

Supplementary Information S4: Detailed description of the migration route, stopover locations used by Common and Demoiselle Cranes.

Common Crane-1

Common Crane-1 started migrating from Gujarat, India, on the 25th of March 2022 and reached Pakistan on the 27th of March. In Pakistan, it stayed for one day around the Indus River in south-eastern Sindh province and reached Afghanistan the next day. It entered Afghanistan by crossing the Registan desert and continued migrating northeast towards Iran. It took a route east of the Elburz Mountains range in northern Iran and crossed into Turkmenistan on the 31st of March 2022. Common Crane-1 stopped in southern Turkmenistan between the 31st of March to the 2nd of April in agricultural fields before flying again northwards across the Karakum desert's large span, covering roughly 70% of Turkmenistan. On the 2nd of April 2022, it stopped for one day again in northern Turkmenistan, about 35 km east of Sarygamysh Lake. It took a straight northward route across the Kyzylum desert along western Uzbekistan and crossed Uzbekistan in one day (the 3rd of April). It reached Kazakhstan on the same day (the 3rd of April) and stayed in southern Kazakhstan for one day (the 4th of April) in the Aktobe region. It made a short stopover between the 5th and 9th of April 2022 along the western border of Kazakhstan around the lake systems in Kazakhstan (Fig. 2). It reached Russia on the 10th of April 2022. The migration lasted 17 days (the 25th of March to the 10th of April), crossing Pakistan, Afghanistan, Iran, Turkmenistan, Uzbekistan, and Kazakhstan to reach Russia. Common Crane-1 covered a total distance of 12,982 km during its migration to Russia, with the largest distance covered in April. It covered a daily distance (Mean \pm SD) of 864. 25 \pm 299.08 km during migration and flew at an average altitude of 475.39 \pm 564.87 m above mean sea level. It rested at stopovers located in Pakistan, Afghanistan, Turkmenistan, and Kazakhstan.

The return migration started on the 14th of August 2022. It crossed into Kazakhstan from Russia on the 15th of August 2022 and stayed till the 8th of October 2022 in northern Kazakhstan around a smaller group of water bodies. The southward movement from Kazakhstan started on the 9th of October 2022, and it reached Uzbekistan on the 12th of October 2022 and stayed for one day at the Aral Sea. It entered Uzbekistan by flying across the Aral Sea, and on the 13th of October 2022, it reached Turkmenistan. It took three days to cross Turkmenistan by flying along the

southwestern border of Turkmenistan across the Kyzylum desert, avoiding crossing the Zagros mountainous range in northern Iran. It took the shortest path to cross Iran in one day by flying east of the Elburz Mountains range, and on the same day (the 17th of October), it reached Afghanistan. It took a similar southwestern route in Afghanistan and crossed into Pakistan on the 19th of October 2022, crossing over the Registan desert (Afghanistan). It did not stay in Pakistan, continued its southward migration towards India, and reached India on the 22nd of October 2022. The winter migration lasted for 71 days, during which Common Crane-1 travelled a total of 14,873 km in 71 days by covering a daily average (Mean \pm SD) distance of 209.15 \pm 298.74 km and flew at an average elevation of 252.76 \pm 323.83 m. While returning, the stopovers were located in the same countries with the addition of Uzbekistan.

Common Crane-2

Common Crane-2 started its migration on the 1st of April 2022. It crossed into Pakistan on the 2nd of April and made a stopover between 2nd and 3rd April 2022 in Sindh Province around Manchar Lake, Pakistan's largest natural freshwater lake. It made a second stopover in Baluchistan Province for one day (the 4th of April 2022), and on the 5th of April, it reached Afghanistan, flying across the Registan desert. It made a one-day stopover in Nimruz province, located in southwestern Afghanistan, on the 6th of April 2022; on the same day, it reached Iran. It stopped for one day in Iran in Khorasan province (northeastern Iran). Like Common Crane-1, it flew along the shortest path of northeastern Iran to the east of the Elburz Mountains range and crossed into Turkmenistan on the same day (the 7th of April 2022). It made two short stopovers of one day each in the Ahal and Dasoguz provinces of Turkmenistan across the Karakum desert and reached Uzbekistan on the 9th of April 2022. It stayed for one day in Uzbekistan along the southern Aral Sea, and on the 10th of April 2022, it crossed into Kazakhstan by flying along the eastern Aral Sea. It stayed for about 18 days in Kyzylorda region east of the Aral Sea. On the 27th of April 2022, it moved up into northern Kazakhstan, and by the 30th of April, it settled in the extreme northern region of Kazakhstan along the southern border of Russia. Common Crane-2 covered a total distance of 4,500 km in about 30 days while migrating from India to Kazakhstan. It covered an average (Mean \pm SD) daily distance of 150.02 \pm 145.22 km and flew at an average elevation of 286.39 \pm 578.55 m. Stopovers were located in Pakistan, Afghanistan, Iran, Turkmenistan, Uzbekistan, and Kazakhstan.

