population trend of Far Eastern Curlew Numenius madagascariensis in Banyuasin Peninsula, South Sumatra, Indonesia

MUHAMMAD IQBAL1*, CIPTO DWI HANDONO2, DENI MULYANA3, ARUM SETIAWAN4, ZAZILI HANAFIAH4, HENNI MARTINI5, SARNO4, INDRA YUSTIAN4 & HILDA ZULKIFLI4

1Biology Program, Faculty of Science, Sriwijaya University, Jalan Padang Selasa 524, Palembang, South Sumatra 30139, Indonesia.
2Yayasan Ekologi Satwa Liar Indonesia (EKSAI), Jalan Katisari 1 No. 19, Surabaya, East Java 60291, Indonesia
3Berbak Sembilang National Park, South Sumatra office, Jalan Tanjung Api-api komplek Imadinatuna No. 114, South Sumatra, Indonesia
4Department of Biology, Faculty of Science, Sriwijaya University, Jalan Raya Palembang-Prabumulih km 32, Indralaya, South Sumatra, Indonesia.
5Hutan Kita Institute (HAKI), Jalan Yudo No. 9H, Palembang, South Sumatra 30126, Indonesia

*Corresponding author: kpbsos26@yahoo.com

Received 28 June 2021 | Accepted by V. Pešić: 13 July 2021 | Published online 16 July 2021.

Abstract
Far Eastern Curlew Numenius madagascariensis (Linnaeus, 1766) is Endangered species confined in East Asian Australasian Flyway (EAAF) sites. We compiled and summarized all historical numbers of Far Eastern Curlew in Banyuasin Peninsula, South Sumatra, Indonesia. A total of 30 records were documented from 1984 to 2020. The largest number is 2,620 individuals during the migration period in 1988. Unfortunately, the largest number drop to 1,750 individuals in wintering period in 2008, and then drop to 850 individuals in 2019. The numbers indicate that the population decline by up to 62% in the last 35 years (1984 to 2019). It is clear that the global decline of the Far Eastern Curlew also reflects the local population decline in Banyuasin Peninsula.

Key words: Number, Far Eastern Curlew, Numenius madagascariensis, Endangered, Sumatra, Indonesia.

Introduction
One of the most amazing ecological aspects of migration is how shorebirds capable of flying between exactly the same breeding and wintering areas year after year, even if these places located far away on different continents (Newton 2008). The evolution of a migratory route from one location to another involves a variety of factors, particularly geographic barriers such as oceans or mountains may be important in influencing the route taken, although the barriers are rather species-specific (Faaborg 1988). Successful migration is obviously a very important part of birds’ life so it is not surprising to find that many aspects of
migratory behavior are under strict genetic control and hence are readily influenced by natural selection (Perrins & Birkhead 1983).

Far Eastern Curlew *Numenius madagascariensis* (Linnaeus, 1766) is a long-distance shorebird migration that satellite-tracked suggest a long flights of 12,000 km from breeding areas in Russia to wintering grounds in Australia (Driscoll & Ueta 2002). This species breeds in Eastern Siberia, Russian Far East, Mongolia, and Northeast China; wintering in Taiwan, Southeast Asia, Indonesia and New Guinea, but most population migrate to Australia and a few reach New Zealand (Hayman *et al.* 1986; van Gils & Wiersma 1996). All important sites during the migration period were in Russia, North Korea, South Korea, China, Malaysia, Indonesia and Australia (Bamford *et al.* 2008).

The Far Eastern Curlew has been uplisted to Endangered since 2015, based on it is undergoing a very rapid population decline which is suspected to have been primary drive by habitat loss (Birdlife International 2021a). Banyuasin Peninsula in South Sumatra is important site for shorebirds in Indonesia (Bamford *et al.* 2008; Iqbal *et al.* 2019; Iqbal *et al.* 2021). In this paper, we report historical numbers of Far Eastern Curlew in Banyuasin Peninsula, to review whether global population decline also reflects local decline.

