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中国野生动物保护协会鹤类联合保护委员会
United Crane Conservation Committee of China Wildlife Conservation Association



1979 年，乔治·阿其博第一次访问中国，与中国学者丁文宁、郑作新、刘荫增、周福章合影

During his first trip to China in 1979, George Archibald posed for a photograph with Chinese scholars Ding Wenning, Zheng Zuoxin, Liu Yinzeng and Zhou Fuzhang.



1987 年，参与主办的国际鹤类学术讨论会在中国黑龙江省齐齐哈尔隆重召开

The International Crane Symposium, co-organized was convened in Qiqihar, China in 1987.



乔治·阿其博在扎龙保护区科考

George Archibald carried out scientific investigations in Zhalong Nature Reserve.



乔治·阿其博带领外国志愿者在扎龙开展科考活动

George Archibald guided foreign volunteers in field-studies at Zhalong Nature Reserve.



2023 年，国际鹤类基金会成立 50 周年庆祝活动在北京举办，乔治·阿其博发表了热情洋溢的致辞

In 2023, the 50-anniversary celebration of ICF was held in Beijing, where George Archibald delivered an enthusiastic address.



乔治·阿其博与苏立英博士合影，二位都为中国鹤类保护事业贡献良多

George Archibald and Dr. Su Liying, both contributed greatly to China's crane conservation.

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【鹤类研究】
[Crane Research]

黑龙江扎龙保护区孵化期野生与散养丹顶鹤肠道菌群结构及功能对比分析

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作为湿地生态系统中的旗舰物种, 丹顶鹤在维持生态平衡、指示环境质量等方面发挥着重要作用。本研究基于 16SrRNA 高通量测序方法对黑龙江扎龙国家级自然保护区 (简称扎龙保护区) 中野生和散养丹顶鹤肠道微生物的群落组成及多样性进行分析, 同时对潜在的功能进行预测, 从而揭示其特殊时期的生理适应机制, 进而为丹顶鹤的有效保护和科学管理提供关键依据。

本研究从扎龙保护区采集了 8 份新鲜丹顶鹤粪便样本, 利用高通量测序技术对丹顶鹤 16S rDNA 的 V3-V4 区进行测序, 进而对丹顶鹤肠道菌群组成、多样性及功能进行分析。结果表明: 在菌门水平上, 两组均以厚壁菌门 (Firmicutes) 为优势菌门, 属水平上乳酸杆菌属 (*Lactobacillus*) 相对丰度最高; 野生丹顶鹤与散养丹顶鹤的肠道微生物 α 多样性无显著差异 ($P>0.05$), 而 β 多样性存在显著分离; 野生丹顶鹤与散养丹顶鹤肠道微生物的 KEGG 代谢通路在 level 1 水平上主要以新陈代谢和遗传信息处理为主, 在 level 2 水平上以碳水化合物代谢、氨基酸代谢以及辅因子和维生素的代谢为主, 在 level 3 水平上以脂肪酸生物合成、D-谷氨酰胺和 D-谷氨酸代谢、D-丙氨酸代谢为核心通路, 且功能通路未达到显著水平。

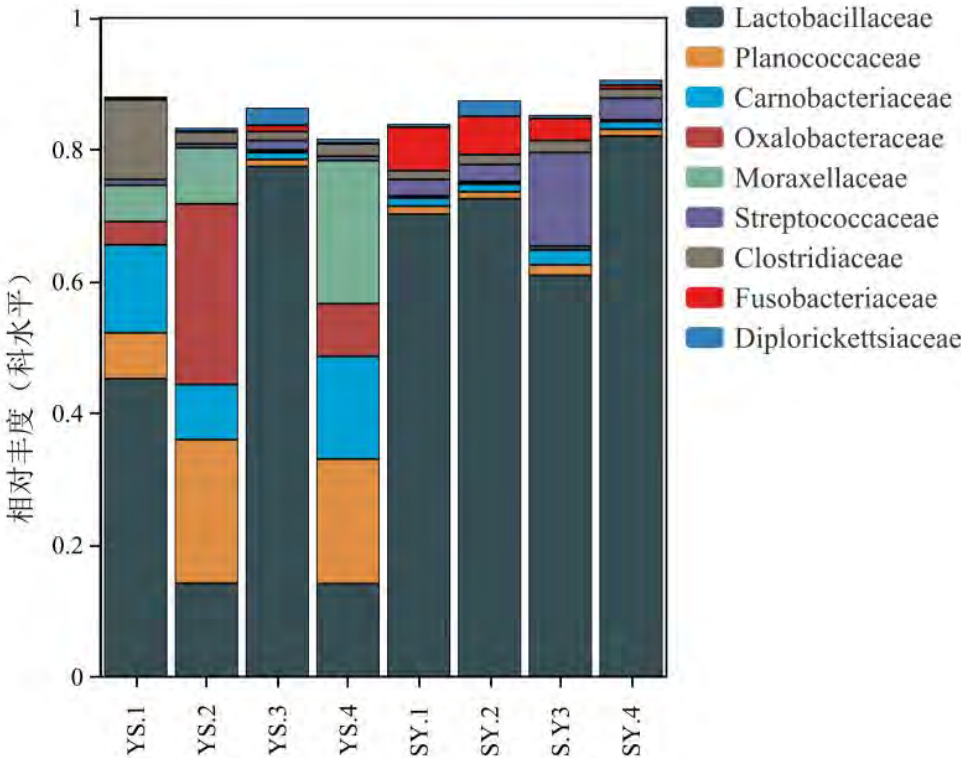


图 1 孵化期丹顶鹤肠道菌群的组成 (科水平)

Fig. 1 Composition of intestinal flora of Red-crown Cranes during hatching. (family level)

Comparative Analysis of the Gut Microbiota Structure and Function Between Wild and Captive Red-crowned Cranes (*Grus japonensis*) During the Incubation Period

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The Red-crowned Crane is a large wading bird belonging to the genus *Grus* in the family Gruidae of the order Gruiformes. It is the national first-class key protected wild animal in China and also listed as a Vulnerable species on the IUCN Red List of Threatened Species. As a flagship species in wetland ecosystem, the Red-crowned Crane plays a vital role in maintaining ecological balance and serving as an indicator of environmental quality. In terms of population distribution patterns, Red-crowned Cranes can be divided into two types based on geographical distribution and life history differences: the continental migratory population and the non-migratory population in Japan. The continental migratory population exhibits typical migratory bird characteristics, undertaking regular north-south migrations annually, while the non-migratory population in Japan exhibits resident bird characteristics, inhabiting fixed areas year-round. This study utilized high-throughput 16S rRNA sequencing to analyze the community composition and diversity of gut microbiota in wild and free-range Red-crowned Cranes within the Zhalong National Nature Reserve in Heilongjiang Province. It also predicted potential functional roles to elucidate physiological adaptation mechanisms during specific life stages, thereby providing critical evidence for the effective conservation and scientific management of Red-crowned Cranes.

In this study, eight fresh Red-crowned Crane fecal samples were collected from the Zhalong Nature Reserve. High-throughput sequencing technology was used to sequence the V3-V4 regions of the 16S rDNA of Red-crowned Cranes, thereby analyzing the composition, diversity, and function of their gut microbiota. The results showed that, at the phylum level, Firmicutes was the dominant phylum in both groups, while at the genus level, *Lactobacillus* had the highest relative abundance. Alpha diversity analysis showed no significant difference in gut microbial diversity between wild and free-range Red-crowned Cranes ($P > 0.05$), whereas beta diversity analysis revealed significant separation in community composition. Functional prediction using PICRUST 2 showed that the KEGG metabolic pathways of gut microbiota in wild and free-range Red-crowned Cranes were primarily dominated by metabolism and genetic information processing at Level 1; at Level 2, they were dominated by carbohydrate metabolism, amino acid metabolism, and cofactor and vitamin metabolism; at Level 3, the core pathways were fatty acid biosynthesis, D-glutamine and D-glutamic acid metabolism, and D-alanine metabolism, though these functional pathways did not reach statistical significance.

鄱阳湖 2025-2026 年越冬季白头鹤和白枕鹤时空种群动态

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鄱阳湖位于江西省北部、长江中游南岸, 地理坐标为东经 115°49′~116°46′、北纬 28°24′~29°46′。作为中国最大淡水湖, 鄱阳湖不仅是全球候鸟迁徙网络中的关键节点, 也是国际重要湿地和东亚—澳

大利西亚候鸟迁飞通道的重要越冬地。湖区广阔的湿地植被、丰富的浅滩与洲滩环境，以及充足的底栖动物资源，为越冬候鸟提供了优越的觅食与栖息条件。白头鹤与白枕鹤均为国家一级重点保护野生动物，每年秋冬迁徙至鄱阳湖越冬。其中，鄱阳湖被认为是白枕鹤全球核心的越冬栖息地之一，同时也是白头鹤的重要越冬场所，对维持其全球种群安全具有重要意义。

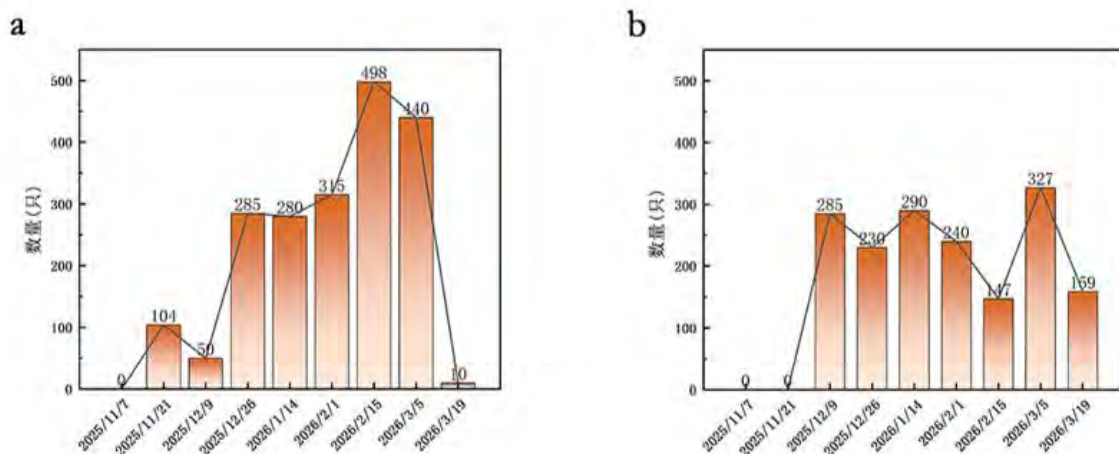


图 1 2025-2026 年白枕鹤和白头鹤种群数量变化趋势

Fig. 1 Population trends of White-naped Cranes and Hooded Cranes during the 2025-2026 wintering season

时间尺度上看，2025-2026 年越冬期，鄱阳湖白枕鹤和白头鹤种群数量均表现出明显的季节性动态变化特征。2025 年 11 月上旬调查期间未发现白枕鹤个体，随后随着越冬种群陆续迁入，其数量逐步上升，期间虽存在小幅波动，但整体保持持续增长趋势，并于 2026 年 2 月中旬达到越冬高峰，种群数量达 498 只；进入 3 月中下旬后，随着春季北迁启动，白枕鹤种群数量迅速下降（图 1a）。白头鹤则自 2025 年 12 月上旬开始陆续迁入鄱阳湖，种群数量快速增长，越冬期间虽有一定波动，但总体呈上升趋势，并于 2026 年 3 月上旬达到峰值，记录数量为 327 只；随后随着春季北迁进程推进，其种群数量逐渐回落，至 3 月中下旬降至 159 只（图 1b）。总体来看，两种鹤类在鄱阳湖越冬期间均呈现出“迁入增长—越冬高峰—春迁下降”的阶段性的动态变化格局。

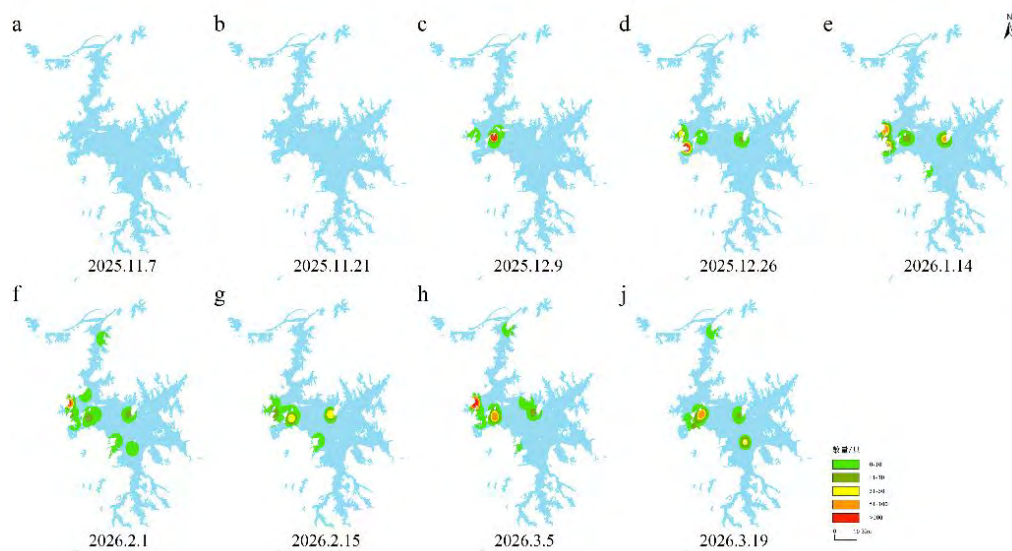


图 2 2025-2026 年鄱阳湖白枕鹤空间分布格局

Fig. 2 Spatial distribution pattern of White-naped Cranes in Poyang Lake, 2025-2026

从空间尺度上看，2025-2026 年越冬期，白枕鹤与白头鹤在鄱阳湖均表现出明显的阶段性空间动态变化特征，但两者在迁入时间和集聚格局上存在一定差异。越冬初期，2025 年 11 月上旬湖区调查

过程中尚未发现白枕鹤种群（图 2a），至 11 月下旬（图 2b）开始陆续迁入，并在吴城、南矶乡等湖区西北部形成低—中密度分布点；白头鹤则在 2025 年 11 月调查初期（图 3a-b）同样未被记录，至 12 月上旬（图 3c）开始迁入，低密度分布点首先出现在吴城区域。进入越冬中期后，两种鹤类的分布范围均持续扩大，空间集聚程度显著增强。白枕鹤在吴城、南矶乡、周溪镇及鸦雀湖等区域形成多个聚集区，整体呈现“多中心集聚”分布特征（图 2c-g）；白头鹤则逐渐在吴城、周溪镇等湖区西北部湖湾形成多个中高密度聚集热点（图 3d-g）。至 2026 年 3 月，白枕鹤于 3 月中旬达到越冬期分布峰值，主要集中于吴城至南矶乡一带（图 2h）；白头鹤则于 3 月上旬达到越冬高峰（图 3h），其高密度分布区主要集中于吴城湖区北部。随后，随着春季北迁启动，两种鹤类分布点数量均明显减少。至 3 月中下旬，白枕鹤仅保留少量零散个体（图 2j），白头鹤虽有所回落，但湖区北部仍为其主要停留区域（图 3j）。总体来看，两种鹤类在鄱阳湖越冬期间均呈现由迁入扩散、集聚增强到春迁消退的阶段性空间动态过程，其中核心栖息区均稳定分布于湖区西北部。

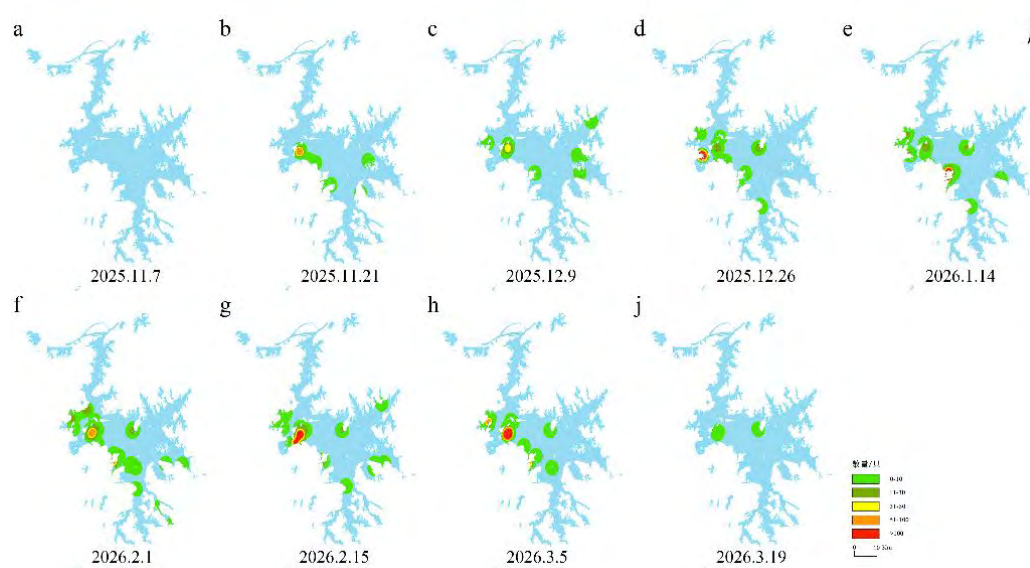


图 3 2025-2026 年鄱阳湖白头鹤空间分布格局

Fig. 3 Spatial distribution pattern of Hooded cranes in Poyang Lake, 2025-2026

Population Dynamics of Hooded Cranes and White-naped Cranes during the 2025-2026 Wintering Season at Poyang Lake

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Poyang Lake, located in northern Jiangxi Province on the southern bank of the middle Yangtze River (longitude 115°49'-116°46' E, latitude 28°24'-29°46' N), is the largest freshwater lake in China. It serves as a key node in the global migratory network for waterbirds and an internationally important wetland along the East Asia-Australasia Flyway. The lake's extensive wetland vegetation, abundant shoals and islets, and rich benthic fauna provide excellent foraging and roosting habitats for overwintering birds. Both Hooded Cranes (*Grus monacha*) and White-naped Cranes (*Antigone vipio*) are the national first-class key protected wild animal in China and migrate to Poyang Lake every autumn and winter. Poyang Lake is recognized as one of the global core wintering sites for White-naped Cranes and also an important wintering area for Hooded Cranes, playing a crucial role in maintaining global population security for both species.

Temporally, both White-naped Cranes and Hooded Cranes at Poyang Lake exhibited clear seasonal dynamics during the 2025-2026 wintering period. During early November 2025 surveys, no White-naped Cranes were recorded. Their numbers gradually increased as individuals arrived at the lake for the winter, with minor fluctuations along the way. The population reached a peak of 498 individuals in mid-February 2026. Following the onset of northward migration in mid-to-late March, the population of White-naped Cranes declined sharply (Fig. 1a).

Hooded Cranes began arriving at Poyang Lake in early December 2025. Their numbers increased rapidly, fluctuating moderately during the wintering period, and reached a peak of 327 individuals in early March 2026. With the progression of spring northward migration, their population gradually decreased to 159 individuals by mid-to-late March (Fig. 1b). Overall, both species exhibited a characteristic pattern of arrival, mid-winter peak, and spring decline during the wintering season.

Spatially, both White-naped Cranes and Hooded Cranes distinct spatiotemporal dynamics, though differences were observed in timing and aggregation patterns. In early November 2025, no White-naped Cranes were detected during lake surveys (Fig. 2a). By late November, individuals began arriving and formed low-to-moderate density aggregation sites in the northwest of the lake, including Wucheng and Nanji Township (Fig. 2b). Hooded Cranes were not recorded during early November surveys (Fig. 3a-b), but began arriving in early December, with low-density points first observed in the Wucheng area (Fig. 3c).