On its return migration towards India, Common Crane-2 started moving southwards between the 28th and 29th of September 2022. It made a one-day stopover in the Aktobe region of central Kazakhstan near a small water body. On the 1st of October 2022, its southward migration continued, and it crossed into Uzbekistan on the 2nd of October 2022, along the Aral Sea. It did not stop in Uzbekistan and crossed into Turkmenistan, flying across the Aral Sea the same day. It took three days for Common Crane-2 to cross Turkmenistan, where it stayed along a water body about 70 km east of Sarygamysh Lake and crossed the Karakum desert (Turkmenistan). Like Common Crane-1, it also avoided crossing directly into Iran. It diverted towards the northeastern border of Iran, taking the shortest path to the east of the Elburz Mountains range to cross Iran. It crossed into Afghanistan on the 5th of October 2022, and made stopovers of one day each in Herat and Helmand provinces of Afghanistan. It entered Pakistan on the 7th of October 2022, by flying over the Registan desert in Afghanistan and made stopovers in the Kharan and Lasbela regions of Pakistan in Baluchistan and Sindh provinces. It crossed into India on the 10th of October 2022. While in Gujarat, it made several stopovers in Kutch, Jamnagar, Rajkot, Junagadh, and Porbandar before settling in southern Gujarat. While returning, it covered a total distance of 4,922 km in 25 days by covering an average (Mean \pm SD) daily distance of 864.25 ± 299.08 km and flying at an average elevation of 305.27 ± 512.01 m above mean sea level. While returning, the stopovers were made in Kazakhstan, Turkmenistan, Afghanistan, Pakistan, and India.

Demoiselle Crane-1

Demoiselle Crane-1 started migrating on the 26th of March 2022, by travelling towards Pakistan. It crossed into Pakistan on the 27th of March 2022, moved back into India on the same day, and remained till the 28th of March in Rajasthan, India. On the 28th of March 2022, Demoiselle Crane-1 finally crossed into Pakistan across Punjab province and stayed till the 29th of March 2022 in Punjab province, Pakistan. On the same day, it left Pakistan and reached Afghanistan. Unlike Common Cranes, Demoiselle Crane-1 took a more northward route, avoiding crossing the Registan desert in Afghanistan. In Afghanistan, it took a route about 90 km west of Kabul to continue its northward journey. It took two days to cross Afghanistan. It reached Turkmenistan by crossing the Amu Darya River and took one day to cross Turkmenistan. Again, unlike Common Cranes, it avoided crossing over the Karakum desert in Turkmenistan and stayed along the eastern boundary of Turkmenistan. On the 30th of March 2022, it

reached Uzbekistan and stayed for two days in the Qashqadaryo and Jizzakh provinces of Uzbekistan. While in Uzbekistan, it took a northeastern route crossing over Aydar Lake to reach Kazakhstan. On the 1st of April 2022, Demoiselle Crane-1 reached the Otrarskiy district in southern Kazakhstan. While in Kazakhstan, it stayed till the 8th of April 2022, in the Zhualynskiy and Suzakskiy districts of southern Kazakhstan, primarily within agricultural fields. It continued its northward movement from southern Kazakhstan from the 9th of April 2022. By the 13th of April 2022, Demoiselle Crane-1 had reached the Akmola region in northern Kazakhstan, where it stayed till its return migration to India.

Demoiselle Crane-1 covered a total distance of 4,968 km in 18 days and travelled an average (Mean \pm SD) daily distance of 366.38 ± 287.43 to reach Kazakhstan from India. It flew at an average elevation of 744.75 ± 685.26 m. It avoided crossing over all three deserts along its route, such as the Registan desert in Afghanistan, the Karakum desert in Turkmenistan, and the Kyzylum desert in Uzbekistan. It rested at stopovers located in Pakistan, Uzbekistan, and Kazakhstan.