**Methods**

Banyuasin Peninsula is one important site for migratory shorebirds in the East Asian Australasian Flyway (Bamford *et al.* 2008). This area is also known as a Ramsar site, Important Bird Area and important wetlands sites in Indonesia (Wibowo & Suyatno 1997; Holmes & Rombang 2001; Birdlife International 2021b). Administratively, Banyuasin Peninsula is located in Banyuasin II subdistrict, Banyuasin district, South Sumatra province (Figure 1). The coastal zone of Banyuasin Peninsula has 35 km line, provided mudflat that a very important habitat for feeding ground of shorebirds during the migration period (Danielsen & Verheugt 1990; Verheugt *et al.* 1993).

![Figure 1. Map of Banyuasin Peninsula, South Sumatra, Indonesia.](image)
We compiled and summarized all historical records of Far Eastern Curlew, both based on published and unpublished available information. Published numbers of Far Eastern Curlew mainly collected from fieldwork conducted from 1984 to 2000, and unpublished data are compiled from various surveys from 2000 to 2020. We checked and screened carefully all records, and provide a range number of historical and recent records. Banyuasin Peninsula is usually visited by birdwatchers and photographers, but only valid information from advanced birdwatchers or researchers are received.

Results and Discussion

Population size and trend

A total of 30 records of Far Eastern Curlew from the Banyuasin Peninsula was summarized from 1984 to 2020 (Table 1). The bird was recorded all seasons in terms of four migration periods: northward migration (March to April), summer (May to July), southward migration (August to October) and winter (November to February).

Table 1. Historical notes of Far Eastern Curlew on the Banyuasin Peninsula, South Sumatra, during 1984-2020 (Observers: HM = Henni Martini, DM = Deni Mulyana, MI = Muhammad Iqbal).

| Date                  | Number | Sources/Observers               |
|-----------------------|--------|--------------------------------|
| Oct-Nov 1984          | 383    | Silvius 1988                   |
| Jul-Aug 1985          | 2      | Silvius 1988                   |
| 23-29 Mar 1986        | 39     | Silvius 1987, Silvius 1988     |
| Sep 1988 (unspecified date) | 2    | Verheugt et al. 1990 |
| Oct 1988 (unspecified date) | 2,620 | Verheugt et al. 1990 |
| Nov 1988 (unspecified date) | 2,250 | Verheugt et al. 1990 |
| Dec 1988 (unspecified date) | 350 | Verheugt et al. 1990 |
| Jan 1989 (unspecified date) | 1,103 | Verheugt et al. 1990 |
| Feb 1989 (unspecified date) | 49 | Verheugt et al. 1990 |
| Mar 1989 (unspecified date) | 255 | Verheugt et al. 1990 |
| Apr 1989 (unspecified date) | 137 | Verheugt et al. 1990 |
| May 1989 (unspecified date) | 20 | Verheugt et al. 1990 |
| 19-23 Mar 2001        | No number given | Sutaryo et al. 2001 |
| 9-10 Nov 2001         | c. 350 | Hasudungan & Sutaryo 2002     |
| 26 Feb 2002           | c. 150 | Hasudungan & Wardoyo 2002a    |
| 9 Oct 2002            | c. 100 | Hasudungan & Wardoyo 2002b    |
| 31 Jul 2003           | 50     | Iqbal 2003a                   |
| 21 Oct 2003           | c. 700 | Iqbal 2003b                   |
| 29 Jun 2004           | c. 50  | Iqbal 2004                    |
| Nov 2008 (unspecified date) | 1,750 | Sembilang National Park 2016 |
| Nov 2009 (unspecified date) | 806 | Sembilang National Park 2016 |
| Dec 2011 (unspecified date) | 94 | Sembilang National Park 2016 |
| Dec 2012              | 508    | Sembilang National Park 2016  |
| Nov 2014 (unspecified date) | 600 | HM, DM, MI pers.obs          |
| Dec 2015 to Jan 2016 (unspecified date) | 37 | Sembilang National Park 2016 |
| 8 Sep 2017            | 20     | HM, DM, MI pers.obs          |
| 12 May 2018           | c. 200 | HM, DM, MI pers.obs          |
| 24 Nov 2018           | 55     | HM, DM, MI pers.obs          |
| 20-22 Dec 2019        | 850    | DM, MI pers.obs              |
| 8 Nov 2020            | 210    | CDH, DM pers.obs             |
The most earlier record of Far Eastern Curlew in the Banyuasin Peninsula is a record of 383 individuals in October and November 1984. Record of 2,620 and 2,250 individuals in October and December 1988 are the highest numbers of Far Eastern Curlew in this area. Historical records suggest the number of Far Eastern Curlew increase during the migration period (November to January) when the number of individuals reported around 800 to 2,620 individuals. The bird is also recorded in summer or during the nonbreeding period (May to July), but the number drops around 20 to 50 birds. Historical records of Far Eastern Curlew from 1984 to 2020 suggest the trend of population of Far Eastern Curlew in Banyuasin Peninsula are decline (Figure 2).