During the mid-winter period, the distribution range of both species expanded, and aggregation intensity increased markedly. White-naped Cranes formed multiple aggregation areas in Wucheng, Nanji Township, Zhouxi Town, and Yaqiao Lake, showing a “multi-center aggregation” pattern (Fig. 2c-g). Hooded Cranes gradually formed multiple medium-to-high density aggregation hotspots in Wucheng and Zhouxi Town in the northwest part of the lake (Fig. 3d-g).

By March 2026, White-naped Cranes reached their spatial distribution peak in mid-March, primarily concentrated from Wucheng to Nanji Township (Fig. 2h). Hooded Cranes reached their wintering peak in early March, with high-density areas mainly in the northern part of Wucheng Lake (Fig. 3h). Subsequently, as northward migration progressed, the number of recorded occurrence sites for both species declined significantly. By mid-to-late March, only scattered individuals remained (Fig. 2j), while Hooded Cranes decreased but still mainly occupied the northern part of the lake (Fig. 3j).

Overall, both species exhibited a pronounced spatiotemporal pattern during the wintering season at Poyang Lake: initial arrival and dispersion, enhanced aggregation in core habitats, followed by decline during spring migration. Core wintering areas for both species remained stably distributed in the northwest part of the lake.

【鹤类监测】
[Crane Monitoring]

2025 年内蒙古通辽市鹤类调查纪实

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通辽市位于内蒙古自治区东北部，是候鸟迁徙的重要途经地之一。2025年通辽市林草资源监测保障中心对迁徙鹤类进行了首次监测。

全年共监测到鹤类2491只，3月14日至3月27日共监测到鹤类275只，其中白鹤82只、丹顶鹤7只、白枕鹤18只、白头鹤18只、灰鹤150只。10月21日至11月21日共监测到鹤类2216只，其中白鹤69只、丹顶鹤144只、白枕鹤3只、白头鹤1只、灰鹤1999只。

调查地点分别选择在保护条件好、鸟类多、人为因素干扰小、候鸟集中的自然保护区和国家湿地公园等湿地范围内。





图 1 通辽市鹤类
Fig. 1 Cranes in Tongliao

Survey Record of Cranes in Tongliao City, Inner Mongolia, 2025

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Tongliao Forestry and Grassland Resources Monitoring and Support Center, Inner Mongolia 028314

Tongliao City, situated in the northeastern part of Inner Mongolia Autonomous Region, serves as a key stopover site for migratory birds. In 2025, the Tongliao City Monitoring and Safeguarding Center of Forestry and Grassland Resources conducted the first survey of migratory cranes.

Across the two survey periods, a total of 2,491 cranes were recorded. From March 14 to March 27, 275 cranes were recorded, including 82 Siberian Cranes, 7 Red-crowned Cranes, 18 White-naped Cranes, 18 Hooded Cranes, and 150 Common Cranes. From October 21 to November 21, 2,216 cranes were recorded, including 69 Siberian Cranes, 144 Red-crowned Cranes, 3 White-naped Cranes, 1 Hooded Crane, and 1,999 Common Cranes.

Survey sites were selected within nature reserves and national wetland parks that featured good protection status, high avian diversity, low levels of human disturbance, and high concentrations of migratory waterbirds.

山西运城保护区越冬鹤类资讯

陈春明

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2025 年冬季，位于永济市的山西运城湿地省级自然保护区（简称“运城保护区”）观测到鹤类越冬。其中，12 月 18 日，观测到 4 只白枕鹤；12 月 29 日，观测到 1 只丹顶鹤；同时有大群灰鹤越冬。下一步，永济市将进一步强化湿地巡护监测力度，完善鸟类多样性保护体系。



图 1 越冬的丹顶鹤与灰鹤

Fig. 1 Wintering Red-crowned Crane and Common Cranes



图 2 越冬的白枕鹤

Fig. 2 Wintering White-naped Cranes



图 3 越冬的灰鹤

Fig. 3 Wintering Common Cranes

Information on Wintering Cranes in Shanxi Yuncheng Nature Reserve

CHEN Chunming

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During the 2025 wintering season, migratory cranes were observed at the Shanxi Yuncheng Wetland Provincial Nature Reserve (hereinafter "Yuncheng Nature Reserve") in Yongji City. Surveys on December 18 recorded four White-naped Cranes, and on December 29, a single Red-crowned Crane was documented, alongside large flocks of Common Cranes wintering in the reserve.

In response to these findings, Yongji City plans to set up wetland monitoring and patrols, and to reinforce the conservation framework for regional avian diversity.

云南纳帕海保护区越冬鹤鹳类种群数量再攀新高

赵旭燕

纳帕海省级自然保护区管理局, 云南 香格里拉 674400

纳帕海是一个高原淡水湖, 位于云南西北部迪庆州香格里拉县, 距县城8 km, 海拔3266 m。丰水期湖水面积可达31.25 km², 集水面积660 km²。纳帕海湿地于1984成为云南纳帕海省级自然保护区(简称纳帕海保护区), 保护区面积24 km², 2004年被列为国际重要湿地。

2026年1月7日至9日, 纳帕海保护区管护局进行了2025-2026冬季鹤类调查。此次调查也作为2025-2026年度全国越冬鹤类同步调查的一部分。按全国鹤类调查的统一规程, 1月7日进行了调查地点、方法、培训新人方面的预调查; 1月9日开展了正式调查, 把保护区划分为哈木谷、纳帕、角茸、康几吓学4个片区。

此次调查记录到黑颈鹤数量573只, 其中幼鸟88只, 为纳帕海保护区成立以来的最高记录。这个数量相比去年同期增加11只; 相比2004年纳帕海列入国际重要湿地时的290只增加了283只, 增长比例为97.6%; 相比1984年纳帕海保护区成立时的61只增加了512只, 增长比例为839.3%。



图1 调查人员在观测(纳帕海保护区供图)

Fig. 1 Survey personnel conducting observations (Provided by Napahai Nature Reserve)



图 2 在纳帕海越冬的黑颈鹤（陈志明 摄）

Fig. 2 Black-necked Cranes wintering in Napahai (Photo by Chen Zhiming)

另外，本次调查还监测到灰鹤68只，相比去年同期增加32只；黑鹳226只，相比去年同期增加118只。值得一提的是，2025年12月2日观测到420只黑鹳，为2025-2026年度冬季候鸟迁徙期的最高值。



图 3 在纳帕海越冬的黑鹳（陈志明 摄）

Fig. 3 Black Storks wintering in Napahai (Photo by Chen Zhiming)



图 4 在纳帕海越冬的灰鹤（文杰 摄）

Fig. 4 Common Crane wintering in Napahai (Photo by Wen Jie)

纳帕海保护区位于中亚候鸟迁徙通道上，是众多候鸟的越冬地和迁徙停歇地。截至目前共记录到鸟类272种，其中国家一级保护鸟类15种、二级保护鸟类48种。纳帕海保护区是黑颈鹤中部种群最重要的越冬地，越冬的黑颈鹤数量占中部迁徙种群的90%以上。

近年来，纳帕海保护区的湿地保护与流域综合治理工作成效显著，区域整体生态环境持续改善，越冬黑颈鹤种群数量稳步增长，其他鸟类的种类与数量也同步增长，十四五期间新增鸟类记录61种，越冬高峰期候鸟数量高达5万余只。

Population of Wintering Cranes and Storks in Yunnan Napa Lake Nature Reserve Reaches a New Peak

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Napa Lake is a high-altitude freshwater lake located in Shangri-La County, Diqing Prefecture, northwestern Yunnan, approximately 8 km from the county town, at an elevation of 3,266 m. During the high-water season, the lake's surface area can reach 31.25 km², with a catchment area of 660 km². The area was designated as Napa Lake Provincial Nature Reserve in 1984, with the reserve covering 24 km², and in 2004 it was recognized as a Wetland of International Importance.

From January 7 to 9, 2026, the Napa Lake Nature Reserve Administration conducted the 2025 – 2026 winter crane survey. This survey was part of the nationwide synchronized winter crane survey for 2025 – 2026. According to the unified national crane survey protocol, January 7 was used for a preliminary survey, including the selection of survey sites, methodology, and training of new personnel. The formal survey was conducted on January 9, with the reserve divided into four survey zones: Hamugu, Napa, Jiaorong, and Kangjixue.

During the survey, a total of 573 Black-necked Cranes (*Grus nigricollis*) were recorded, including 88 juveniles, marking the highest count since the reserve was established. Compared with the previous winter, this represents an increase of 11 individuals. Relative to 2004, when Napa Lake was designated as a Wetland of International Importance, the population has increased by 283 individuals, representing a growth of 97.6%, and compared to 1984, when the reserve was established, the increase is 512 individuals (an increase of 839.3%).

Additionally, the survey recorded 68 Common Cranes (*Grus grus*), up by 32 from last year, and 226 Black Storks (*Ciconia nigra*), a rise of 118 individuals. Notably, on December 2, 2025, 420 Black Storks were observed, representing the highest count during the 2025 – 2026 wintering period.

Napa Lake Nature Reserve is situated along the Central Asian-Indian migratory flyway, serving as an important wintering and stopover site for numerous migratory birds. To date, 272 bird species have been recorded in the reserve, including 15 Nationally First-class Key Protected Species and 48 National Second-class Key Protected Species. The reserve is the most critical wintering site for the Central population of Black-necked Cranes, with over 90% of this population wintering here.

In recent years, wetland protection and integrated watershed management in Napa Lake have yielded notable conservation gains. The overall ecological environment of the region continues to improve, and the wintering population of Black-necked Cranes has steadily increased, alongside parallel increases in the diversity and abundance of other bird species. During the 14th Five-Year Plan, 61 new bird species were recorded, and the peak wintering period saw over 50,000 migratory birds in the reserve.

中国辽宁省辽河口国家级自然保护区的丹顶鹤☆

安东·A·萨辛

远东国立农业大学，俄罗斯 阿穆尔州布拉戈维申斯克

丹顶鹤是远东地区特有物种，现存两个种群：一个是栖息于日本北海道的岛屿非迁徙种群，另一个是繁殖于中国东北和俄罗斯东南部、越冬于中国东部沿海及朝鲜半岛中部的大陆迁徙种群。辽宁省辽河流域位于丹顶鹤前往中国盐城国家级自然保护区和黄河三角洲越冬地的迁徙路线上（图1）。历史上，该区域曾是丹顶鹤繁殖区的最南界，同时也是其越冬区的最北界。

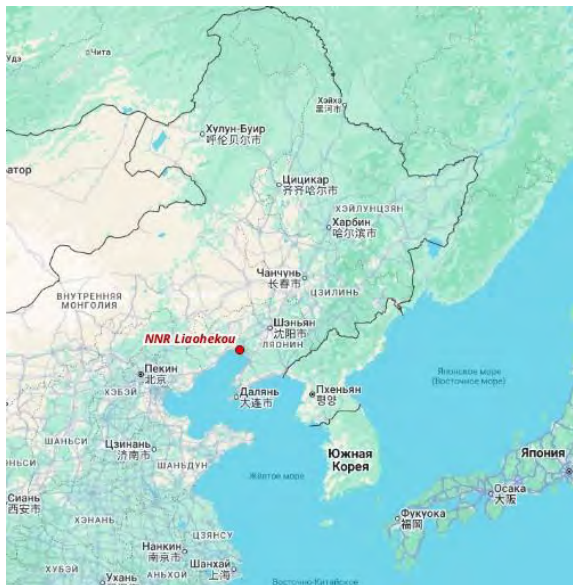


图 1 辽河口国家级自然保护区地理位置

Fig. 1 Location of the Liaohhekou National Nature Reserve

对一只名为“雪花”（俄语名Snezhinka）的雌性丹顶鹤的迁徙远程追踪显示，2021至2025年间，它每年都在中国辽河口国家级自然保护区附近越冬。这只丹顶鹤于俄罗斯阿穆尔州穆拉维约夫卡公园佩戴了GPS-GSM发射器（Sasin, Nikitina, 2024）。为了解其越冬状况并拍摄关于“雪花”的纪录片，笔者安东·萨辛与马克西姆·洛古诺夫于2026年1月16日至19日访问了辽河口国家级自然保护区（图2）。



图 2 与辽河口国家级自然保护区管理局的正式会面（中：马克西姆·洛古诺夫、安东·萨辛、李玉祥主任）

Fig. 2 Official meeting with the administration of the Liaohhekou NNR
(in the center: Maxim Logunov, Anton Sasin and Director Li Yuxiang)

☆ 转载自 Newsletter of the Flint Crane Working Group of Eurasia.

保护区南部缓冲区是名为“红海滩”的旅游区（得名于秋季茎叶变红、覆盖辽河两岸的碱蓬草），区内设有面积430公顷的丹顶鹤繁育中心（以下简称“繁育中心”）（图3、图4）。野生丹顶鹤偏好在此区域越冬，主要原因是保护区会进行定期人工补饲。

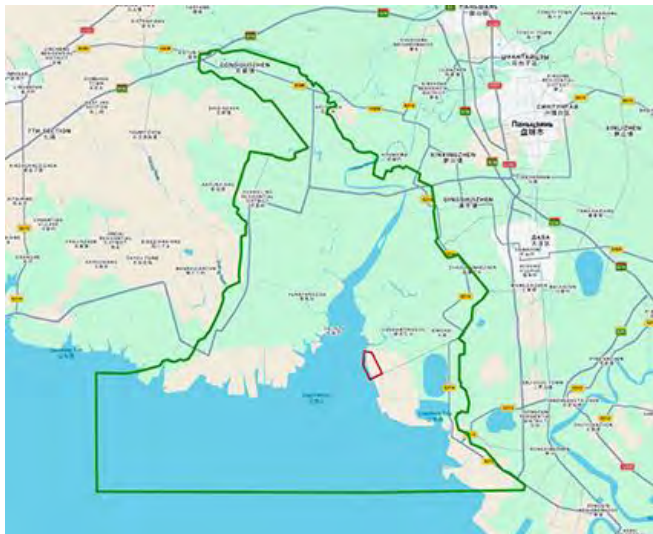


图3 辽河口国家级自然保护区总体边界（绿线）及繁育中心位置（红线）

Fig. 3 General boundaries of the Liaohhekou NNR (green line) and the location of the Breeding Center area (red line)

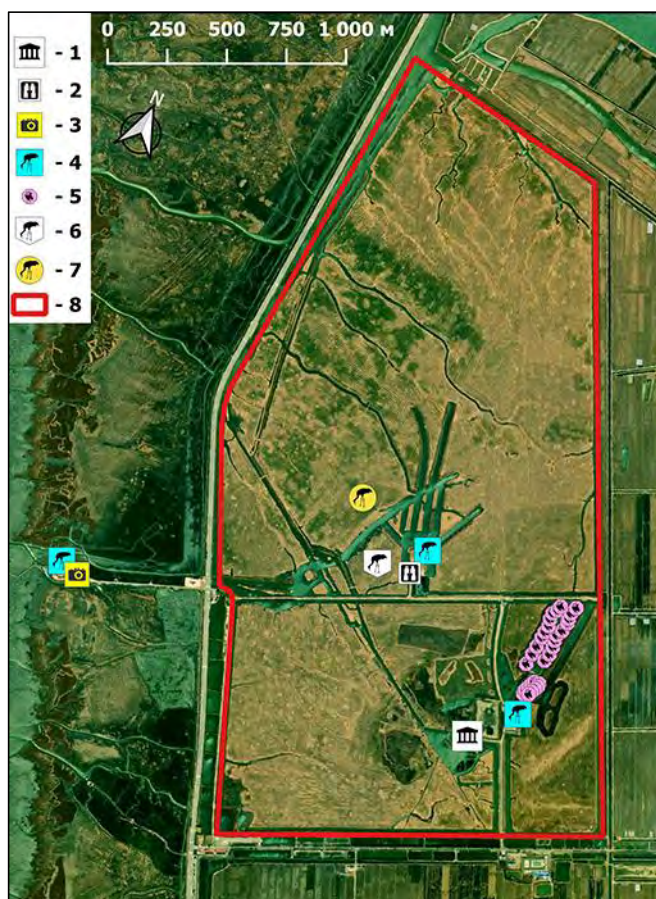


图4 辽河口国家级自然保护区内繁育中心区域示意图

Fig. 4 Schematic map of the Breeding Center territory within the Liaohhekou NNR

借助GPS发射器提供的坐标和繁育中心内安装的监控摄像头，我们很容易就找到了“雪花”。它与其他鹤类一起，定期前往保护区工作人员在结冰人工池塘上设置的投喂点。除了至少100只丹顶鹤外，繁育中心内的鹤群还包括白枕鹤、灰鹤、白鹤，以及一只单独的白头鹤（图5）。

保护区工作人员每天早上会在该池塘冰面上撒1-2袋玉米进行投喂，池塘岸边建有一座永久性建筑——游客观景台，建筑上安装的摄像头可用于观测鸟类。鹤类成群抵达投喂点，进食后返回池塘周围被部分收割的芦苇地，在那里度过大部分时间（图6）。



图 5 人工池塘冰面上投喂点的丹顶鹤、白枕鹤、灰鹤、白鹤及一只白头鹤（A·萨辛 摄）

注：该位置在图 4 中标记为“投喂点”

Fig. 5 Red-crowned Cranes, White-naped Cranes and Eurasian Cranes, as well as Siberian Cranes and a solitary Hooded Crane, at the feeding site located on the ice of an artificial pond. In Fig. 4, this site is marked as “Feeding site” (Photo by A. Sasin)



图 6 鹤类在投喂点附近的收割芦苇地休息（A·萨辛 摄）

注：该位置在图 4 中标记为“鹤类休息区”

Fig. 6 Cranes resting on cut reeds near the feeding site. In Fig. 4, this location is marked as “Crane roosting site” (Photo by A. Sasin)

在野生丹顶鹤中，除了佩戴白色脚环8C3的“雪花”（图7）外，我们还识别出：两只在俄罗斯阿穆尔州兴安国家级自然保护区环志的丹顶鹤：雌性“塔尔玛”（白色脚环1J6，2020年野放）和雄性“布戈”（白—黄—白三色脚环组合，2024年野放）（图8），两只佩戴扎龙国家级自然保护区宽红色脚环的个体，数只佩戴辽河口国家级自然保护区红色脚环、由该中心繁育并野放的个体，其他鹤类中未发现佩戴标记的个体。



图 7 投喂点的丹顶鹤“雪花”（白色脚环 8C3）（A·萨辛 摄）
Fig. 7 The Red-crowned Crane named Snowflake (white ring 8C3) at the feeding site (Photo by A. Sasin)



图 8 投喂点的丹顶鹤“布戈”（白—黄—白三色脚环组合），于阿穆尔州兴安国家级自然保护区野放（A·萨辛 摄）
Fig. 8 The Red-crowned Crane named Bugo (white–yellow–white ring combination), released into the wild in the Khingansky Nature Reserve, Amur Region, at the feeding site (Photo by A. Sasin)

尽管当地气候条件较为恶劣（持续零下5至18℃的低温，伴有黄海吹来的强风），但严格的保护措施和定期补饲为丹顶鹤创造了适宜的越冬条件。我们能看到鹤类因寒冷而发抖，但它们并未飞往更靠南的传统越冬地——黄河口和盐城国家级自然保护区（分别需要多飞行500公里和1000公里）。每年留在辽河口国家级自然保护区越冬的丹顶鹤数量持续增加：2010年首次记录到5只越冬个体，2024年已达到112只（图9）。2024年，迁徙途经辽河口国家级自然保护区的丹顶鹤总数为530只（图10）。



图 9 辽河口国家级自然保护区丹顶鹤越冬数量变化（数据来源 李玉祥）

Fig. 9 Dynamics of the number of Red-crowned cranes wintering in the Liaohekou NNR (Data provided by Li Yuxiang)



图 10 辽河口丹顶鹤迁徙过境数量变化（数据来源 李玉祥）

Fig. 10 Dynamics of the number of Red-crowned Cranes migrating through the Liao River estuary (Data provided by Li Yuxiang)