While returning, Demoiselle Crane-1 started its southward migration on the 8th of August 2022. It moved southwards about 250 km from the Akmola region of northern Kazakhstan. It settled till the 4th of September 2022, in agricultural fields having a moderate assemblage of smaller-sized water bodies in central Kazakhstan. It continued its southward migration and took three days to cross Kazakhstan and reached Uzbekistan on the 7th of September 2022, by flying along the eastern side of Aydar Lake. By the 8th of September 2022, it had crossed Uzbekistan, Turkmenistan avoiding Kyzylum and Karakum deserts. It had reached Afghanistan without making any apparent stopovers. It crossed into Turkmenistan by following an eastern route from Uzbekistan which was only ~85 km long. Demoiselle Crane-1 took only one day to cross Afghanistan and reached Pakistan on the 9th of September 2022. It reached India the next day, on the 11th of September 2022, crossing into the Jaisalmer district of Rajasthan (Fig. 4). It stayed in the Barmer, Pali, Jodhpur, and Nagpur districts of Rajasthan till the 17th of November 2022. By the 18th of November 2022, it reached the Jamnagar district of Gujarat; on the 21st of November 2022, it reached the Porbandar district of southern Gujarat. The return migration route was almost similar to the northbound migration, avoiding all major deserts. While returning, it covered a total distance of 7,394 km in 105 days to reach India. It covered an average (Mean \pm SD) daily distance of 68.97 ± 48.51

km and flew at an average elevation of 404.04 ± 366.69 m above mean sea level and rested at stopovers located in Kazakhstan, Uzbekistan, and India.

Demoiselle Crane-2

The northward migration undertaken by Demoiselle Crane-2 was apparent on the 25th of March 2022, and it took a similar route as Demoiselle Crane-1. It made a one-day stopover in the Barmer district of Rajasthan before continuing its northward migration. It crossed into Pakistan on the 27th of March 2022, and on the following day, the 28th of March 2022, it crossed into Afghanistan and did not make any stopovers in Afghanistan. It took a northward route about 80 km west of Kabul and avoided crossing over the Registan desert completely. It entered Uzbekistan by crossing the Amu Darya River and taking a northward route about 40 km west of Mazar-I-sharif in north Afghanistan. Demoiselle Crane-2 took two days to cross Uzbekistan (29th to 30th March 2022), stopping in the Farish district of Uzbekistan. It flew west of the Pskem mountain range located northeast of Uzbekistan. Afterward, it flew northeast over Samarkand and crossed Aydar Lake to reach Kazakhstan. On the 30th of March 2022, it crossed into Kazakhstan and stayed for two and six days in the Zhalagashskiy and Terenozekskiy districts of the Kyzylorda region of Kazakhstan, respectively. It continued its northward migration, and by the 12th of April 2022, it reached the Aytekebiyskiy district of northern Kazakhstan. Demoiselle Crane-2 covered a total distance of 4,310 km in 18 days to reach Kazakhstan. The average (Mean \pm SD) daily distance covered during migration from India to Kazakhstan was estimated as 308.34 ± 292.30 km, and it flew at an average elevation of 338.60 ± 679.46 m. Like Demoiselle Crane-1, it avoided major deserts in Afghanistan, Uzbekistan, and Turkmenistan and rested at stopovers in Uzbekistan, and Kazakhstan.

The return southward migration started on the 25th of August 2022, and it took only one day to cross Kazakhstan. However, it deviated from its northward route and flew across the eastern side of the Aral Sea to reach Uzbekistan. It made a one-day stopover in the Uchkuduk district of Navoiy region of Uzbekistan. On its return to India, it flew over the Kyzylum desert to reach Turkmenistan. It crossed into Turkmenistan on the 27th of August 2022, and made a one-day stopover in the Halac region of the Lebap district of Turkmenistan. Again, it flew over the Karakum desert to reach Afghanistan. It reached Afghanistan on the 28th of August 2022. It continued its migration southwards, making a one-day stopover in the Nawa district of Ghazni province of

Afghanistan, about 10 km east of Abe Istada Lake. It reached Pakistan on the 29th of August 2022, and made a one-day stopover in Baluchistan province. On the 30th of August 2022, it reached the Bikaner district of Rajasthan, India. It crossed Jodhpur and made 28 days stopover (the 31st of August 2022 to the 27th of October 2022) in the Pali and Jalor districts of Rajasthan. It reached Kutch on the 28th of August 2022, and the same day it travelled to the Jamnagar district of Gujarat. It stayed in the Jamnagar and Porbandar districts of Gujarat afterwards. It covered a total distance of 7,757 km in 128 days by covering a daily average (Mean \pm SD) distance of 146.83 ± 252.22 while migrating from Kazakhstan to Gujarat by flying at an average elevation of 183.82 ± 359.50 m. Interestingly, during its return southward migration, it crossed across Kyzlum and Karakum deserts which it had avoided crossing while on its northward migration and made stopovers in Kazakhstan, Uzbekistan, Turkmenistan, Afghanistan, and Pakistan. After crossing to India, it settled in Rajasthan for about two months before travelling to its wintering areas in Gujarat.