![Figure 2. Population trend of number of the Far Eastern Curlew in Banyuasin Peninsula from 1984 to 2020.](image)

The east coastal zone of Sumatra has known as important area for migratory shorebirds (MacKinnon et al. 2014; Conklin et al. 2014). Recent surveys revealed that northern Sumatra has significant international importance for shorebird’s habitat (Crossland et al. 2009; Putra et al. 2015). In North Sumatra, Iqbal et al. (2010) reported a total number of 1,700 Far Eastern Curlews in January 2010 from three survey locations. Several surveys from Bagan Percut of North Sumatra from 1995 to 2011 recorded number around 85 to 161 individuals (Crossland et al. 2012; Putra et al. 2015). A survey at three locations in North Sumatra on 28 March 2002 counted 22,421 shorebirds, but only one Far Eastern Curlew was recorded (Crossland et al. 2009). Furthermore, Putra et al. (2020) only found one Far Eastern Curlew from more than 10,000 shorebirds across 34 species detected during the survey in the east coastal zone of Aceh province from October 2019 to January 2020. These records suggest the number of Far Eastern Curlew getting occur in low number in the east coastal zone of northern Sumatra. Far Eastern Curlew is very similar to Eurasian Curlew *Numenius arquata* (Linnaeus, 1758) and other large shorebirds (Fig. 3 and 4), so, identification should be with great care.

The recent status of Far Eastern Curlew is Endangered with a total population estimated around 20,000 to 49,999 individuals (Birdlife International 2021). This species is confined to East Asian Australasian Flyway where the population estimate is about 38,000 birds worldwide (Delany & Scott 2006; Bamford et al. 2008). In 2016, Hansen et al. (2016) reported that the final population estimate of Far Eastern Curlew in the East Asian Australasian Flyway decrease to 35,000 birds. An analysis of monitoring data collected from Australia and New Zealand suggests that the Far Eastern Curlew has declined much more rapidly than was previously thought, with an annual rate of decline on 0.058 equating to a loss of 81.7% over three generations (Birdlife International 2021a). Based on the largest number record of 2,620 individuals in 1980 to 1990, and 850 individuals in 2010 to 2020; it is suggested that the population trend decline by up to 67% in the last 30 years. It is clear that the global decline of Far Eastern Curlew also reflects local population decline in Banyuasin Peninsula.
Figure 3. Mix flocks of Far Eastern Curlew and Eurasian Curlew *Numenius arquata* in flight on 8 November 2020 in Banyuasin Peninsula, South Sumatra province, Indonesia (Photo: Cipto Dwi Handono).