辽河口国家级自然保护区概况

1985年9月20日，盘锦市人民政府发布《关于将双台子河口列为市级水禽自然保护区的决定》（盘政发〔1985〕72号）；1987年，辽宁省人民政府发布辽政发〔1987〕12号文件，批准双台子河口自然保护区晋升为省级自然保护区；1988年，经国务院批准，该保护区升格为国家级自然保护区，总面积485624公顷。

丹顶鹤人工繁育工作

1987年，国际鹤类基金会联合创始人乔治·阿奇博尔德与美国野生动物研究中心研究员戴维斯·埃利斯访问该保护区。5月9日，他们在辽河口及沿海滩涂记录到23只丹顶鹤；5月10日，在保护区西部三道沟发现两个巢穴（分别有2枚和1枚卵）。访问期间，乔治建议饲养几对丹顶鹤以发展生态旅游和环境教育。6月6日，保护区工作人员将3只幼鹤交由芦苇场一名职工在家中饲养，这标志着保护区丹顶鹤人工繁育工作的正式启动。

1989年，保护区选派人员前往沈阳动物园学习鹤类人工繁育技术；1994年，将3只雌性丹顶鹤送往该动物园进行人工授精，同年6月这些雌鹤产卵后被送回保护区。自1996年起，繁育中心开始成功获得人工繁育的丹顶鹤后代。截至2026年1月，繁育中心拥有30对可繁殖丹顶鹤种群（表1）。

表 1 2016-2024 年繁育中心丹顶鹤繁殖对数及育雏数量（数据来源 李昱祥）

Tab. 1 Number of breeding pairs of Red-crowned Cranes and number of chicks raised at the Breeding Center from 2016 to 2024 (data provided by Li Yuxiang)

Year	Number of breeding pairs	Number of reared chicks
2016	11	27
2017	11	35
2018	11	46
2019	20	31
2020	20	17
2021	20	39
2022	30	76
2023	30	85
2024	30	86
Total	442	

繁殖对饲养在7×7米的独立笼舍中，无遮蔽设施。笼舍建在人工池塘中的平台上，彼此间距5-20米，部分笼舍内部设有水池供鹤类使用。繁育中心不同区域建有三个宽敞的公共雏鸟笼舍，尺寸分别为50×8米、50×10米和25×12米，每个笼舍可饲养数十只当年离巢的雏鸟。其中一个50×8米的笼舍紧邻野生鹤类的休息和投喂区，使雏鸟能够与野生个体保持视觉和听觉接触，有助于提高野放后的适应能力和社会化程度（图11）。



图11 位于野生鹤类越冬地附近的离巢雏鸟公共笼舍，雏鸟可与野生个体保持视觉和听觉接触（A·萨辛 摄）
Fig. 11 Communal enclosure for fledged chicks located near the wintering site of wild cranes. The chicks maintain visual and vocal contact with wild individuals (Photo by A. Sasin)

另一个50×10米的笼舍建在“红海滩”旅游区内，饲养用于旅游展示和环境教育的大龄雏鸟。这些鸟类长期与人类接触，行为类似家禽，可在游客中自由行走、活动和飞翔，但夜间会返回笼舍（图12）。尽管气温低于零度且有强风，所有笼舍均未设置遮蔽设施，使丹顶鹤从小就适应自然气候条件。笼舍位置分布见图4。



图 12 旅游区内散步的幼年丹顶鹤，在向游客进行飞行展示后会被引导返回笼舍（A·萨辛 摄）

Fig. 12 Young Red-crowned Cranes during a walk in the tourist zone. After demonstration flights among tourists, they are guided back into their enclosure (Photo by A. Sasin)

近年来，为提高繁育中心的繁殖效率，广泛采用取走第一窝卵以刺激亲鸟产第二窝卵的技术。2024 年，30 对繁殖对共繁育出 86 只雏鸟，平均每对近 3 只。

繁育中心饲养的大部分雏鸟最终会在保护区内野放：2021 年野放 140 只幼鹤；2024 年野放 103 只 2021-2022 年孵化的幼鹤。然而，并非所有野放个体都能成功适应野生环境：2021 年野放的 140 只丹顶鹤中，20 只死亡；2023 年越冬期记录到 106 只个体，14 只未被发现，野放鹤的存活率在 75.7% 至 80% 之间。

值得注意的是，野放的丹顶鹤未表现出迁徙行为，没有向南越冬的迫切需求，因此在辽河口国家级自然保护区内逐渐形成了一个留居种群。

目前，辽河口国家级自然保护区是中国丹顶鹤人工繁育和野放工作的领先基地，已通过两项丹顶鹤保护与恢复项目累计野放个体超过 240 只。

本文关于辽河口国家级自然保护区工作的信息，整理自《丹顶鹤·辽宁省辽河口国家级自然保护区》宣传册（李玉祥主编，中文）以及《辽宁省辽河口国家级自然保护区丹顶鹤人工繁育与野放进展报告》（李玉祥著）。

致谢

感谢中国科学院生态环境研究中心曹垒教授及其团队协助组织盘锦之行和保护区访问，感谢李玉祥主任及辽河口国家级自然保护区全体工作人员帮助寻找丹顶鹤“雪花”、提供繁育中心工作资料并全程陪同考察。

Red-crowned Cranes in the Liaohekou National Nature Reserve, Liaoning Province, China

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The Red-crowned Crane is an endemic species of the Far East. There are two populations: one island non-migratory population inhabiting Hokkaido (Japan), and another continental population that breeds in northeastern China and southeastern Russia and winters along the eastern coast of China and in the central part of the Korean Peninsula. The Liaohe River Valley in Liaoning Province lies along the migration route to the Chinese wintering grounds in the Yancheng National Nature Reserve (NNR) and the Yellow River Delta (Fig. 1). In the past, this area marked the southernmost boundary of the breeding range and hosted the northernmost wintering sites.

Remote tracking of the migration of a female Red-crowned Crane named Snowflake (Snezhinka in

Russian), fitted with a GPS-GMS transmitter in Muravyovka Park (Amur Region, Russia), revealed that each year from 2021 to 2025 she wintered in China in the vicinity of the Liaohekou NNR (Sasin, Nikitina, 2024). To familiarize ourselves with the wintering conditions and to film a documentary about Snowflake, we, Anton Sasin and Maxim Logunov, visited the Liaohekou NNR from 16 to 19 January 2026 (Fig. 2).

In the southern buffer zone of the reserve, which serves as the tourist area known as “Red Beach” (the name derives from the plant *Suaeda prostrata*, whose shoots and leaves turn red in autumn and cover the banks of the Liaohe River), there is the Red-crowned Crane Breeding Center (hereafter – the Breeding Center) with an area of 430 ha (Fig. 3, 4). It is precisely within this territory that wild cranes prefer to winter. The main reason for wintering in such a cold location is regular artificial feeding.

Thanks to the coordinates obtained from the GPS transmitter and the surveillance cameras installed within the Breeding Center, locating Snowflake proved to be quite easy. Together with other cranes, she regularly visited the feeding site organized by the reserve staff on a frozen artificial pond. In addition to Red-crowned Cranes, numbering at least 100 individuals, gatherings within the Breeding Center also included White-naped, Eurasian and Siberian cranes, and a solitary Hooded Crane (Fig. 5).

Daily morning feeding is carried out by scattering 1–2 sacks of corn on the ice of this pond, on whose shore a permanent building has been constructed – a viewing platform for tourists. Cameras mounted on the building allow observation of the birds. The cranes arrived at the feeding site in groups and then returned to the partially cut reed beds surrounding the pond, where they spent most of their time (Fig. 6).

Among the wild Red-crowned cranes, in addition to Snowflake with the white ring 8C3 (Fig. 7), we identified two Red-crowned cranes banded at the Khingan State Nature Reserve in Amur Region in Russia (a female named Talma with the white ring 1J6, released into the wild in 2020, and a male named Bugo with a color-ring combination white–yellow–white (Fig. 8), released into the wild in 2024), two individuals with wide red bands marked in the Zhalong NNR, and several cranes with narrower red rings raised and released into the wild in the Liaohekou NNR. No tagged individuals were detected among the other crane species.

Despite the rather unfavorable climate (persistent subzero temperatures ranging from -5 to -18 °C accompanied by strong winds blowing from the Yellow Sea), protection and regular feeding have created suitable conditions for successful wintering. The cranes could be seen shivering from the cold, yet they did not depart for their more southern traditional wintering grounds — the Yellow River estuary and the Yancheng NNR, which would require flights of an additional 500 and 1,000 km, respectively. Each year, the number of Red-crowned cranes remaining to winter in Liaohekou NNR increases. The first five wintering cranes were recorded here in 2010, while in 2024 their number had already reached 112 individuals (Fig. 9). The total number of Red-crowned Cranes migrating through the Liaohekou NNR in 2024 amounted to 530 individuals (Fig. 10).

About the Liaohekou National Nature Reserve

On 20 September 1985, the People’s Government of Panjin issued the decree “On Granting the Shuangtaizi River Estuary the Status of a Municipal Waterfowl Nature Reserve” (Panzhengfa [1985] No. 72). In 1987, the People’s Government of Liaoning Province issued Document No. 12 of 1987, “*Approval of Granting the Shuangtaizi River Estuary Nature Reserve Provincial-Level Status.*” In 1988, by decision of the State Council, the territory was upgraded to a National Nature Reserve with an area of 485,624 ha.

Captive breeding of Red-crowned Cranes

In 1987, the reserve was visited by George Archibald, co-founder of the International Crane Foundation, and Davis Ellis, a researcher from the U.S. Wildlife Research Center. On 9 May, they recorded 23 Red-crowned cranes at the Liao River estuary and along coastal mudflats, and on 10 May discovered two nests (with two and one egg) at Sandao in the western part of the Liaohekou NNR. During the visit, George proposed raising several pairs of Red-crowned Cranes to attract tourists and support environmental education.

On 6 June, reserve staff placed three juvenile cranes for keeping at the home of an employee of a reed farm. These events marked the beginning of Red-crowned Crane captive breeding activities in the reserve.

In 1989, the reserve sent the staff to Shenyang Zoo to study crane breeding methods in captivity, and in 1994 three females were transferred to the zoo for artificial insemination. In June, they laid eggs and were subsequently returned. Since 1996, the Breeding Center has begun to obtain offspring from captive cranes. As of January 2026, the breeding stock comprises 30 reproductive pairs (Table 1).

Breeding pairs are kept in individual (paired) enclosures measuring 7×7 m, without covered shelters. The enclosures are situated on platforms among artificial ponds, at distances of 5–20 m from one another. Some enclosures are equipped with internal pools for the cranes.

Three spacious communal enclosures measuring 50×8 , 50×10 , and 25×12 m have been constructed for chicks and are located in different parts of the Breeding Center. Each houses several dozen fledged chicks of the year. One enclosure (50×8 m) is situated near the resting and feeding area of wild cranes; thus, the chicks maintain visual and vocal contact with wild individuals, facilitating improved adaptation and socialization after the release (Fig. 11).

Another enclosure (50×10 m) is built within the “Red Beach” tourist zone. It holds older chicks used for tourism development and environmental education. These birds are in constant contact with humans and behave like domestic birds. They are released to walk among tourists, move freely, and fly, but return to their enclosure at night (Fig. 12). Despite subzero temperatures and strong winds, the enclosures lack shelters, and cranes are accustomed to natural weather conditions from an early age. The scheme of the enclosures’ location is shown in Fig. 4.

In recent years, to increase productivity at the Breeding Center, the removal of the first clutch has been actively practiced, stimulating pairs to lay a repeated clutch. As a result, in 2024 a total of 86 chicks were obtained from 30 pairs (nearly three chicks per pair).

Most chicks raised in enclosures are subsequently released into the wild within the reserve. In 2021, 140 young cranes were released, and in 2024, 103 cranes hatched in 2021 and 2022 were released. However, not all released cranes successfully adapt to wild conditions. Of the 140 Red-crowned Cranes released in 2021, 20 died. During the wintering period of 2023, 106 individuals were recorded, while 14 were not detected. The survival rate of released cranes ranged from 75.7% to 80%. Notably, released cranes do not exhibit migratory behavior and lack a critical need to move south for wintering. Thus, a resident sedentary population is gradually forming within the Liaohekou NNR.

At present, the Liaohekou NNR is a leading site in China for the captive breeding and reintroduction of Red-crowned Cranes into the wild, having released more than 240 individuals as part of two conservation and restoration programs for this species in China.

The information on the activities of the Liaohekou NNR was prepared based on the brochure “Red-crowned Crane. Liaohekou National Nature Reserve, Liaoning Province” (ed. Li Yuxiang) (in Chinese), as well as the presentation “*Progress Report on Artificial Breeding and Release of Red-crowned Cranes in the Liaohekou National Nature Reserve, Liaoning Province*” (author Li Yuxiang).

Acknowledgements

I would like to thank Professor Cao Lei (RCEES, CAS) and her team for their assistance in organizing the trip to Panjin and the visit to the Liaohekou NNR, as well as Director Li Yuxiang and the staff of the Liaohekou NNR for their help in locating the crane Snowflake, providing materials on the Breeding Center’s activities, and accompanying us during the visit to the reserve.

来自黄河三角洲的鹤讯

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山东黄河三角洲国家级自然保护区（简称黄河三角洲）已经成为众多候鸟重要的栖息地。继东方白鹳（*Ciconia boyciana*）之后，又一关键物种丹顶鹤（*Grus japonensis*）把这里从迁徙停歇地变成了越冬地和繁殖地。自 2018 年以来卫星跟踪数据显示，这里越冬的丹顶鹤多在潮间带“赶海”，很难被观察到。近三年来，这里繁殖的丹顶鹤巢数稳中有增（图 1）。两个繁殖季的卫星跟踪结果显示，当地出生的丹顶鹤尚未有迁离出生地的情况。未来是否有扩散的可能有待进一步监测。从迁徙停歇到越冬和繁殖，黄河三角洲已经成为丹顶鹤的“全能型”栖息地。



图 1 黄河三角洲繁殖的丹顶鹤

Fig. 1 Breeding Red-crowned Cranes in the Yellow River Delta



图 2 黄河三角洲卫星追踪的丹顶鹤

Fig. 2 Satellite-tracked Red-crowned Cranes in the Yellow River Delta.

Updates on Cranes in the Yellow River Delta

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The Yellow River Delta National Nature Reserve has become an excellent habitat for numerous migratory birds. Following the Oriental White Stork (*Ciconia boyciana*), another key species, the Red-crowned Crane (*Grus japonensis*), has transformed this area from a stopover site into both a wintering and breeding ground. Since 2018, satellite tracking data have shown that Red-crowned Cranes wintering here frequently forage in the intertidal zone, which makes them difficult to observe. Over the past three years, the number of Red-crowned Crane nests in the area has steadily increased (Fig. 1). Satellite tracking during two consecutive breeding seasons indicates that locally born Red-crowned Cranes have not yet dispersed from their natal sites. Whether they will expand their range in the future remains to be monitored. Having transitioned from a stopover site to both a wintering and breeding habitat, the Yellow River Delta has already become an “all-purpose” habitat for Red-crowned Cranes

【黑颈鹤网络】

[Black-necked Crane Conservation Network]

甘肃盐池湾保护区 2025 年黑颈鹤繁殖信息

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2025 年 5-7 月, 甘肃盐池湾国家级自然保护区 (简称“盐池湾保护区”) 管护中心盐池湾保护站联合中国科学院动物研究所通过“地面调查+无人机精确定位”方式开展了黑颈鹤巢位分布格局专项调查。

本次调查共搜索定位 55 巢黑颈鹤。分析显示: 繁殖黑颈鹤在保护区内呈明显的聚集分布; 巢位主要集中于远离牧民定居点、周围生境异质性较高且内部连通性较好的深水湖泊斑块中, 且多偏好岛状草垛。

窝卵数方面, 2 枚卵的有 49 巢、1 枚卵的有 3 巢、3 枚卵的有 2 巢、另 1 巢见 1 雏鸟但无法确定窝卵数, 累计记录到卵数至少 108 枚。

孵化成功率方面, 截至 2025 年 7 月 30 日, 11 巢孵化失败、雏鸟均未破壳。2025 年, 盐池湾保护区黑颈鹤的巢孵化成功率为 $44/55=80.00\%$, 卵孵化成功率为 $74/108=68.52\%$ 。

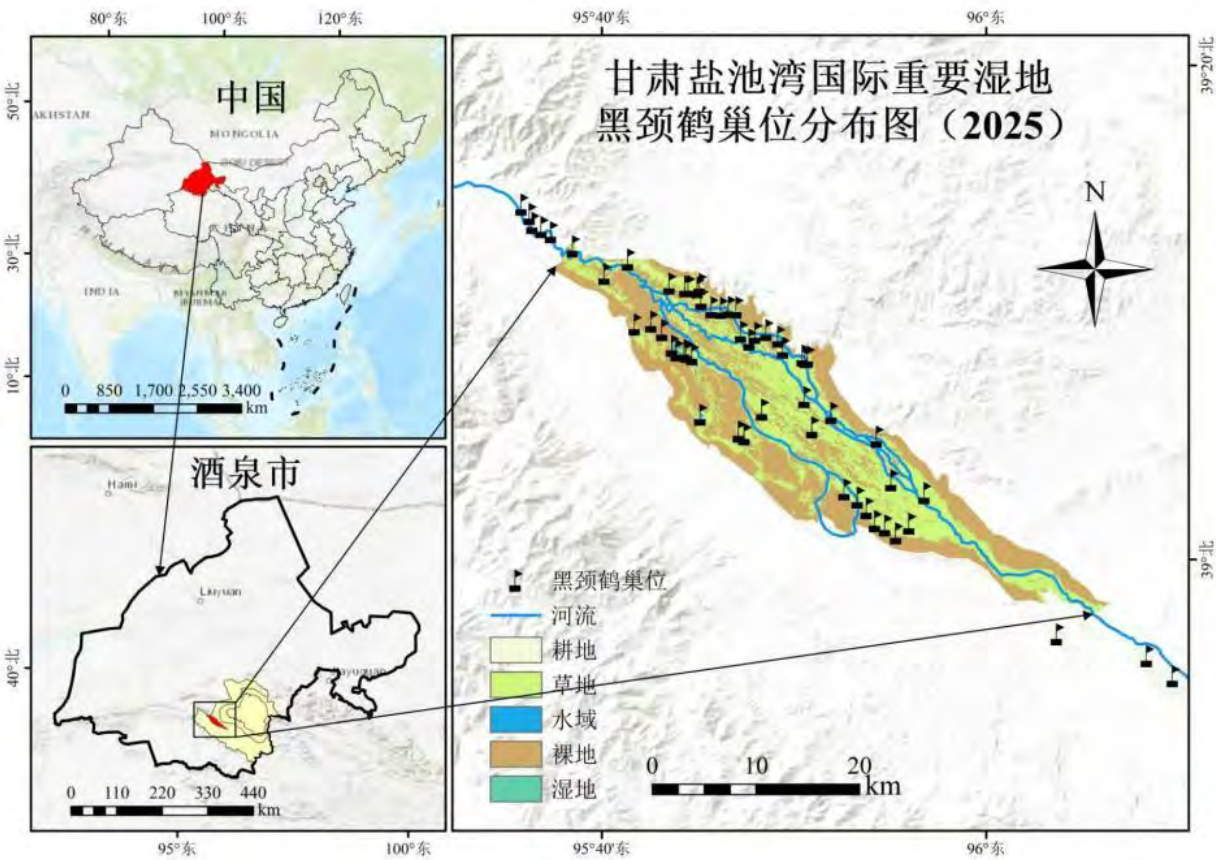


图 1 2025 年甘肃盐池湾保护区黑颈鹤巢位分布图 (地图审图号为 GS (2024) 0650)

Fig. 1 Distribution of Black-necked Crane nests in Gansu Yanchiwan Reserve, 2025

Black-necked Crane Breeding Information in Gansu Yanchiwan Nature Reserve, 2025

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From May to July 2025, the Yanchiwan Protection Station of the Management and Protection Center of Gansu Yanchiwan National Nature Reserve (hereinafter referred to as “Yanchiwan Nature Reserve”), in collaboration with the Institute of Zoology, Chinese Academy of Sciences, conducted a specialized survey on the nest distribution patterns of Black-necked Crane. The survey employed a combination of ground-based surveys and high-precision drone positioning.

A total of 55 Black-necked Crane nests were identified and analyzed. The results showed that breeding Black-necked Cranes exhibited a pronounced aggregated distribution pattern within the Reserve. Nests were predominantly concentrated in deep-water lake patches characterized by located far from herder settlements, possessing high surrounding habitat heterogeneity, and maintaining good internal connectivity, with a distinct preference for island-like grass mounds.

In terms of clutch size, 49 nests contained 2 eggs, 3 nests contained 1 egg, and 2 nests contained 3 eggs. In one additional nest, a single chick was observed but the exact clutch size could not be determined. A minimum total of 108 eggs was recorded.

Regarding hatching success: As of July 30, 2025, 11 nests had failed to hatch, with no chicks breaking out of their eggs. In 2025, the nest hatching success rate for Black-necked Cranes in Yanchiwan Nature Reserve was $44/55 = 80.00\%$, and the egg hatching success rate was $74/108 = 68.52\%$.

云南会泽保护区小鹤学堂环境教育基地建设成效明显

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小鹤学堂环境教育基地项目是会泽黑颈鹤国家级自然保护区（以下简称“会泽保护区”）的首个国际合作项目。自 2024 年与国际鹤类基金会（美国）北京代表处深度合作以来，项目建设卓有成效。

一、主要做法

（一）创新区校共建教学模式。会泽鹤管局与两所小学各选派 1-2 名业务能力强的科普宣教人员和教师共 10 人，由国际鹤类基金会组织培训，组成一支稳定的小鹤学堂教师团队，建立小鹤学堂长效教学机制。“保护区+学校”双师共教的区校共建教学模式属全国首家。

（二）创新课程开发方式。教师团队自主开发了《会泽黑颈鹤的栖息地》《念湖水生植物的奇妙世界》《会泽悠久的历史》《讲好保护区故事》等 16 门涵盖黑颈鹤知识、念湖湿地、历史人文、环境保护、人鸟和谐的特色课程，由会泽鹤管局分管副局长、局长、鹤类保护专家和国际鹤类基金会四级联审，最终形成小鹤学堂教师教学教案、学生教材、进阶课程及 PPT，纳入学校教学计划进行课程固化。

（三）创新基地实践范式。以杨梅山小学和多发小学为基地，装修 2 间鹤元素特色教室，利用保护区和县教体局共建的全县中小学生生态文明劳动教育实践基地，以及保护区一地（念湖湿地）两馆（9D 沉浸式体验馆、VR 科普体验馆）一中心（黑颈鹤视频监控中心）4 个室外宣教场所，开展室内教学和户外体验，打造小鹤学堂实践的标准范式。

（四）创新全面推广形式。结合学校延时服务课，将小鹤学堂课程在 2 个乡镇小学全面推广。创作校歌《鹤翔天际》，编排鹤元素舞蹈《守护》，举办“小鹤杯”教职工运动会，在幼儿园大班开设黑颈鹤保护专题教育课，组织县城 6 所小学以“嘉年华”形式开展世界候鸟日+国际生物多样性日公众宣传活动、“六·五”世界环境日公众宣传活动 2 次 1000 余人，利用“家校活动”引导 100 余名家长自觉签订《黑颈鹤保护与社区共建共管协议》，带动社区群众自愿参加黑颈鹤食源地建设、湿地垃圾清理等行动，推动小鹤学堂环境教育由校园向社区辐射。

二、取得的成绩

（一）传播面广。2024 年 9 月以来，在保护区涉及的大桥乡杨梅山小学和者海镇多发小学 4-5 年級的 150 名学生中，每年开展小鹤学堂环境教育活动 18 次，其中自然游戏、鹤类户外观测等形式多样的冬/夏令营活动 2 次。至 2025 年 12 月，小鹤学堂已逐步推广至 2 个乡镇 28 所小学 230 个班级 7500 余名学生，受众达 19872 人（次），成为青少年自然教育的阵地。

（二）课程开发成果丰。项目实施中，配套开发了《小鹤学堂教学教案（教师版）》及 PPT；延伸开发的小鹤学堂教材（学生版）—《高原精灵·念湖黑颈鹤探秘》作为“全国未成年人生态道德教育系列教材”，得到中国野生动物保护协会、国际鹤类基金会、会泽县教体局支持，将于 2026 年末出版发行；开发的 1-6 年级进阶课程作为校本课程，已在大桥乡 13 所小学 76 个班级 5800 余名学生中试行。《小鹤学堂》（生态文明教育课程）获云南省教育厅 2025 年云南省生态文明教育活动优秀成果奖。“小鹤学堂”科普宣教活动正参加国家林草局举办的 2025 年全国科普月优秀科普活动案例评选。

（三）影响力大。《会泽黑颈鹤国家级自然保护区“小鹤学堂”开课了》《“小鹤学堂”源泉厚植云南会泽的“绿水青山”沃土》《护鹤员野外巡护的一天》等信息被国家林草局官网、学习强国、中国鹤类通讯、环球少年地理等媒体及刊物登载报道；小鹤学堂建设成效得到国家林草局国际合作交流中心和北京市公安局的高度认可和肯定，取得的经验在第九届黑颈鹤国际网络年会上作典范交流，为全国鹤类保护区提供“会泽模式”。

（四）保护成效好。通过小鹤学堂教学活动的开展，公众保护意识不断增强。2025 年保护区巡护监督结果表明，通过“小手拉大手”，社区对鹤类的威胁和对湿地的破坏行为为 0，群众主动救治受伤黑颈鹤、金雕、灰鹤、亚洲狗獾等野生动物 4 例。

三、取得的经验

（一）小鹤学堂成为保护工作联盟的纽带。通过小鹤学堂项目的实施，将会泽保护区与鹤类迁徙通道上的江西、内蒙、四川、贵州、甘肃及云南昭通、寻甸等鹤类保护地及社区联结起来，形成鹤类迁飞路线上的自然保护工作联盟，更好地为黑颈鹤等候鸟保驾护航。

（二）小鹤学堂成为生态效益向社会效益转化的载体。通过小鹤学堂环境教育教学实践，向青少年普及习近平生态文明思想、人与自然和谐共生、绿水青山就是金山银山理念及美丽中国建设知识，引导孩子们从学知识的情感认同升华为护家乡爱祖国的行动自觉，构建“教育一个孩子、带动一个家庭、影响整个社区”的大保护格局。

（三）小鹤学堂成为自然保护合力形成的杠杆。小鹤学堂项目的实施，撬动了国际鹤类基金会、深圳质兰基金会、中国科学院昆明动物研究所、会泽县公安局、会泽县教体局、会泽县社科联、会泽县文明办、大桥乡和者海镇党委、政府、在地·念湖自然中心、社区群众等各方力量，形成自然保护合力。

Remarkable Progress in the Development of “Crane School” Environmental Education Base in Yunnan Huize National Nature Reserve

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The “Crane School” environmental education base project is the first international cooperation project undertaken by the Huize Black-necked Crane National Nature Reserve (hereinafter referred to as “Huize Nature Reserve”). Since the initiation of in-depth cooperation with International Crane Foundation in 2024, the project has achieved remarkable results.

1. Main Approaches

(1) Innovative Reserve-School Co-teaching Model

The Huize Nature Reserve Administration Bureau selected 1-2 capable science popularization educators and teachers from each of two primary schools, totaling 10 people. These individuals were trained by the International Crane Foundation to form a stable teaching team for “Crane School”, establishing a long-term teaching mechanism. This “reserve + school” co-teaching model is the first of its kind in China.

(2) Innovative Curriculum Development

The teaching team independently developed 16 specialized courses covering Black-necked Crane knowledge, Nianhu Lake wetland, history and culture, environmental protection, and harmonious coexistence between humans and cranes. These courses include topics such as “Habitat of the Huize Black-necked Crane”, “The Wonderful World of Aquatic Plants in Nianhu Lake”, “The Long History of Huize”, and “Telling the Stories of the Reserve”. The curriculum underwent a four-level joint review process involving the Deputy Director and Director of the Huize Nature Reserve Administration Bureau, crane protection experts, and the International Crane Foundation. This process ultimately produced teaching plans, student textbooks, advanced courses, and PPT materials. These materials have been incorporated into school teaching plans as fixed courses.

(3) Innovative Base Practice Model

Using Yangmeishan Primary School and Duofa Primary School as base sites, two crane-themed classrooms were renovated. The project utilizes the ecological and labor education practice base for primary and secondary school students, jointly established by the reserve and the county education and sports bureau, as well as four outdoor education venues within the reserve: one wetland (Nianhu Lake), two museums (9D immersive experience museum, VR science experience museum), and one center (Black-necked Crane video monitoring center). By integrating indoor teaching with outdoor experiences, the project has established a standard practice model for “Crane School”.

(4) Innovative Comprehensive Promotion

The “Crane School” curriculum has been fully promoted in primary schools across two townships through after-school services. Activities include: creating the school song “Crane Soaring in the Sky”; choreographing the crane-themed dance “Guardian”; organizing the “Little Crane Cup” faculty sports meeting; offering special Black-necked Crane protection education classes in kindergarten senior classes; organizing public awareness activities for World Migratory Bird Day and International Day for Biological Diversity in the form of a carnival involving six primary schools in the county seat; conducting two public environmental awareness activities (on World Environment Day, June 5) with over 1,000 participants, and using “home-school activities” to guide more than 100 parents to voluntarily sign the “Black-necked Crane Protection and Community Co-management Agreement”. These efforts have encouraged community members to voluntarily participate in actions such as creating food sources for Black-necked Cranes and cleaning up wetland garbage, thereby radiating environmental education from the school campus to the community.

2. Achievements

(1) Wide Outreach.

Since September 2024, environmental education activities of “Crane School” have been conducted 18 times annually among 150 students in grades 4-5 at Yangmeishan Primary School in Daqiao Township and Duofa Primary School in Zehai Town within the reserve. These include two winter/summer camps featuring nature games and outdoor crane observation. By December 2025, “Crane School” has been gradually expanded to reach 7,500 students across 230 classes in 28 primary schools throughout the two townships, with a total audience of 19,872 person-times. It has become a hub for youth nature education.

(2) Rich Curriculum Development Outcomes.

During project implementation, the “Little Crane Academy Teaching Plan (Teacher’s Edition)” and accompanying PPT materials were developed. An extended student edition textbook, “*Highland Spirits: Exploring the Black-necked Cranes of Nianhu Lake*”, which is part of the “National Youth Ecological Ethics Education Series”, has received support from the China Wildlife Conservation Association, the International Crane Foundation, and the Huize County Education and Sports Bureau, and is scheduled to be published and distributed at the end of 2026. The advanced courses for grades 1-6, developed as school-based curricula, have been piloted with over 5,800 students across 76 classes in 13 primary schools in Daqiao Township. “Crane School” (Ecological Civilization Education Course) received the Outstanding Achievement Award in the 2025 Yunnan Province Ecological Civilization Education Activities from the Yunnan Provincial Department of Education. The science popularization activities of the “Crane School” are currently under consideration for the Outstanding Science Popularization Activity Case selection for the 2025 National Science Popularization Month organized by the National Forestry and Grassland Administration.

(3) Significant Influence.

Information such as “Huize Black-necked Crane National Nature Reserve’s Crane School Opens”, “Crane School Nurtures the Lucid Waters and Lush Mountains of Huize, Yunnan”, and “A Day in the Field Patrol of a Crane Guardian” has been reported and published by media and journals including the official website of the National Forestry and Grassland Administration, Xuexi Qiangguo (Learning Power), *China Crane Newsletter*, and *National Geographic Kids* (Global Edition). The achievements of the “Crane School” have received high recognition and affirmation from the International Cooperation and Exchange Center of the National Forestry and Grassland Administration and the Beijing Public Security Bureau. The experience gained has been shared as a model at the 9th International Black-necked Crane Network Annual Meeting, providing a “Huize Model” for crane reserves across China.

(4) Effective Conservation Outcomes.

Through the implementation of “Crane School” teaching activities, public awareness of conservation has been continuously strengthened. Patrol and monitoring results from the Reserve in 2025 show that, through the “small hands holding big hands” approach, there have been zero instances of community threats to cranes or damage to wetlands. Community members have voluntarily taken the initiative to rescue four cases of wild animals, including injured Black-necked Cranes, Golden Eagles, Common Cranes, and Asian Badgers.

3.Experiences

(1) “Crane School” has become a unifying force for the conservation collaboration.

Through its implementation, the Huize Nature Reserve has forced connections with crane conservation sites and communities across the migratory flyway, spanning Jiangxi, Inner Mongolia, Sichuan, Guizhou, Gansu, as well as Zhaotong and Xundian within Yunnan Province. This network has formed a cohesive conservation alliance along the crane flyway, significantly strengthening the protection of migratory birds such as the Black-necked Crane.

(2) “Crane School” serves as a vital conduit for the transformation of ecological benefits into social benefits.

Through its environmental education practice of “Crane School”, it instills in young people the principles of Xi Jinping Thought on Ecological Civilization, the vision of harmonious coexistence between humans and nature, the philosophy that clear waters and lush mountains are invaluable assets, and about the broader goals of construction of a beautiful China among young people. It guides children to translate their emotional connection to learning into concrete actions of protecting their hometown and cherishing their motherland, and fosters a comprehensive conservation model where “one child teaches one family, one family moves a community”.

(3) “Crane School” has emerged as a strategic catalyst for building collaborative synergy in nature conservation.

Its implementation has brought together a diverse coalition of stakeholders—including the International Crane Foundation, Shenzhen Zhilan Foundation, Kunming Institute of Zoology of Chinese Academy of Sciences, Huize County Public Security Bureau, Huize County Education and Sports Bureau, Huize County Federation of Social Sciences, Huize County Civil Affairs Office, the Party and Government Committees of Daqiao Township and Zhehai Town, the Onsite-Nianhu Nature Center, community residents, and others. This multi-sector partnership has effectively forged a powerful conservation synergy along crane flyway.

2025 年甘肃盐池湾湿地公园黑颈鹤专项调查

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黑颈鹤 (*Grus nigricollis*) 是全球唯一典型的高原鹤类, 也是我国一级重点保护野生动物。盐池湾湿地公园是甘肃省黑颈鹤最重要的繁殖地之一, 10 月正值其繁殖季末期和迁徙前集结阶段, 是评估种群数量、家庭结构及空间分布特征的关键时期。基于此, 2025 年 10 月在以盐池湾湿地公园为中心、半径 350 km 的圆形范围内 (重点覆盖盐池湾党河湿地、大小苏干湖及东巴兔、桥子、双塔、阳关、石包城等外围相关区域) 开展了黑颈鹤及伴生物种专项调查。

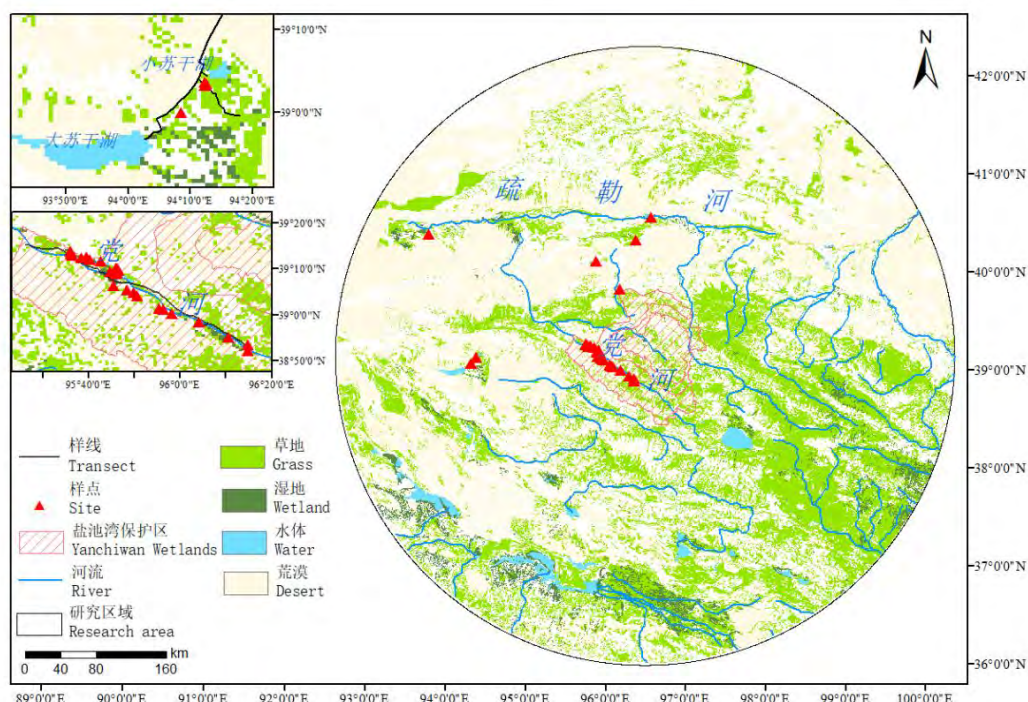


图 1 调查区域及样点样线

Fig. 1 Survey area and sampling sites/transects

本次调查共记录黑颈鹤 34 个家庭 105 只个体，其中成鸟 68 只、幼鸟 30 只（28.6%）、亚成体 7 只，未发现环志个体。其中，盐池湾 25 个家庭（3 个双幼家庭、16 个单幼家庭）79 只个体，苏干湖 4 个家庭（1 个双幼家庭、1 个单幼家庭）11 只个体，东巴兔、桥子、双塔、阳关和石包城等地区 5 个家庭（2 个双幼家庭、1 个单幼家庭）15 只个体。

除黑颈鹤外，本次调查伴生物种 19 种 560 只个体；其中，鸟类 14 种 522 只，兽类 5 种 38 只。其中，水鸟 11 种 518 只（91.3%），优势种为棕头鸥（251 只）、大天鹅（102 只）、凤头潜鸭（95 只）和白骨顶（40 只），红隼（2 只）、猎隼（1 只）和漠鹞（1 只）数量较少；兽类包括藏野驴（20 只）、藏原羚（9 只）、鹅喉羚（7 只）、狗獾（1 只）、赤狐（1 只）。

综上，盐池湾仍是区域内最重要的黑颈鹤核心分布区，大小苏干湖则在维持少量家庭分布的同时，对伴生水鸟表现出更强的集群承载功能。值得注意的是，本次调查除记录到大量棕头鸥和大天鹅等水鸟外，还记录到赤狐、猎隼等可能对黑颈鹤生存与繁殖产生影响的物种。

然而，现阶段调查仍存在三方面不足。首先，部分区域缺乏确切调查记录，会限制对黑颈鹤实际利用范围和外围扩展程度的准确判断；其次，调查期间的不利天气条件可能降低目标物种及伴生物种的可探测性，会影响数量统计及空间比较的准确性；再次，伴生物种监测目前仍以数量记录为主，对于干扰因素、群落动态及关键生境条件之间关系的分析尚不充分。

基于此，后续工作应在保留盐池湾党河湿地和小苏干湖固定样线的基础上，将盐池湾北部及周边区域纳入重点核查范围，并在繁殖早期、育雏期和秋季迁徙集结期开展重复调查，以提高对亚成体和外围家庭的检出率。同时，应将主要水鸟、猛禽和大型兽类纳入统一监测体系，逐步完善黑颈鹤及伴生物种协同监测框架，为区域保护与管理提供更可靠的科学依据。

Survey of Black-necked Cranes in Gansu Yanchiwan Wetland Park, 2025

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The Black-necked Crane (*Grus nigricollis*), the world's only typical plateau crane species, is designated as a First-class National Key Protected Wild Animal in China. Yanchiwan Wetland Park is one of the most

important breeding grounds for Black-necked Cranes in Gansu Province. October—marking the end of the breeding season and the pre-migration staging period, is a critical time for assessing population size, family structure, and spatial distribution characteristics. Accordingly, a dedicated survey of Black-necked Cranes and associated species was conducted in October 2025 within a circular area with a radius of 350 km centered on Yanchiwan Wetland Park (with key coverage extending to Yanchiwan Danghe Wetland, Greater and Smaller Sugan Lakes, as well as peripheral areas such as Dongbatu, Qiaozi, Shuangta, Yangguan, and Shibaocheng).