Figure 4. Far Eastern Curlew standing at the mudflat on 8 November 2020 in the coastal zone of Banyuasin Peninsula, South Sumatra province, Indonesia (Photo: Cipto Dwi Handono).
Conservation
Migratory shorebirds are declining rapidly, including in East Asian Australasian Flyway, and study has highlighted the impact of changes in land use on shorebirds, in particular loss of the wintering habitat in the Yellow Sea (Murray et al. 2014; Hansen et al. 2016). Birdlife International (2021a) justified that loss of wintering habitat is a major threat to the Far Eastern Curlew, with loss of the stopover sites in the Yellow Sea thought to be responsible for shorebird in the flyway region. Some of the migratory shorebirds have been protected by Indonesian law, including Far Eastern Curlew (Ministry of Environment and Forestry 2018).

As one of the important migratory shorebirds site in East Asian Australasian Flyway, Banyuasin Peninsula is a key habitat of Far Eastern Curlew in Indonesia (Bamford et al. 2008). Banyuasin Peninsula has the advantage by its conservation status as part of Berbak Sembilang National Park (based Decree of the Ministry of Forestry Number 95/Kpts-II/2003). Some possible threats for Far Eastern Curlew, such as hunting and pollution are not detected in this area. There is a total of 3,000 ha of mangrove forest (1.5 % from the total area of 205,750 ha) has been converted as fish ponds, but it is looks like not give a significant impact on the wintering habitats of migratory shorebirds. It is presumed that the decline of Far Eastern Curlew numbers in Banyuasin peninsula could be an impact of loss of wintering habitats of other sites in the East Asian Australasian Flyway. Continue to monitor population trends and replanting of mangroves in fish ponds area are key conservation actions for Far Eastern Curlew in the future in Banyuasin Peninsula.

Conclusion
The maximum count of Far Eastern Curlew in the Banyuasin Peninsula is around 2,620 to 2,250 individuals during wintering season in 1988. After these records, the maximum count is 1,750 individuals in wintering period in 2008, and then drop to 850 in 2019. These numbers suggest that the population decline of up to 62% in the last 35 years (1984 to 2019). The locally decline of Far Eastern Curlew in the Banyuasin Peninsula show same pattern of global decline of this species worldwide.

Acknowledgments
We thank the Hutan Kita Institute (HAKI) and Berbak Sembilang National Park of South Sumatra province office who supports our waterbirds monitoring on the Banyuasin Peninsula during 2017–2019. The first author is very grateful to Asian Waterbird Conservation Fund and World Migratory Bird Day (WMBD) Small Grant Fund for funding our fieldwork in Banyuasin Peninsula from 2020 to 2021. Second author thank Iwan “Londo” Febrianto and Hwaseong City Government through EAAFP for Far Eastern Curlew Project in Indonesia in 2020.

References
Bamford, M., Watkins, D., Bancroft, W., Tischler, G. & Wahl, J. (2008). Migratory shorebirds of the East Asian Australasian Flyway: Population estimates and internationally important sites. Wetlands International-Oceania, Canberra, 240 pp.

BirdLife International. (2021a) Species factsheet: Numenius madagascariensis. Downloaded from http://www.birdlife.org on 25/06/2021.

BirdLife International. (2021b) Important Bird Areas factsheet: Sembilang. Downloaded from http://www.birdlife.org on 25/06/2021.

Conklin, J.R., Verkuil, Y.I. & Smith, B.R. 2014. Prioritizing Migratory Shorebirds for Conservation ction on the East Asian-Australasian Flyway. WWF-Hong Kong, Hong Kong, 128 pp.

Crossland, A.C., Lubis, L., Sinambela, S.A., Sitorus, A.S., Sitorus, A.W. & Muis, A. (2012) Observations of shorebirds along the Deli-Serdang coast, North Sumatra province, Indonesia: 1995–2006. Stilt, 61, 37–44.

Crossland, A.C., Sinambela, S.A., Sitorus, A.S. & Sitorus, A.W. (2009) The coastal zone of Asahan regency: An area of international importance for migratory waders in North Sumatra province, Indonesia. Stilt 55, 8–12.
Danielsen, F. & Verheught, W. (1990) Integrating Land-use Planning in the Coastal Region of South Sumatra, Indonesia. PHPA/AWB, Bogor, 208 pp.

Delany, S. & Scott, D. (2006) Waterbird population estimates. Wetlands International, Wageningen, 239 pp.

Driscoll, P.V. & Ueta, M. (2002) The migration route and behaviour of Eastern Curlews Numenius madagascariensis. Ibis 144, 3: E119–E130.

van Gills, J. & Wiersma, P. (1996) Scolopacidae (Snipes, Sandpipers and Phalaropes). Pp. 489–533. In: del Hoyo J., Elliot A. & Sargatal J., (eds.), Handbook of the birds of the world. Vol. 3. Hoatzin to Auk. Lynx Editions, Barcelona.

Hansen, B.D., Fuller, R.A., Watkins, D., Rogers, D.I., Clemens, R.S., Newman, M., Woehler, E.J. and Weller, D.R. (2016) Revision of the East Asian-Australasian flyway population estimates for 37 listed migratory shorebird species. BirdLife Australia, Melbourne, 92 pp.

Hasudungan, F. & Sutaryo, D. (2002) Laporan pemantauan Sembilang No. 2, November 2001. Laporan Teknis No. 32. Proyek Konservasi Terpadu Lahan Basah Pesisir Berbak Sembilang. Wetland International Indonesia Programme, Palembang, 20 pp. [in Indonesian]

Hasudungan, F. & Wardoyo, S. A. (2002a) Pemantauan kawasan Sembilang No. 3, Februari/Maret 2002. Laporan Teknis No. 38. Proyek Konservasi Terpadu Lahan Basah Pesisir Berbak Sembilang. Wetland International Indonesia Programme, Palembang, 23 pp. [in Indonesian]

Hasudungan, F. & Wardoyo, S. A. (2002b) Pemantauan kawasan Sembilang No. 5, Oktober 2002. Laporan Teknis No. 62. Proyek Konservasi Terpadu Lahan Basah Pesisir Berbak Sembilang. Wetland International Indonesia Programme, Palembang, 25 pp. [in Indonesian]

Hayman, P., Marchant, J. & Prater, T. (1986) Shorebirds: an identification guide to the waders of the world. Houghton Mifflin Company, Boston, 412 pp.

Holmes, D. & Rombang, W.M. (2001) Daerah Penting Bagi Burung di Sumatera. PKA/BirdLifeInternational Indonesia Programme, Bogor, 103 pp. [in Indonesian]

Iqbal, M. (2003a) Pemantauan kawasan Sembilang No. 7, Juli/Augustus 2003. Laporan Teknis No. 74. Proyek Konservasi Terpadu Lahan Basah Pesisir Berbak Sembilang. Wetland International Indonesia Programme, Palembang, 29 pp. [in Indonesian]

Iqbal, M. (2003b) Pemantauan kawasan Sembilang No. 8, Oktober 2003. Laporan Teknis No. 76. Proyek Konservasi Terpadu Lahan Basah Pesisir Berbak Sembilang. Wetland International Indonesia Programme, Palembang, pp. [in Indonesian]

Iqbal, M. (2004). Pemantauan Kawasan Sembilang ke-10, Juni/Juli 2004. Laporan Teknis No. 87. Proyek Konservasi Terpadu Lahan Basah Pesisir Berbak Sembilang. Wetland International Indonesia Programme, Palembang, 28 pp. [in Indonesian]

Iqbal, M., Martini, H., Mulyana, D., Franjhasdika, G., Aji, R.S.K. & Nurnawati, E. (2019) From zero to abundance: successful colonization of the Banyuasin Peninsula, South Sumatra, Indonesia, by Pied Stilts Himantopus (himantopus) leucocephalus. Wader Study, 126(3), 236–239.

Iqbal, M., Mulyana, D., Hasudungan, F., Noor, Y.R., Setiawan, A., Mulyani, Y.A., Yustian, I. & Zulkifli, H. (2021) Population size and trend of Asian dowitcher Limnodromus semipalmatus in Banyuasin Peninsula, Sumatra, Indonesia. International Journal of Conservation Science, 12, 577–584.