The survey recorded 105 Black-necked Cranes from 34 families, comprising 68 adults, 30 juveniles (28.6%), and 7 subadults. No ringed individuals were found. Spatially, 79 individuals from 25 families (including 3 families with two juveniles and 16 families with one juvenile) were recorded in Yanchiwan; 11 individuals from 4 families (including 1 family with two juveniles and 1 family with one juvenile) were recorded in the Sugan Lake area; and 15 individuals from 5 families (including 2 families with two juveniles and 1 family with one juvenile) were recorded in peripheral areas such as Dongbatu, Qiaozi, Shuangta, Yangguan, and Shibaocheng.

In addition to Black-necked Cranes, the survey documented 560 individuals of 19 associated species, consisting 522 individuals from 14 species and 38 mammals of 5 species. Among the avifauna, 518 individuals of 11 waterbird species accounted for 91.3% of the total. The dominant species were Brown-headed Gull (251), Whooper Swan (102), Tufted Duck (95), and Eurasian Coot (40). Fewer individuals of Common Kestrel (2), Saker Falcon (1), and Desert Wheatear (1) were observed. Mammals recorded included Kiang (20 individuals), Tibetan Gazelle (9 individuals), Goitered Gazelle (7), Eurasian Badger (1), and Red Fox (1).

Overall, Yanchiwan remains the region's core distribution area for Black-necked Cranes. The Greater and Smaller Sugan Lakes, while supporting a modest number of crane families, also serve as important aggregation site for associated waterbirds. Notably, the survey recored not only large congregations of waterbirds such as Brown-headed Gulls and Whooper Swans, but also predators like Red Fox and Saker Falcon, which may pose potential threats to crane survival and reproduction.

Nevertheless, three limitations should be acknowledged. First, incomplete survey coverage in certain areas constrains our ability to accurately define the actual range of Black-necked Crane utilization and the extent of peripheral expansion. Second, adverse weather during the survey period likely reduced the detectability for bothe target and associated species, potentially affecting the accuracy of population counts and spatial comparisons. Last, current monitoring of associated species remains largely focused on abundance records, with insufficient analysis of disturbance factors, community dynamics, and critical habitat conditions.

To address these gaps, future efforts should retain the fixed transects in Yanchiwan Danghe Wetland and Small Sugan Lake, while expanding verification efforts to include northern Yanchiwan and its surrounding areas. Repeated surveys are recommended during the early breeding, brooding, and autumn staging periods to improve detection rates of subadults and peripheral families. Additionally, major waterbirds, raptors, and large mammals should be integrated into a unified monitoring system, gradually refining a collaborative framework for Black-necked Cranes and associated species monitoring. This will provide more reliable scientific evidence for regional conservation and management.

越冬黑颈鹤抗生素耐药基因组成及其水平转移风险分析

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世界卫生组织已将抗生素耐药性列为 21 世纪人类健康的重大威胁之一, 并提出“一体健康 (One Health)”的理念, 强调人类、动物与环境健康的协同防控。在人为污染加剧和栖息地破碎化的背景下, 野生动物接触抗生素残留、抗生素耐药菌 (antibiotic-resistant bacteria, ARB) 和抗生素耐药基因 (antibiotic resistance genes, ARGs) 的风险可能增加。黑颈鹤 (*Grus nigricollis*) 是高原湿地生态系统的旗舰物种, 也是世界上唯一主要在高原地区繁殖和栖息的鹤类。其迁徙过程中跨越多种生境, 且部

分栖息地与人类活动区域高度重叠，可能增加其 ARGs 环境暴露风险。然而，目前关于黑颈鹤的肠道微生物组的 ARGs 携带特征与水平转移风险尚不明确，这限制了对其健康状况的评估及其栖息环境中抗生素耐药风险的认知。基于此，2025 年越冬期在贵州草海国家级自然保护区（简称草海保护区）采集到 10 份黑颈鹤新鲜粪便样本进行了相关分析。



图 1 夜栖完准备出去觅食的黑颈鹤（刘广惠 摄）

Fig. 1 Black-necked crane preparing to leave its roost to forage (photo by Liu Guanghui)



图 2 贵州大学生物多样性与自然保护研究中心水鸟研究人员赴草海保护区做黑颈鹤调查研究（李红佳 摄）

Fig. 2 Waterbird researchers from the Centre for Biodiversity and Nature Conservation at Guizhou University conducting a survey of Black-necked Cranes at the Caohai National Nature Reserve (Photo by Li Hongjia)

1. 抗生素耐药基因的组成与丰度

在黑颈鹤肠道微生物群中共检出 586 种 ARGs，涉及 23 类抗生素耐药类型。从种类数来看， β -内酰胺类和多重耐药类对应的 ARGs 种类最为丰富（图 3A）。从相对丰度来看，多重耐药类占比最高（50.9%），其次为杆菌肽类（16.8%）、多黏菌素类（14.7%）、 β -内酰胺类（4.7%）、大环内酯-林可酰胺-链阳菌素类（2.6%）、喹诺酮类（2.5%）、磷霉素类（2.2%）、四环素类（2.0%）、氨基糖苷类（0.9%）和利福霉素类（0.2%）（图 3B）。黑颈鹤粪便样本中 ARGs 的标准化丰度为 0.69 ± 0.31 （均值 $\pm$ 标准差），以 ARGs 拷贝数与 16S rRNA 基因拷贝数之比表示。

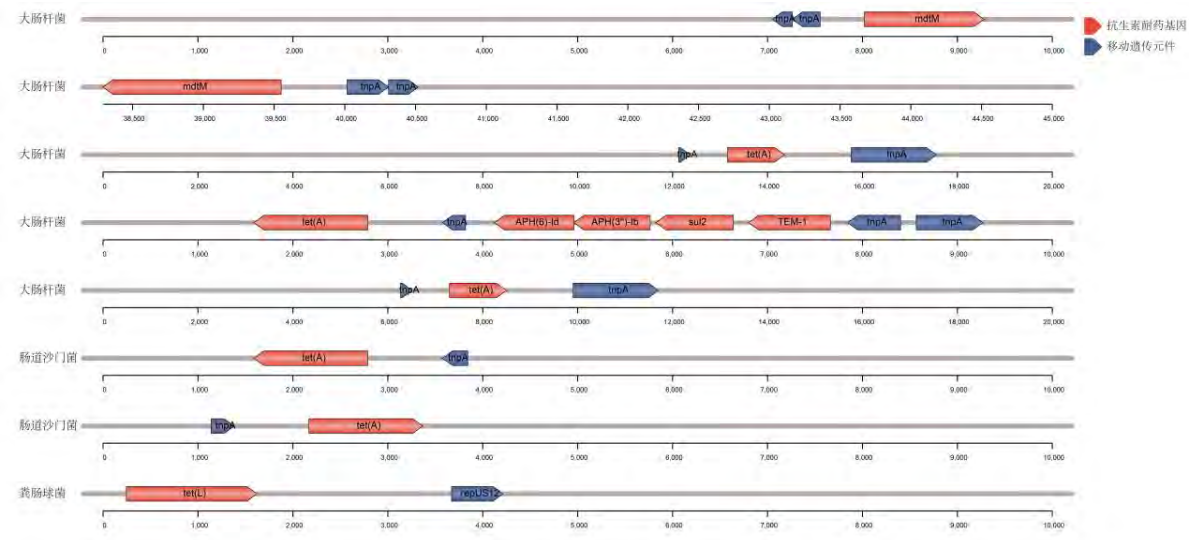


图 5 抗生素耐药基因（ARGs）与移动遗传元件（MGEs）的共定位关系

注：红色箭头表示 ARGs，蓝色箭头表示 MGEs，灰色线条表示基因组序列，比例尺单位为 bp

Fig. 5 Co-localisation of antibiotic resistance genes (ARGs) and mobile genetic elements (MGEs): red arrows indicate ARGs, blue arrows indicate MGEs, and grey lines indicate genomic sequences; scale in bp

4. 讨论与结论

本研究表明，多重耐药基因是越冬黑颈鹤肠道耐药组中的优势类型，同时杆菌肽类和多黏菌素类耐药基因也表现出较高丰度。移动遗传元件广泛分布，其中转座子和插入序列丰度占比最高。在大肠杆菌、沙门菌和粪肠球菌中，ARGs 与 MGEs 呈现紧密共定位关系，提示其水平基因转移风险较高。假单胞菌属作为携带 ARGs 或 MGEs 的优势菌群，可能在肠道耐药基因库的维持与传播中发挥重要作用。总体而言，黑颈鹤可能既是环境耐药基因的重要“汇”，也可能在耐药基因扩散过程中发挥潜在作用。因此，加强高原湿地野生鸟类及其栖息地的耐药性综合监测，对于野生动物保护及公共卫生风险防控具有重要意义。

Composition of Antibiotic Resistance Genes and Horizontal Transfer Risk Analysis in Overwintering Black-necked Cranes

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The World Health Organization has identified antibiotic resistance as one of the foremost threats to human health in the 21st century and has championed the “One Health” approach, which emphasizes coordinated prevention and control of health risks across humans, animals, and the environment. Against a backdrop of intensifying anthropogenic pollution and habitat fragmentation, wild animals may face increased exposure to antibiotic residues, antibiotic-resistant bacteria (ARB), and antibiotic resistance genes (ARGs). The Black-necked Crane (*Grus nigricollis*), a flagship species of highland wetland ecosystems, is the only crane species that primarily breeds and resides high-altitude regions. During migration, it traverses diverse habitats, some of which overlap considerably with human activity areas, potentially increasing its environmental exposure to ARGs. However, the characteristics of ARG carriage and the risk of horizontal gene transfer within the gut microbiota of Black-necked Cranes remain poorly understood, constraining assessments of their health status and the evaluations of antibiotic resistance risks in their habitats. Accordingly, in the winter of 2025, ten fresh fecal samples of Black-necked Cranes were collected from the Caohai National Nature Reserve in Guizhou for subsequent analysis.

1. Composition and Abundance of Antibiotic Resistance Genes

A total of 586 ARGs were detected in the gut microbiota of Black-necked Cranes, spanning 23 antibiotic resistance categories. In terms of type richness, β -lactam and multidrug resistance genes exhibited the greatest diversity (Fig. 3A). Relative abundance analysis revealed that multidrug resistance genes were predominant (50.9%), followed by bacitracin (16.8%), polymyxin (14.7%), β -lactams (4.7%), macrolide – lincosamide – streptogramin (2.6%), quinolones (2.5%), fosfomycin (2.2%), tetracyclines (2.0%), aminoglycosides (0.9%), and rifamycins (0.2%) (Fig. 3B). The standardized abundance of ARGs in Black-necked Crane fecal samples was 0.69 ± 0.31 (mean $\pm$ SD), expressed as the ratio of ARG copies to 16S rRNA gene copies.

2. Composition and Abundance of Mobile Genetic Elements

A total of 114 mobile genetic elements (MGEs) were identified in the gut microbiota, comprising plasmids, insertion sequences, integrons, and transposons. Plasmids and transposons exhibited the greatest type diversity (Fig. 4A). Relative abundance analysis indicated that transposons and insertion sequences were predominated, accounting for 53.2% and 33.6%, respectively (Fig. 4B). The standardized abundance of MGEs in fecal samples was 0.31 ± 0.15 (mean $\pm$ SD), expressed as the ratio of MGE copies to 16S rRNA gene copies.

3. Microbial Hosts of ARGs and Horizontal Gene Transfer Risk

Taxonomic annotation of metagenome-assembled contigs revealed that ARG- or MGE-carrying microbes spanned 5 phyla, 8 classes, 14 orders, 27 families, 57 genera, and 177 species. *Pseudomonas* was the dominant genus (32.4%), followed by *Parabacteroides* (5.0%), *Escherichia* (3.9%), *Raoultella* (3.5%), and *Burkholderia* (3.3%). Additionally, co-localization of ARGs and MGEs within a 5-kb range was detected in *Escherichia coli*, *Salmonella enterica*, and *Enterococcus faecalis*, indicating a potential risk of horizontal gene transfer (Fig. 5).

4. Discussion and Conclusion

Our study demonstrates that multidrug resistance genes are the predominant ARG type in the gut resistome of overwintering Black-necked Cranes, with bacitracin and polymyxin resistance genes also showing high abundance. MGEs were widely distributed, with transposons and insertion sequences being the most abundant. In *E. coli*, *S. enterica*, and *E. faecalis*, ARGs and MGEs were closely co-localized, highlighting a substantial potential for horizontal gene transfer. *Pseudomonas* likely plays a key role in maintaining and disseminating gut resistomes. Overall, Black-necked Cranes may serve as important environmental reservoirs of ARGs and potentially facilitate their dissemination. Strengthening comprehensive surveillance of antibiotic resistance in highland wetland birds and their habitats is therefore critical for wildlife conservation and public health risk management.

西藏林周县越冬黑颈鹤撞线热点区警示装置治理效果初报

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黑颈鹤是青藏高原及其邻近高寒湿地生态系统中的代表性大型水鸟, 也是我国国家一级重点保护野生动物。越冬期黑颈鹤常在河谷湿地、农田和浅滩之间往返活动, 部分飞行通道与输电线路走廊在局部区域存在重叠。当输电线路位于夜栖地至觅食地通道, 如河谷开阔地、湿地边缘或农田与居民点交错区域时, 黑颈鹤在晨昏、低光照、逆光、复杂背景或受惊起飞等条件下, 可能面临较高的撞线风险。

我们于 2024-2025 年越冬期,进行了为期 77 天的调查,期间在西藏自治区林周县发现了黑颈鹤撞击输电线路的重点风险区段,并将相关情况反馈给电力部门。2025 年 8-10 月,拉萨市供电公司对 400 kV 柴拉极一线和 220 kV 旁拉一线的部分重点区段开展了警示装置安装工作(图 1)。为初步评估治理效果,我们在 2025-2026 年越冬期,进行了为期 123 天的调查,对已安装警示装置的相关区域评估,并与治理前记录进行对比。根据现有统计,治理前相关区域记录黑颈鹤伤亡个体 38 只,治理后记录伤亡个体 10 只,记录数量下降约 73%。其中, A 区域的伤亡记录由治理前 22 只下降至治理后 3 只,降幅约 86%(图 2); B 区域由治理前 16 只下降至治理后 7 只,降幅约 56%(图 3)。

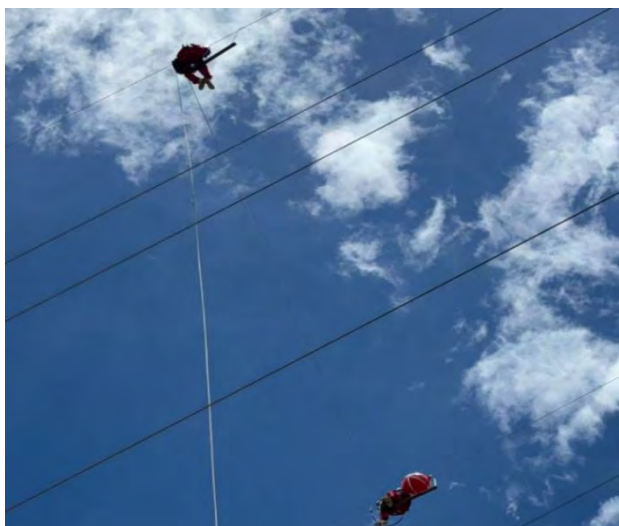


图 1 2025 年拉萨市供电公司对重点区段警示装置安装现场(拉萨供电公司 摄)

Fig. 1 Installation of line-marking devices along key transmission-line sections by Lhasa Power Supply Company in 2025 (Photo by Lhasa Power Supply Company)



图 2 A 区域前后数量对比(李欣桐 制)

Fig. 2 Comparison of record numbers before and after mitigation in Area A (Prepared by Li Xintong)

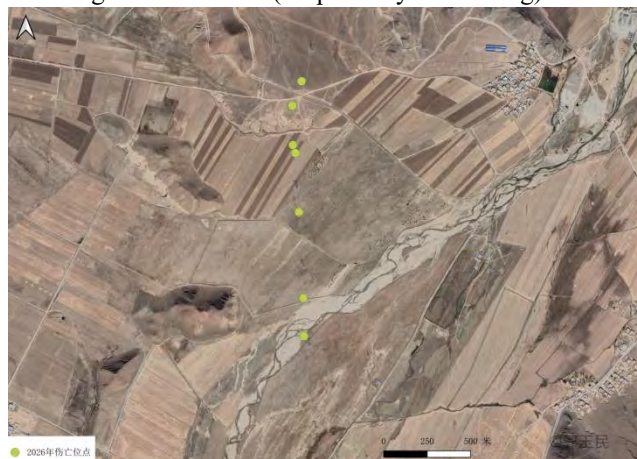


图 3 B 区域前后数量对比(李欣桐 制)

Fig. 3 Comparison of record numbers before and after mitigation in Area B. Prepared by Li Xintong

上述结果表明, 在已识别的黑颈鹤撞线高风险线路区段, 加装警示装置后, 相关区域的伤亡记录数量出现明显减少。需要说明的是, 黑颈鹤撞线伤亡记录受多种因素影响, 包括越冬种群数量、鸟群空间分布格局、调查频次、天气条件、线路附近活动强度、受伤个体移动距离以及残骸发现概率等。

因此, 现阶段尚不能将记录数量下降完全归因于警示装置本身, 但从前后对比结果看, 伤亡记录下降幅度较大, 说明在重点风险线路上开展警示装置改造具有较强的现实意义。目前本调查团队在西藏和青海发现了十余处撞击热点区域, 这些区域尚未加装任何警示装置, 急待完成警示装置的布设。后续治理不宜仅依赖单一警示装置, 而应根据不同线路电压等级、导线结构、地形条件和黑颈鹤飞行通道特征, 采取多类型警示装置组合布设, 并结合重点区段巡查、伤亡记录反馈、装置维护和长期监测, 形成综合治理模式。

Preliminary Report on the Effectiveness of Line-Marking Devices in a Wintering Black-necked Crane Power-line Collision Hotspot in Linzhou County, Tibet

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The Black-necked Crane (*Grus nigricollis*) is a representative large waterbird of the Qinghai-Tibet Plateau and its surrounding alpine wetland ecosystems, and is also designated as a National Class I Protected Wild Animal in China. During the wintering period, Black-necked Cranes frequently move among river-valley wetlands, farmlands, and shoals, and some of their flight routes locally overlap with transmission-line corridors. When transmission lines are situated along flight corridors between night roosts and foraging sites—such as open river valleys, wetland edges, or transitional zones between farmlands and settlements—Black-necked Cranes may face a relatively high risk of power-line collision under conditions including dawn or dusk flight, low light, backlighting, complex visual backgrounds, or startled take-off.

During the 2024–2025 wintering period, we conducted a 77-day survey, identified key high-risk transmission-line sections for Black-necked Crane collisions in Linzhou County, Tibet Autonomous Region, and reported the findings to the power supply authorities. From August to October 2025, Lhasa Power Supply Company installed line-marking devices along selected high-risk sections of the 400 kV Chailaji Line I and the 220 kV Pangla Line I (Fig. 1). During the 2025–2026 wintering period, we conducted a 123-day survey to evaluate the areas where line-marking devices had been installed, comparing the post-mitigation records with pre-mitigation records.

According to the current statistics, 38 injured or dead Black-necked Cranes were recorded in the relevant areas before mitigation, whereas 10 individuals were recorded after mitigation, representing an approximate 73% decrease in the number of records. Specifically, in Area A, the number of injury and mortality records decreased from 22 before mitigation to 3 after mitigation, corresponding to an approximate 86% reduction (Fig. 2). In Area B, the number decreased from 16 before mitigation to 7 after mitigation, corresponding to an approximate 56% reduction (Fig. 3).

These results indicate that, after line-marking devices were installed along the identified high-risk power-line sections for Black-necked Crane collisions, the number of injury and mortality records in the relevant areas decreased markedly. However, it should be noted that records of Black-necked Crane power-line collision injuries and mortalities can be influenced by multiple factors, including wintering population size, spatial distribution patterns of crane flocks, survey frequency, weather conditions, activity intensity near transmission lines, movement distance of injured individuals, and the probability of carcass detection.

Therefore, at this stage, the observed decrease in record numbers cannot be attributed entirely to the line-marking devices themselves. Nevertheless, the magnitude of the decrease observed in the before-after comparison suggests that installing line-marking devices along key high-risk transmission-line sections has strong practical significance. At present, our survey team has identified more than ten power-line collision hotspot areas in Tibet and Qinghai, where no line-marking devices have yet been installed and where installation is urgently needed. Future mitigation should not rely on a single type of line-marking device alone. Instead, combined deployment of multiple types of line-marking devices should be adopted according to voltage level, wire structure, topographic conditions, and the characteristics of Black-necked Crane flight pathways. This should be further integrated with patrols of key sections, feedback based on injury and mortality records, device maintenance, and long-term monitoring, so as to establish an integrated mitigation framework.

【其他水鸟消息】

[News on Other Waterbirds]

东方白鹳首次现身甘肃山丹县祁家店湿地

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2026 年 3 月 31 日，甘肃张掖市山丹县湿地保护站监测人员通过图像视频采集系统(DH-PTZ-85848 星光级一体化红外激光云台)在祁家店水库湿地首次监测到 2 只东方白鹳。

发现地点位于祁家店水库东边一处高出水面的土埂周围，坐标为东经 101°1'12"、北纬 38°48'7"，海拔 1715.8 米。该区域属沼泽湿地，土埂上生长有白杨、垂柳、芦苇、菰、黑三棱、狗牙根等多种植物。同一区域还有数只大白鹭、苍鹭、普通鸬鹚、白琵鹭、渔鸥等在土埂上休息或活动，水面上有斑嘴鸭、绿头鸭、凤头鸊鷉、白骨顶等鸟类游泳觅食。

该图像视频采集系统依托张掖黑河湿地保护区“天空地网”一体化信息化监管体系，可对鸟类进行全天候智能监测。该设备已相继监测到黑鹳、白枕鹤、黑颈鹤、蓑羽鹤、卷羽鹈鹕、罗纹鸭等多个新记录物种。

近年来，山丹县持续加强祁家店水库湿地生态保护与修复，湿地生态环境逐年改善。据统计，目前在此停歇的珍稀濒危鸟类还包括灰鹤、大天鹅、白琵鹭、金雕、白尾海雕、遗鸥等。

下一步，山丹县湿地保护站将持续加大候鸟监测频次、强化巡护管理、严控人为干扰，全力守护候鸟栖息安全，为筑牢区域生态安全屏障贡献力量。



图 1 祁家店水库湿地的东方白鹳

Fig. 1 Oriental Storks in Qijiadian Reservoir Wetland

First Sighting of Oriental Storks in Qijiadian Wetland, Shandan County, Gansu Province

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On March 31, 2026, monitoring personnel from the Shandan County Wetland Protection Station in Zhangye City, Gansu Province, recorded two Oriental Storks (*Ciconia boyciana*) for the first time in the Qijiadian Reservoir Wetland, using an image and video acquisition system (DH-PTZ-85848 starlight-level integrated infrared laser PTZ).

The discovery site is located on an earthen ridge rising above the water on the east side of Qijiadian Reservoir, at coordinates 101°1'12"E, 38°48'7"N, at an altitude of 1,715.8 m. This area is a marsh wetland, where various plants including White Poplar, Weeping Willow, Reed, Manchurian Wild Rice, *Sparganium Stoloniferum*, and Bermudagrass—grow on the ridge. In the same area, several Great Egrets, Grey Herons, Great Cormorants, Eurasian Spoonbills, and Pallas's Gulls were observed resting or moving about on the ridge, while Spot-billed Ducks, Mallards, Great Crested Grebes, and Eurasian Coots were seen swimming and foraging on the water.

This image and video acquisition system is part of the integrated "Sky-Earth-Net" information-based monitoring and management system of Heihe Wetland Nature Reserve in Zhangye, enabling round-the-clock intelligent monitoring of birds. The system has previously detected several new record species, including Black Stork, White-naped Crane, Black-necked Crane, Demoiselle Crane, Dalmatian Pelican, and Falcated Teal.

In recent years, Shandan County has continuously strengthened the ecological protection and restoration of the Qijiadian Reservoir Wetland, leading to gradual improvements in the wetland environment. According to statistics, rare and endangered bird species currently stopping over here also include Common Crane, Whooper Swan, Eurasian Spoonbill, Golden Eagle, White-tailed Eagle, and Relict Gull.

As next steps, the Shandan County Wetland Protection Station will further increase the frequency of migratory bird monitoring, strengthen patrol management, strictly control human disturbance, and make every effort to ensure the safety of migratory bird habitats, contributing to the development of a regional ecological security barrier

一次成功的跨地区大天鹅救助

古志和

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2025 年 12 月 14 日上午，内蒙古正蓝旗上都河国家湿地公园管理局（简称“正蓝旗湿地局”）接到正蓝旗五一种畜场七分场牧民报案，电话告知养牧点附近有受伤的天鹅需救助。正蓝旗湿地局与正蓝旗野生动物保护协会立即组成救助组，共同驾车展开救助。

救助组于当天下午 4 时到达救助地点。经报案牧民带领，找到三只游弋在附近尚未结冰湖面的大天鹅（图 1）：2 只成鸟、1 只亚成鸟；其中 2 只成鸟颈部均带有卫星跟踪器，1 只成鸟左翅下垂、翅羽附有冰块、行动迟缓（图 2）。为摸清其伤情，救助组待傍晚天鹅上岸后将受伤天鹅捕获（图 3），清除羽毛上冰雪后，将其安置在牧民家中，并给与玉米和水，观察其恢复情况。

救助组及时将现场情况上报正蓝旗湿地局领导，同时联系东北林业大学、鹤联会、北京林业大学东亚-澳大利亚候鸟迁徙研究中心，寻求环志信息，以便妥善处理滞留的大天鹅。通过寻查，很快得知两只大天鹅的环志单位是内蒙古呼伦湖国家级自然保护区管理局下属的呼伦贝尔市北方寒冷干旱地区内陆湖泊研究院（简称“呼伦湖研究院”）。两只成年大天鹅是该研究院三年前救助后经野化放飞

呼伦湖研究院派出 2 人 1 车组成接应组，历经 2 天行车 1400 多公里，于 19 日下午到达正蓝旗。20 日在正蓝旗五一种畜场七分场将两只成年大天鹅接走，接回原野化地进行治疗（图 4）。



图 1 游泳的 3 只大天鹅
Fig. 1 Three Whooper Swans swimming



图 2 受伤的大天鹅
Fig. 2 The injured Whooper Swan

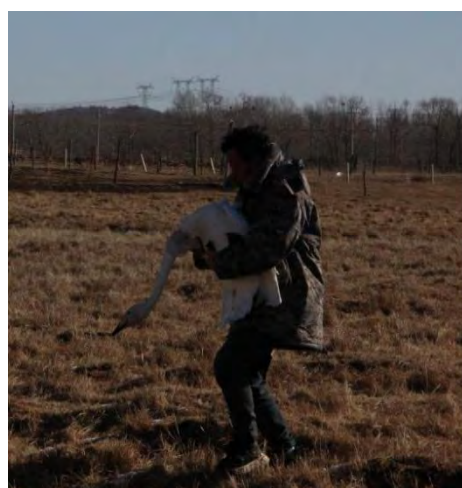


图 3 受伤大天鹅捕获
Fig. 3 Capture of the injured Whooper Swan



图 4 大天鹅跨地救助
Fig. 4 Cross-regional rescue of Whooper Swans

A Successful Cross-Regional Rescue of Whooper Swans

GU Zhihe

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On the morning of December 14, 2025, the Administrative Bureau of Shangdu River National Wetland Park in Plain Blue Banner, Inner Mongolia (hereinafter referred to as “the Plain Blue Banner Wetland Bureau”) received a report from a herder at the Seventh Branch of Wuyi State Farm in Plain Blue Banner. The herder informed them that there were injured swans near their livestock grazing site in need of rescue. The Plain Blue Banner Wetland Bureau and the Plain Blue Banner Wildlife Protection Association immediately formed a rescue team and set off together by vehicle to carry out the rescue.

The rescue team arrived at the site at 4:00 p.m. the same day. Guided by the herder who had reported the incident, they found three Whooper Swans (*Cygnus cygnus*) swimming in a nearby unfrozen lake (Fig. 1): two adults and one juvenile. Both adult swans were fitted with satellite trackers on their necks. One adult swan had a drooping left wing with ice attached to its wing feathers and was moving slowly (Fig. 2). To assess the injury, the rescue team waited until the swans came ashore in the evening and then captured the injured swan (Fig. 3). After removing the ice from its feathers, they placed the swan in the herder’s home and provided corn and water to monitor its recovery.

The rescue team promptly reported the situation to the leadership of the Plain Blue Banner Wetland Bureau. At the same time, they contacted Northeast Forestry University, the Crane Union, and the East Asian-Australasian Flyway Research Center at Beijing Forestry University to seek banding information in order to properly handle the stranded Whooper Swans. Through these inquiries, they quickly learned that the banding unit for the two Whooper Swans was the Hulunbuir Academy of Inland Lakes in Cold and Arid Regions of Northern China (hereinafter referred to as the “Hulun Lake Institute”), which is under the Hulun Lake National Nature Reserve Administration in Inner Mongolia. The two adult Whooper Swans had been rescued and rehabilitated, then banded and released into the wild three years ago by this research institute; the juvenile was an individual from a natural wild flock.

The Hulun Lake Institute dispatched a two-person, one-vehicle response team, which drove more than 1,400 km over two days and arrived in Plain Blue Banner on the afternoon of December 19. On December 20, they retrieved the two adult Whooper Swans from the Seventh Branch of Wuyi State Farm in Plain Blue Banner and transported them back to their original release site for treatment (Fig. 4).

贵州草海湿地生态修复期越冬雁鸭类水鸟多样性逐渐增加

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贵州草海是中国典型的西南高原高寒湿地。因湿地生态系统退化, 2014 年孙鸿烈等 20 位院士专家向国务院提交《关于采取抢救性措施保护草海生态系统建议》, 之后一系列生态保护与环境修复措施开始实施至今。雁形目水鸟作为湿地环境变化的敏感物种, 掌握其群落结构动态与生境因子关系对湿地生物多样性保护具有重要意义。利用 2014 年以来的越冬水鸟观测数据对草海十余年来越冬雁鸭类群落变化及影响因素进行了分析。

生态修复期间, 草海湿地主要雁鸭类以斑头雁、赤膀鸭、赤麻鸭、赤颈鸭为稳定优势种。10 年间, 雁鸭水鸟群落丰富度越来越高, 2020 年越冬期, 群落多样性和均匀性最高 ($H'=2.230, J=0.869$); 群落间相似性较高 ($0.70 < Cs < 0.90$), 十余年来虽有波动, 但年际间物种周转率呈现递减趋势, 群落趋于稳定。其中, 草海胡叶林 (17 种)、温家屯 (16 种)、王家院子 (16 种) 和顾家底下 (16 种) 是雁鸭水鸟最集中、物种最丰富的区域; 浅水区域承载物种数 (18 种) 与个体数最多 (55.83%),

Shannon-Wiener 指数（2.295）与丰富度指数（1.527）显著高于其他生境；沼泽草甸生境群落均匀性最高（0.858），而深水区与浅水区物种组成相似性达到 87.5%。耕地生境利用率较低（67.22%为斑头雁和赤麻鸭）。

植被覆盖度是影响草海湿地雁鸭水鸟群落的主要因子（贡献率 45.9%），与杂食/肉食性水鸟物种数量呈负向影响；水位抬升显著抑制物种数及群落丰富度（ $p<0.05$ ）。在整个湿地生态系统修复中，需要格外关注两者的变化动态。

表 1 2014 年以来贵州草海湿地越冬的主要雁鸭类水鸟
Tab. 1 Major wintering Anseriformes waterbirds in Guizhou Caohai Wetland since 2014

中文名	拉丁名	保护等级	IUCN	居留型	分布型	食性	Pi	优势划分
麻鸭属	<i>Tadorna</i>							
赤麻鸭	<i>Tadorna ferruginea</i>			W	U	杂食	11.55%	优势种
翘鼻麻鸭	<i>Tadorna tadorna</i>			W	U	杂食	0.00%	罕见种
潜鸭属	<i>Aythya</i>							
白眼潜鸭	<i>Aythya nyroca</i>		NT	W	O	杂食	0.76%	稀有种
斑背潜鸭	<i>Aythya marila</i>			W		肉食	0.08%	罕见种
凤头潜鸭	<i>Aythya fuligula</i>			W	U	肉食	1.02%	常见种
红头潜鸭	<i>Aythya ferina</i>		VU	W	C	杂食	8.66%	常见种
秋沙鸭属	<i>Mergus</i>							
普通秋沙鸭	<i>Mergus merganser</i>			W	C	肉食	1.13%	常见种
匙嘴鸭属	<i>Spatula</i>							
白眉鸭*	<i>Spatula querquedula</i>			W	U	植食	0.01%	罕见种
琵嘴鸭	<i>Spatula clypeata</i>			W	C	杂食	0.71%	稀有种
天鹅属	<i>Cygnus</i>							
小天鹅#	<i>Cygnus columbianus</i>	II		W	C	杂食	0.01%	罕见种
狭嘴潜鸭属	<i>Netta</i>							
赤嘴潜鸭	<i>Netta rufina</i>			W	O	植食	0.03%	罕见种
鸭属	<i>Anas</i>							
斑嘴鸭	<i>Anas poecilorhyncha</i>			W/R	W	杂食	8.82%	常见种
赤膀鸭	<i>Mareca strepera</i>			W	C	植食	12.80%	优势种
赤颈鸭	<i>Mareca penelope</i>			W	U	植食	18.57%	优势种
罗纹鸭	<i>Anas falcata</i>		NT	W	M	杂食	0.25%	稀有种
绿翅鸭	<i>Anas crecca</i>			W	C	杂食	3.19%	常见种
绿头鸭	<i>Anas platyrhynchos</i>			W	C	杂食	0.89%	稀有种
针尾鸭	<i>Anas acuta</i>			W	C	杂食	4.94%	常见种
雁属	<i>Anser</i>							
斑头雁	<i>Anser indicus</i>			W	P	杂食	26.38%	优势种
豆雁	<i>Anser fabalis</i>			W	U	植食	0.05%	罕见种
灰雁	<i>Anser anser</i>			W	U	杂食	0.18%	稀有种
小白额雁*	<i>Anser erythropus</i>	II	VU	W		植食	0.00%	罕见种
雪雁+	<i>Anser caerulescens</i>			W		植食	0.00%	罕见种

注：保护等级：II 表示国家二级野生保护动物；IUCN：世界自然保护联盟缩写，NT-近危、VU-易危；居留型：W 表示冬候鸟、R 表示留鸟；分布型：U-古北型，O-不易归类，P-高地型，W-东洋型，M-东北型，C-全北型；*表示仅在 2014 年越冬期记录，+表示仅在 2020 年越冬期记录，#表示仅在 2024 年越冬期记录；Pi：i 物种个体数占总个体数的比例。



赤麻鸭 (*Tadorna ferruginea*)
Ruddy Shelduck



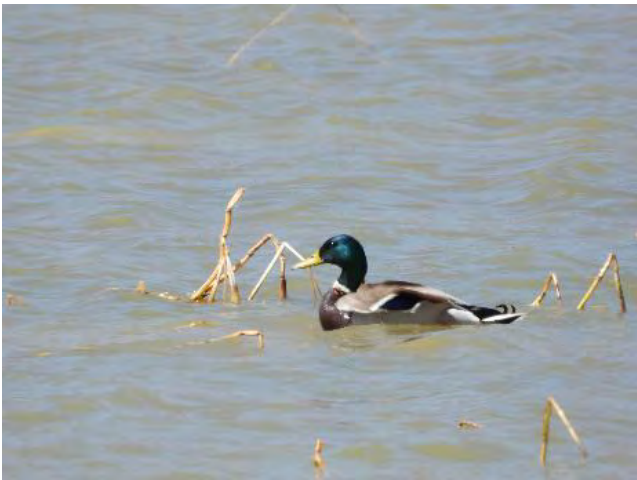
斑头雁 (*Anser indicus*)
Bar-headed Goose



琵嘴鸭 (*Spatula clypeata*)
Northern Shoveler



赤颈鸭 (*Mareca penelope*)
Eurasian Wigeon



绿头鸭 (*Anas platyrhynchos*)
Common Mallard



灰雁 (*Anser anser*)
Greylag Goose



赤嘴潜鸭 (*Netta rufina*)
Netta rufina



普通秋沙鸭 (*Mergus merganser*)
Common Merganser



赤膀鸭 (*Mareca strepera*)
Anas strepera



凤头潜鸭 (*Aythya fuligula*)
Tufted Duck

图 1 草海湿地部分雁鸭类水鸟

Fig. 1 Some Anseriformes waterbirds in Caohai Wetland

Diversity of Wintering Anseriformes Waterbirds Gradually Increases During the Ecological Restoration Period of Caohai Wetland, Guizhou

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Caohai Wetland in Guizhou is a typical alpine wetland in southwestern China. Owing to the degradation of the wetland ecosystem, in 2014, 20 academicians and experts, including Sun Honglie, submitted the “Proposal on Taking Emergency Measures to Protect the Caohai Ecosystem” to the State Council. Subsequently, a series of ecological protection and environmental restoration measures have been implemented to date. As Anseriformes waterbirds are sensitive indicators of wetland environmental changes, understanding the relationship between their community structure dynamics and habitat factors is of great significance for wetland biodiversity conservation. Using wintering waterbird survey data since 2014, this study analyzed the changes in wintering Anseriformes communities in Caohai over the past decade and the influencing factors.

During the ecological restoration period, the dominant Anseriformes species in Caohai Wetland have been the Bar-headed Goose, Gadwall, Ruddy Shelduck, and Northern Shoveler. Over the past decade, the richness of Anseriformes waterbird communities has gradually increased. The highest community diversity and evenness occurred during the 2020 wintering period ($H'=2.230$, $J'=0.869$). Community similarity has been relatively high ($0.70 < Cs < 0.90$). Although there have been fluctuations over the past decade, the interannual species turnover rate has shown a decreasing trend, indicating that the community is becoming more stable. Among the sites, Huyelin (17 species), Wenjiatun (16 species), Wangjiayuanzi (16 species), and Gujiadixia (16 species) in Caohai are the areas with the highest concentration and richest diversity of Anseriformes waterbirds. Shallow-water areas supported the highest number of species (18 species) and the largest number of individuals (55.83%), with significantly higher Shannon-Wiener index (2.295) and richness index (1.527) than other habitats. Marshy meadow habitats had the highest community evenness (0.858), while species composition similarity between deep-water and shallow-water areas reached 87.5%. Cropland habitats showed relatively low utilization (67.22% comprised Bar-headed Geese and Ruddy Shelducks).

Vegetation coverage was the main factor influencing the Anseriformes waterbird community in Caohai Wetland (contribution rate: 45.9%) and showed a negative correlation with the number of omnivorous/carnivorous waterbird species. Rising water level significantly suppressed species richness and community abundance ($p < 0.05$). Throughout the wetland ecosystem restoration process, special attention needs to be paid to the dynamics of these two factors.