Iqbal, M., Nurza, A. & Sanir, T. M. (2010) Notes on the wintering waders at north-eastern tip of Sumatra (Aceh Province), Indonesia. Stilt, 57, 44–49.

Faaborg, J. (1988) Ornithology: an ecological approach. Prentice Hall, New Jersey, 470 pp.

MacKinnon, J., Verkuil, Y.I. & 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 No. 47. IUCN, Gland, 70 pp.

Ministry of Environment and Forestry. (2018) Perubahan Kedua atas Peraturan Menteri Lingkungan Hidup dan Kehutanan Nomor P.20/MENLHK/SETJEN/KUM.1/6/2018 tentang jenis tumbuhan dan satwa yang dilindungi. Ministry of Environment and Forestry, Jakarta, 31 pp. [in Indonesian]

Murray, N.J., Clemens, R.S., Phinn, S.R., Possingham, H.P. & Fuller, R.A. (2014) Tracking the rapid loss of tidal wetlands in the Yellow Sea. Frontiers in Ecology and the Environment, 12, 267–272.

Newton, I. (2008) The migration ecology of birds. Academi Press, London, 976 pp.

Perrins, C.M. & Birkhead, T.R. (1983) Avian ecology. Blackie, Glasgow and London, 221 pp.
Putra, C.A., Hikmatullah, D., Prawiradilaga, D.M. & Harris, J.B.C. (2015) Surveys at Bagan Percut, Sumatra, reveal its international importance to migratory shorebirds and breeding herons. *Kukila*, 18, 46-59.

Putra, C.A., Hikmatullah, D., Yong, D.L., Muzika, Y., Arico, Z., Feryadi., Haka, I. & Chowdhury, S.U. (2020) Identifying priority shorebird sites for conservation on the east coast of Aceh province, Indonesia. *Forktail*, 36, 106–113.

Sembilang National Park. (2016) *Data pengamatan kelompok burung air jenis migrant dan residen pada setiap spot pengamatan Kawasan TN Sembilang 2008–2014*. Balai Taman Nasional Sembilang, Palembang, Indonesia. [in Indonesian]

Silvius, M. (1987) Northward wader migration along the East coast of Sumatra: joint PHPA/Interwader Study. *Stilt*, 10, 31–35.

Silvius, M. (1988) On the importance of Sumatra’s East coast for waterbirds, with notes on the Asian Dowitcher *Limnodromus semipalmatus*. *Kukila*, 3, 117–137.

Sutaryo, D., Hasudungan, F., Muslihat, L., Wardoyo, S.A., Hermawan, H., Wirawijaya, H. & Gunawan. (2001) *Survei pengkajian cepat CTN Sembilang, Sumatera Selatan*. Proyek Konservasi Terpadu Lahan Basah Pesisir Berbak Sembilang, Palembang, 75 pp. [in Indonesian]

van Gils, J., P. Wiersma. Scolopacidae (Snipes, Sandpipers and Phalaropes). In: J. del Hoyo, A. Elliot, J. Sargatal (eds). *Handbook of the Birds of the World*. Vol. 3. Hoatzin to Auk. Lynx Editions, Barcelona, 1996, pp 489–533.

Verheugt, W.J.M., F. Danielsen, F., Skov, H., Purwoko, A., Kadarisman, R. & Suwarman, U. (1990) Seasonal variations in the wader populations of the Banyuasin Delta, South Sumatra, Indonesia. *Wader Study Group Bulletin*, 58, 28–53.

Verheugt, W.J.M., H. Skov, H. & F. Danielsen, F. (1993) Notes on the birds of the tidal lowlands and floodplains of South Sumatra Province Indonesia. *Kukila*, 6, 53–84.

Wibowo, P. & Suyatno, N. (1997) *An overview of Indonesian wetland sites – included in wetland database*. Wetlands International–Indonesia Programme/PHPA, Bogor, 85 pp.