黑龙江三环泡保护区东方白鹳繁殖现状及保护建议

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1. 东方白鹳繁殖现状

为促进东方白鹳的种群繁殖与恢复，黑龙江三环泡国家级自然保护区（简称三环泡保护区）开展了东方白鹳人工招引工作，10 年间共计搭建人工巢 46 个。其中，2015 年初 6 个、2022 年初 20 个、2025 年末 20 个。截至 2025 年，三环泡保护区累计繁殖东方白鹳 64 巢幼鸟 240 只。

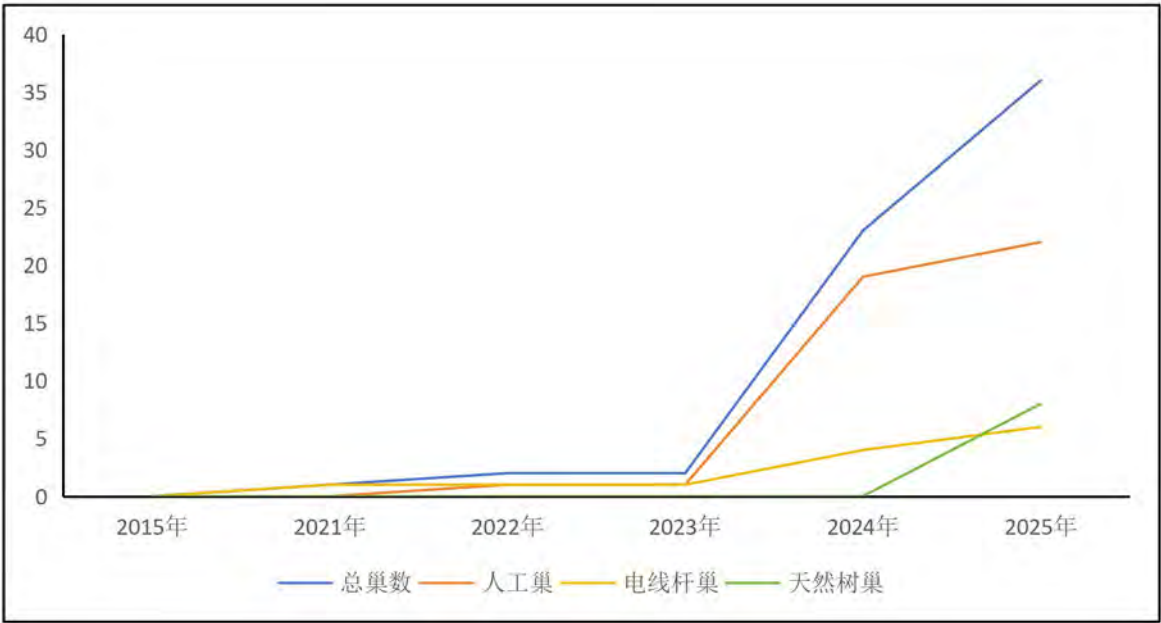


图 1 三环泡保护区东方白鹳繁殖巢情况

Fig. 1 Breeding nest distribution of Oriental Storks in Sanhuanpao Nature Reserve

各年繁殖情况详细如下：2015-2020 年无东方白鹤上巢，上巢率为零；2021 年在电线杆繁殖 1 巢，繁育幼鸟 5 只；2022 年繁殖 2 巢，繁育幼鸟 5 只，其中人工巢 1 巢幼鸟 2 只、电线杆巢 1 巢幼鸟 3 只；2023 年繁殖 2 巢，繁育幼鸟 7 只，其中人工巢 1 巢幼鸟 3 只、电线杆巢 1 巢幼鸟 4 只；2024 年繁殖 23 巢，繁育幼鸟 89 只，其中人工巢 19 巢幼鸟 69 只、电线杆巢 4 巢幼鸟 20 只；2025 年繁殖 36 巢，繁育幼鸟 134 只，其中人工巢 22 巢幼鸟 82 只、电线杆巢 6 巢幼鸟 24 只、天然树巢 8 巢幼鸟 28 只。

历经 10 年，三环泡保护区通过人工招引工作，成功实现了东方白鹤繁殖从无到有和种群不断壮大的目标，为东方白鹤的种群恢复作出了积极贡献。

2. 保护建议

搭建新巢。应结合监测情况，根据东方白鹤的种群密度、分布范围、生境情况等多种因素，在保护区酌情选择合适区域继续搭建新巢，为东方白鹤繁殖种群提供充足的巢基。

加强保护。加强对东方白鹤繁殖保护和调查监测，加强保护巡护，严厉打击非法捕捞等行为，减少人为活动的干扰，并利用生态监测系统，监测保护区水文水质情况，为东方白鹤繁殖提供良好的栖息环境和充足的食物资源。

开展研究。根据现有东方白鹤繁殖种群数量、上巢率、繁殖巢数、孵化率等数据，开展进一步研究，调查影响东方白鹤繁殖的主要因素，促进东方白鹤繁殖种群数量的稳定增长。



图 2. 三环泡保护区东方白鹤人工巢

Fig. 2. Artificial nest for Oriental Stork in Sanhuanpao Reserve.



图 3 三环泡保护区东方白鹤人工巢

Fig. 3 Artificial nest for Oriental Stork in Sanhuanpao Reserve



图 4 三环泡保护区东方白鹳电线杆巢

Fig. 4 Utility pole nest for Oriental Stork in Sanhuanpao Reserve



图 5 三环泡保护区东方白鹳天然树巢

Fig. 5 Natural tree nest of Oriental Stork in Sanhuanpao Reserve

Current Breeding Status and Conservation Recommendations for the Oriental Stork in Sanhuanpao Nature Reserve, Heilongjiang Province

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1. Breeding Status of the Oriental Stork

To facilitate the reproduction and population recovery of the Oriental Stork (*Ciconia boyciana*), the Sanhuanpao National Nature Reserve (hereinafter referred to as Sanhuanpao Reserve) in Heilongjiang Province has implemented artificial nest attraction program. Over the past decade, a total of 46 artificial nests

has been installed, with 6 erected in early 2015, 20 in early 2022, and an additional 20 by the end of 2025. By 2025, the cumulative number of breeding nests had reached 64, from which 240 chicks were fledged.

The annual breeding data are detailed as follows: from 2015 to 2020, no Oriental Storks occupied any nests, resulting in a 0% occupancy rate. In 2021, one nest on a utility pole successfully produced 5 chicks. In 2022, two nests were occupied, yielding a total of 5 chicks (1 artificial nest: 2 chicks; 1 utility pole nest: 3 chicks). In 2023, two nests produced 7 chicks (1 artificial nest: 3 chicks; 1 utility pole nest: 4 chicks). In 2024, 23 nests were active, yielding 89 chicks (19 artificial nests: 69 chicks; 4 utility pole nests: 20 chicks). In 2025, 36 nests successfully fledged 134 chicks (22 artificial nests: 82 chicks; 6 utility pole nests: 24 chicks; 8 natural tree nests: 28 chicks).

Over a ten-year period, the artificial nest attraction program in Sanhuanpao Reserve successfully established a breeding population of Oriental Storks, transitioning from zero occupancy to a growing and sustainable population. These efforts have made a significant contribution to the recovery of this endangered species.

2. Conservation Recommendations

Construction of New Nests: Based on monitoring results, new nests should be strategically installed according to population density, distribution, and habitat conditions. Suitable areas within the reserve should be selected to expand nesting opportunities and support continued population growth.

Strengthening Protection: Breeding protection and monitoring should be intensified. This includes regular patrols to prevent illegal hunting and other anthropogenic disturbances. The ecological monitoring system should be utilized to track hydrology and water quality, ensuring adequate food supply and favorable habitat conditions for Oriental Stork reproduction.

Conducting Research: Using data on population size, nest occupancy, breeding success, and hatching rates, further studies should investigate the main factors influencing Oriental Stork reproduction. These studies will help stabilize and increase the breeding population over time.

黑龙江东方红保护区 2025 年东方白鹳繁殖专项调查

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黑龙江东方红国家级自然保护区（简称东方红保护区）是我国东方白鹳（*Ciconia boyciana*）的主要分布地之一。为有效保护该物种及其栖息环境，2025 年春季繁殖期开展了东方白鹳专项调查。

调查主要采用相机监测、无人机监测、样线调查三种方法。调查期间共布设 15 台红外相机；利用无人机调查 1 次，航迹数 25 条；布设样线 20 条，每月调查 1 次，共计 4 次。

结果表明：春季繁殖初期观测到东方白鹳 29 巢，种群数量 66 只；在空间上，东方白鹳主要集中分布于湿地南部。该区域人类活动干扰少，栖息地质量良好。总体来看，东方白鹳在整片湿地的腹地区域均有广泛分布（图 1）。

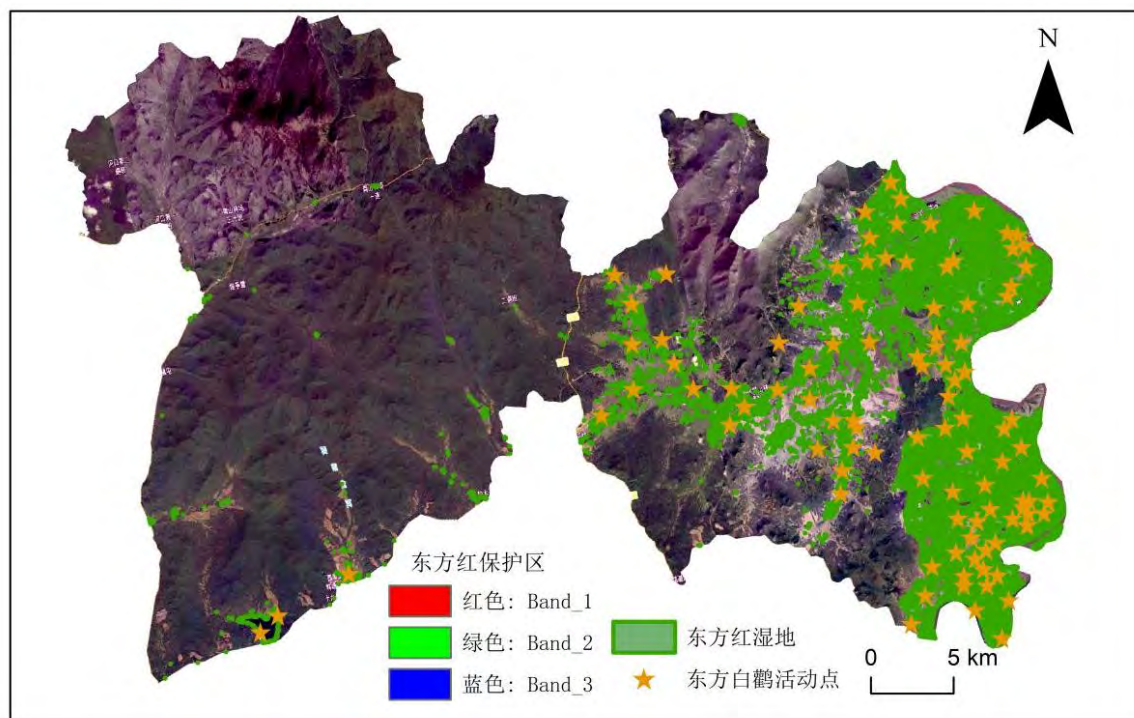


图 1 东方白鹳活动点分布
Fig. 1 Distribution of Oriental Stork activity points

2025 Special Breeding Survey of Oriental Storks in Dongfanghong National Nature Reserve, Heilongjiang

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The Dongfanghong National Nature Reserve (hereinafter referred to as Dongfanghong Reserve) in Heilongjiang Province is one of the primary distribution areas of the Oriental Stork (*Ciconia boyciana*) in China. To effectively conserve this species and its habitat, a dedicated breeding survey was conducted during the spring breeding season of 2025.

The survey employed three main methods: camera trapping, UAV (unmanned aerial vehicle) monitoring, and line transect surveys. During the survey period, a total of 15 infrared cameras were deployed. UAV surveys were conducted once, covering 25 flight lines. Additionally, 20 line transects were established and surveyed monthly, totaling four survey rounds.

The results indicated that 29 nests of Oriental Storks were observed at the early breeding stage, with a total population of 66 individuals. Spatially, the storks were primarily concentrated in the southern part of the wetland. This area experiences minimal human disturbance and maintains good habitat quality. Overall, Oriental Storks exhibited a wide distribution throughout the core areas of the wetland (Fig. 1).

2020–2025 年呼伦湖保护区鸿雁与白琵鹭种群动态

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内蒙古呼伦湖国家级自然保护区（呼伦湖保护区）位于内蒙古自治区呼伦贝尔市新巴尔虎右旗、新巴尔虎左旗、满洲里市、扎赉诺尔区境内。地理坐标介于北纬 $47^{\circ}45'50''$ — $49^{\circ}20'20''$ 、东经 $116^{\circ}50'10''$ — $118^{\circ}10'10''$ 。呼伦湖保护区是鸿雁（*Anser cygnoides*）的重要繁殖地，被誉为“鸿雁之乡”；同时，白琵鹭（*Platalea leucorodia*）也是该保护区繁殖鹭类的代表性物种。两者对栖息地质量与人为干扰程度高度敏感，是反映湿地生态恢复成效的重要指示生物。为掌握其种群动态，呼伦湖保护区于每年 4 月、7 月和 9 月，在重点水域呼伦湖、乌兰诺尔、贝尔湖以及连通河流和周边小型淡水湖泊布设 43 个点位，采用分区直数法和样点法进行监测。基于 2020–2025 年连续监测数据，本文简要报道两种鸟类的数量变化趋势。

2020–2024 年间，鸿雁种群呈持续增长态势，数量从 6748 只逐年上升至 29108 只。2025 年监测数量为 26553 只，较 2024 年回落约 2555 只，但仍显著高于近五年平均水平。这一结果表明，尽管当年数量有所波动，鸿雁种群整体仍维持在历史较高水平。

2020–2025 年，白琵鹭种群呈现典型的波动式增长特征，2025 年数量达到 3712 只，为自有监测记录以来的历史峰值，较 2024 年净增 400 只。

这两个物种在保护区内表现出良好的适应性与持续增长潜力，保护区的栖息地条件与人为干扰管控对其长期保育具有积极作用，也反映出湿地生态系统功能的稳步提升。

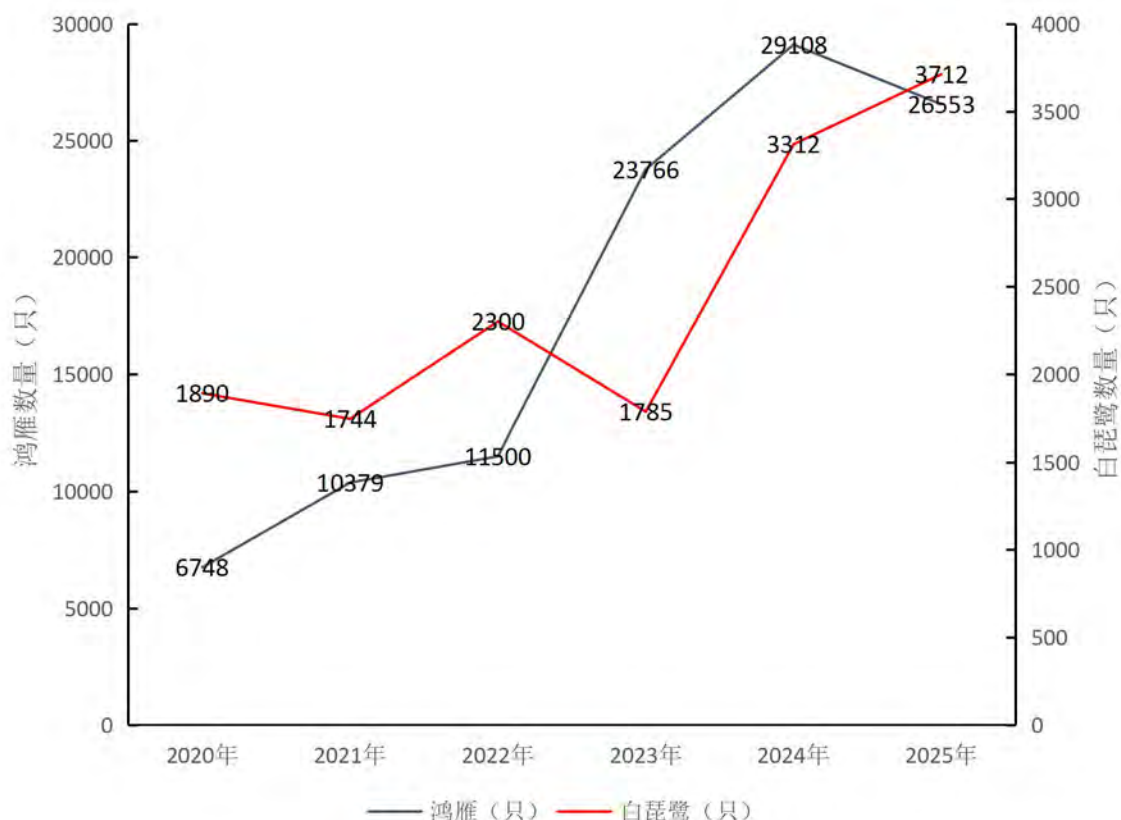


图 1. 2020–2025 年鸿雁和白琵鹭数量变化情况

Fig. 1. Population trends of swan geese and Eurasian Spoonbills in 2020–2025.

Population Dynamics of Swan Geese and Eurasian Spoonbills in the Hulun Lake National Nature Reserve, 2020–2025

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The Hulun Lake National Nature Reserve (hereinafter referred to as Hulun Lake Reserve) is located in Xin Barag Right Banner, Xin Barag Left Banner, Manzhouli City, and Zhalainuoer District of Hulunbuir, Inner Mongolia Autonomous Region, China. Its geographical coordinates range from 47°45'50" to 49°20'20" N latitude and 116°50'10" to 118°10'10" E longitude. The reserve serves as an important breeding ground for the Swan Goose (*Anser cygnoides*), earning it the title “Hometown of Swan Geese.” The Eurasian Spoonbill (*Platalea leucorodia*) is also a representative breeding waterbird species in the reserve. Both species are highly sensitive to habitat quality and anthropogenic disturbances, making them key bioindicators for assessing wetland restoration effectiveness.

To monitor population dynamics, surveys were conducted annually in April, July, and September at 43 sampling sites distributed across major waterbodies, including Hulun Lake, Wulannur, Beier Lake, as well as connecting rivers and nearby small freshwater lakes. The surveys employed both zonal direct counting and plot-based sampling methods. Based on continuous monitoring data from 2020 to 2025, the population trends of these two species are briefly reported here.

Between 2020 and 2024, the Swan Goose population showed a continuous increasing trend, rising from 6,748 to 29,108 individuals. In 2025, the population was recorded at 26,553, representing a decrease of approximately 2,555 individuals compared with 2024, but still significantly above the five-year average. These results indicate that although the population fluctuated in 2025, the Swan Goose population overall remains at historically high levels.

During 2020–2025, the Eurasian Spoonbill population exhibited a fluctuating growth pattern. In 2025, the population reached 3,712 individuals, marking the highest level since monitoring began, with a net increase of 400 individuals compared with 2024.

Both species demonstrate good adaptability and continued growth potential within the reserve. Habitat conditions and effective management of human disturbances have positively contributed to their long-term conservation, reflecting the steady improvement of wetland ecosystem function.

2025 年内蒙古呼伦湖保护区水鸟数量监测

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内蒙古呼伦湖国家级自然保护区（简称呼伦湖保护区）位于内蒙古自治区呼伦贝尔市新巴尔虎右旗、新巴尔虎左旗、满洲里市、扎赉诺尔区境内。地理坐标介于北纬 47°45'50"—49°20'20"、东经 116°50'10"—118°10'10"。该区域拥有我国人为干扰较少、自然景观保护相对完好的草原生态系统和淡水湿地生态系统。保护区内生物多样性丰富，特别是呼伦湖水系发育的湖泊、河流湿地生态系统在干旱草原地带的原生性、稀有性、脆弱性的特点，使该区域成为东北亚—澳大利西亚候鸟迁徙路线上的重要通道和驿站，同时也是东北亚水鸟主要繁殖地之一。

呼伦湖保护区自 1986 年成立以来，经过近四十年监测工作的开展，鸟类记录从最初的 196 种增加

到 346 种，其中国家一级重点保护动物 25 种、国家二级重点保护动物 60 种。近年来，随着生物多样性监测不断科学化和规范化，为准确掌握呼伦湖保护区水鸟主要分布情况、种群数量以及迁徙动态，于每年 4 月、7 月和 9 月，在重点水域呼伦湖、乌兰诺尔、贝尔湖以及连通河流和周边小型淡水湖泊采用分区直数法和样点法进行监测，记录可视范围内发现的所有水鸟等鸟类的种类、数量及栖息地情况等。

2025 年呼伦湖保护区，共监测到水鸟 7 目 12 科 33 属 68 种 166168 只，鸟类群落由雁形目（59%）、鹤形目（16%）、鸕形目（13%）组成；优势种为绿翅鸭（18%）、白骨顶（15%）、鸿雁（12%）；其中国家一级保护动物 4 种 39 只，包括白鹤、白枕鹤、白头鹤、东方白鹳；国家二级保护动物 13 种 24909 只，包括鸿雁、白琵鹭、大天鹅、小天鹅、疣鼻天鹅等。

Waterbird Monitoring in the Hulun Lake National Nature Reserve, Inner Mongolia, 2025

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The Hulun Lake National Nature Reserve (hereinafter referred to as Hulun Lake Reserve) is located in Xin Barag Right Banner, Xin Barag Left Banner, Manzhouli City, and Zhalainguo District of Hulunbuir, Inner Mongolia Autonomous Region, China. Its geographical coordinates range from 47°45'50" to 49°20'20" N latitude and 116°50'10" to 118°10'10" E longitude. The region features a relatively intact grassland ecosystem and freshwater wetland system with minimal human disturbance. The reserve supports rich biodiversity, and the lake-river wetland systems within the Hulun Lake catchment are characterized by their naturalness, rarity, and vulnerability within the arid grassland landscape. Consequently, the area serves as an important corridor and stopover site along the East Asia–Australasia Flyway for migratory birds, and it is one of the major breeding grounds for waterbirds in Northeast Asia.

Since its establishment in 1986, the Hulun Lake Reserve has been monitored for nearly four decades. The number of bird species recorded has increased from 196 to 346, including 25 nationally first-class protected species and 60 nationally second-class protected species. In recent years, as biodiversity monitoring has become more standardized and scientific, systematic surveys have been conducted annually in April, July, and September. Surveys cover key waterbodies, including Hulun Lake, Wulannur, Beier Lake, and connecting rivers, and surrounding small freshwater lakes. Both zonal direct counts and plot-based sampling methods are used to record all observed waterbirds, including their species composition, abundance, and habitat conditions.

In 2025, a total of 166,168 waterbirds were recorded in the Hulun Lake Reserve, representing 68 species, 33 genera, 12 families, and 7 orders. Bird communities were dominated by Anseriformes (59%), Gruiformes (16%), and Charadriiformes (13%). The most abundant species were the Eurasian Teal (*Anas crecca*, 18%), the Common Coot (*Fulica atra*, 15%), and the Swan Goose (*Anser cygnoides*, 12%). Among the recorded species, four are nationally first-class protected species (39 individuals), including the White Crane, the Hooded Crane, the White-naped Crane, and the Oriental Stork. Thirteen species are nationally second-class protected species (24,909 individuals), including the Swan Goose, Eurasian Spoonbill, Whooper Swan, Tundra Swan, and Mute Swan.

【国际资讯】 [News from Overseas]

越南 Tram Chim 国家公园赤颈鹤重引入项目进展

张琦
国际鹤类基金会，北京 100088

2025年4月，首批6只赤颈鹤顺利运抵越南Tram Chim国家公园，标志着越南与泰国联合开展的十年赤颈鹤保护合作计划正式启动。项目实施以来，始终围绕“人工繁育、野化放归、栖息地修复、社区协同”等核心目标有序推进，本文结合实地考察与项目资料，系统梳理赤颈鹤重引入的项目进展。

本项目以十年为实施周期，设定清晰的保护目标：人工繁育并野化放归赤颈鹤 100 只，确保至少 50 只个体在野外存活并实现自主繁殖，最终在 Tram Chim 国家公园建立可自我维持的可持续野生种群。



图 1 2020-2025 年鸿雁和白琵鹭数量变化情况

Fig. 1 Population trends of swan geese and Eurasian Spoonbills in 2020–2025

为实现目标，项目确定四项核心任务：一是接收并科学照料从泰国引进的赤颈鹤；二是研发赤颈鹤繁育技术，开展野化训练与放归实践；三是系统修复公园内赤颈鹤适宜栖息地；四是在缓冲区推广生态友好型农业模式，构建人鹤和谐共生环境。参考泰国赤颈鹤重引入项目经验，预期放归个体总体存活率可达 50%，其中放归首年存活率约 40%，后续逐步提升，为避免惊扰野外原生种群，项目严格执行分批少量放归原则。

新引入的赤颈鹤需经历3个月适应期，期间工作人员每日监测行为状态，达标后方可安排放归。为防止鹤类对人类产生依赖或恐惧，所有进入驯化区的工作人员必须穿戴仿鹤伪装服，确保放归个体能远离人类独立生存。

饲养区采用半野生模式建设，配备原生植被、自然水源与草坪，高度模拟野外生存环境；每个笼舍均配备独立消毒系统，外围种植植被进行伪装，最大限度减少人类活动干扰。同时，项目部署24小时视频监控网络，全覆盖饲养区各笼舍并连接中央控制室，专职技术人员实时监测、记录鹤类健康与行为数据，确保异常情况及时处置。



图 2 适应期半野生笼舍

Fig. 2 Semi-wild enclosure during the acclimation period

幼鹤保育聚焦关键环节：赤颈鹤幼鸟出壳后第一周需大量游泳，腿部骨骼尚未发育成熟，长期行走易致畸形。为此，项目严格执行鹤笼水源每两天更换一次的制度，保障水质清洁，降低幼鸟患病风险。



图 3 赤颈鹤笼舍内监控摄像头的实时画面

Fig. 3 Real-time footage from a surveillance camera inside an Eastern Sarus Crane enclosure

为接轨国际保育标准，公园管护人员已赴泰国接受专业培训，系统学习国际规范的饲养、急救与医疗流程；国际鹤类基金会专家定期提供技术指导与现场培训，保障饲养管理工作专业化、标准化开展。

围绕赤颈鹤生存需求，国家公园实施水文节律恢复、入侵物种清除、荸荠主食群落重建三项核心修复工程，还原湿地自然干湿交替节律、清理入侵植被、恢复千公顷级觅食生境，筑牢赤颈鹤栖息与食物保障基础。

在缓冲区推广减播、禁烧、有机肥替代的生态耕作模式，配套发展稻田养鱼助农增收，已落地生态水稻种植200公顷，实现鹤类栖息环境改善与社区经济提升双赢，构建长期保护的社会支撑。

放归个体严格筛选：优先选择健康状况最优、体质最强壮的配对成鹤，最大化提升野外存活概率；首批放归个体的野外适应数据，为后续种群放归提供了关键参考依据。

赤颈鹤放归后不再进行日常人工干预，所有个体均佩戴定位追踪设备，实现野外活动轨迹实时监测。若监测到个体长期滞留、觅食困难导致体质衰弱，项目团队将及时捕捉回护、康复调养后再次放归，全力保障放归个体存活。

当前野外赤颈鹤仍面临多重生存威胁：家犬是幼鹤的首要天敌，成年鹤可飞离躲避，未学会飞行的幼鹤仅能依赖亲鸟保护，极易遭受攻击；区域内虽无狐狸分布，但缅甸蟒捕食鹤卵、野猫猎捕幼体的现象时有发生，成为制约赤颈鹤繁育成功的重要因素。

越南Tram Chim国家公园赤颈鹤重引入项目，是跨国协同保护、社区深度参与的典范，其标准化饲养、系统化栖息地修复、人鹤共生的实践模式，为东南亚赤颈鹤种群恢复提供了宝贵经验，也为全球濒危鹤类重引入保护工作提供了重要参考。

Progress of the Eastern Sarus Crane Reintroduction Project in Tram Chim National Park, Vietnam

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In April 2025, the first six Eastern Sarus Cranes were successfully transported to Tram Chim National Park in Vietnam, marking the official launch of a ten-year cooperative conservation program between Vietnam and Thailand. Since its inception, the project has steadily advanced around core objectives--captive breeding, wild release, habitat restoration, and community collaboration. Based on field visits and project documents, this article provides a systematic review of the progress of the Eastern Sarus Crane reintroduction initiative.

The project is structured around a ten-year timeline with clear conservation targets: to breed in captivity and release 100 Eastern Sarus Cranes into the wild, ensure that at least 50 individuals survive and establish self-sustaining breeding, and ultimately build a viable, self-sustaining wild population in Tram Chim National Park.

To meet these goals, the project has defined four priority areas: (1) receiving and providing veterinary and husbandry care for Eastern Sarus Cranes imported from Thailand; (2) developing captive breeding techniques for Eastern Sarus Cranes and conducting pre-release training and soft-release practices; (3) systematically restoring suitable Eastern Sarus Crane habitat within the park; and (4) promoting eco-friendly farming practices in the buffer zone to foster conditions for harmonious human-crane coexistence. Drawing on experience from the Eastern Sarus Crane reintroduction program in Thailand, the project anticipates an overall post-release survival rate of $\geq 50\%$, with a first-year survival rate of approximately 40%, gradually improving thereafter. To minimize disturbance to the existing wild population, the project releases are carried out in small batches over time.

Newly arrived Eastern Sarus Cranes must undergo a three-month acclimation period, during which staff monitor their behavior daily. Only once they meet established criteria are they scheduled for release. To prevent the cranes from becoming habituated or fearful of humans, all staff entering the acclimation area must wear crane-like camouflage suits, ensuring that released birds can live independently away from human contact.

The rearing area is designed as a semi-wild facility, equipped with native vegetation, natural water sources, and grassy lawns, closely replicate natural conditions. Each enclosure has its own disinfection system, and the perimeter is planted with vegetation as a visual buffer. Additionally, the project has deployed a 24-hour video monitoring network covering all enclosures in the rearing area, feeds into a central control room, where dedicated technical staff monitor and record crane health and behavioral data in real time to ensure a prompt response to any abnormal situations.

Rearing practices focus on several critical aspects: Eastern Sarus Crane chicks need to swim extensively during the first week after hatching, because their leg bones are not yet fully ossified and prolonged walking can easily cause deformities. Therefore, the project strictly rotates water source in the enclosures every two days to ensure clean water quality and reduce the risk of disease.

To align with international conservation standards, park management staff have been sent to Thailand for professional training, where they gain systematic exposure to internationally recognized protocols husbandry, first aid, and veterinary care. Experts from the International Crane Foundation regularly provide technical guidance and on-site training to ensure that management practices meet professional standards.

To support the survival needs of Eastern Sarus Cranes, the national park has undertaken three core restoration initiatives: restoring hydrological regimes, removing invasive species, and reconstruction of the dominant food plant community (*Eleocharis spp.*). These efforts re-establish the natural wet-dry cycle of the wetland, eliminate invasive vegetation, restore thousands of hectares of foraging habitat, and lay the groundwork for secure food resource and suitable habitat for the cranes.

In the buffer zone, an ecological farming model emphasize by reduced seeding, no burning, and organic fertilizer substitution is being promoted, alongside the development of rice-fish farming system to increase farmers' incomes. To date, 200 hectares have been converted to ecological rice cultivation, yielding a win-win outcome that enhances crane habitat while strengthening the local economy and building community support.

Released individuals are selected according to strict criteria: preference is given to the healthiest and most robust paired adult cranes to maximize their probability of survival in the wild. Behavioral and ecological data from the first batch of released individuals provides key reference information for subsequent releases.

After release, Eastern Sarus Cranes are no longer subject to routine human intervention. Each bird is fitted with tracking devices to enable real-time monitoring of their movement in the wild. If tracking indicates that an individual is lingering for a extended period or experiencing foraging difficulties that lead to decline in physical condition, the project team promptly recaptures it, provides rehabilitation care, and releases it again once it has recovered, taking every effort to ensure the survival of released individuals.

In the wild, Eastern Sarus Cranes continue to face multiple threats. Domestic dogs are the primary predators of chicks. Adult cranes can fly away to avoid danger, but chicks that have not yet fledged can only rely on their parents for protection and are highly vulnerable to attack. Although there are no foxes in the region, predation of crane eggs by Burmese pythons and predation of chicks by wild cats occur periodically, constituting important constraints on breeding success of Eastern Sarus Cranes.

The Eastern Sarus Crane reintroduction project in Tram Chim National Park, Vietnam, exemplifies transnational collaborative conservation with strong community engagement. Its standardized husbandry, systematic habitat restoration, and practices for human-crane coexistence offer valuable lessons for the recovery of Eastern Sarus Crane populations in Southeast Asia and provide an important reference for global efforts in endangered crane reintroduction and conservation.

越南 Tram Chim 国家公园湿地管理

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Tram Chim 国家公园位于越南湄公河三角洲同塔省, 总面积 7588 公顷, 1999 年正式成为国家公园, 是芦苇平原 (Dong Thap Muoi) 最具代表性的洪泛型湿地保护区, 也是东南亚热带湿地生物多样性的关键节点。这里曾是赤颈鹤在湄公河下游最重要的栖息地, 承载着区域内 60% 的赤颈鹤种群, 以完整的湿草甸、千层林沼泽、季节性漫滩构成了独特的湿地生态系统。

Tram Chim 的原生生态系统是季节性淹没的芦苇平原湿地, 由水文节律主导生态系统运转。历史上, 每年雨季湄公河漫溢洪水与区域降雨会将公园淹没 2-3 米深, 形成大范围地表漫流 (sheetflow), 旱季则缓慢退水, 形成干湿交替的自然节律。园区内分布四大核心植物群落: 荸荠属 (*Eleocharis*)、皱叶鸭嘴草、铺地黍和野生稻, 沿地形高程呈梯度分布; 低洼处常年积水, 以莲等水生植物为主, 高地则以千层林 (*Melaleuca cajuputi*) 为优势树种, 伴生 80 余种本土乔灌木。低强度、高频次的自然火是生态系统的重要组成部分, 既能清理枯落物、促进千层林种子萌发, 也能优化草地结构, 为水鸟提供觅食环境, 水文与火共同塑造了稳定、多样的湿地生态格局。

然而过去数十年, 公园管理陷入以防火为核心的单一目标困境。为保护千层林免遭火灾, 管理者长期依靠堤坝与运河维持高水位, 试图隔绝火险, 却引发连锁生态退化。长期高水位抑制荸荠属植物块茎形成, 导致赤颈鹤食物短缺、种群数量下降; 淹水减缓有机质分解, 枯枝落叶大量堆积, 反而大幅提升高强度火灾风险; 堤坝阻断自然漫流, 造成水体酸化、鱼类栖息地破碎化; 运河堤岸成为入侵物种银合欢 (*Mimosa pigra*) 的扩散通道, 2000 至 2002 年其入侵面积从 450 公顷激增至 1800 公顷, 本土草地持续退化。这套“防火却破坏生态”的模式, 与公园保护原生湿地系统的使命背道而驰。

2006 年, 公园推出水与火综合管理战略, 以恢复生态自然节律为核心, 重构湿地管理体系。公园划分为五个独立的管理区 (A1-A5), 在水文管理上, 摒弃常年高水位模式, 为湿地制定贴合历史的旱季目标水位, 通过水闸渐进式控水还原季节性干湿交替; 同时新建控水设施、拆除内部运河堤坝, 恢复漫流过程, 改善水体连通性, 为鱼类洄游、植物群落恢复创造条件。

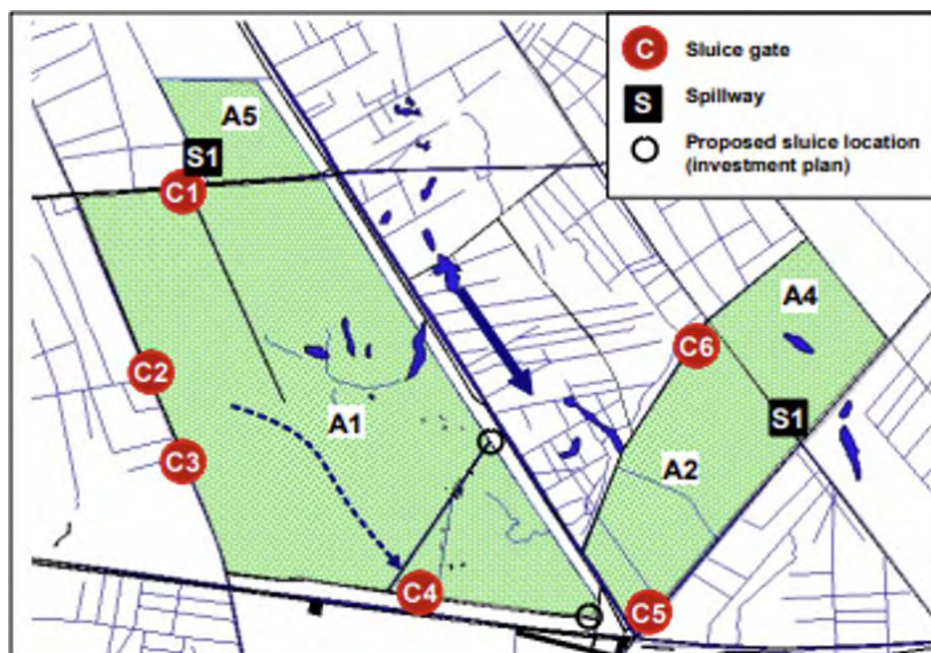


图1 Tram Chim国家公园管理区和水文基础设施

Fig. 1 Tram Chim National Park management zones and hydrological infrastructure



图2 A1管理区水闸
Fig. 2 Sluice gate in Management Zone A1

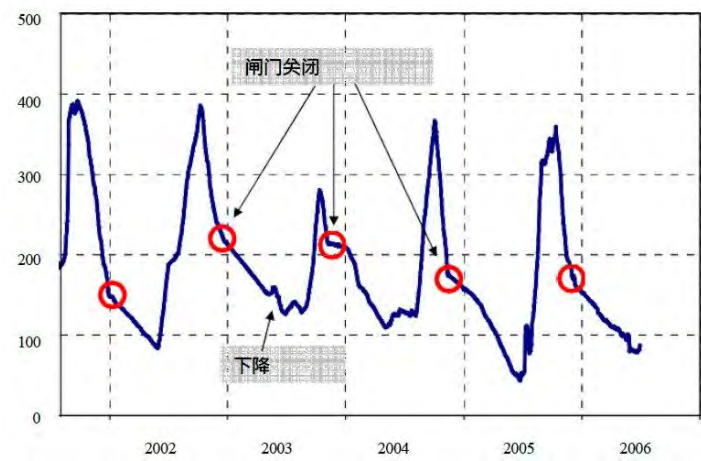


图3 A1管理区水位和水闸运行示意图
Fig. 3 Schematic diagram of water level and sluice gate operation in Management Zone A1

在火管理上，正式承认火在湿地生态中的正向作用。公园持续在草地开展计划性防火，降低枯落物负荷、减少野火风险；试点千层林计划性防火，结合社区参与的枯木收集、草地刈割，在控火的同时促进林木更新。

针对入侵物种，采用“烧除+翻耕+水位调控”组合技术清除银合欢，并发动社区将其加工为饲料、菌基，实现生态治理与民生收益协同。

为保障管理措施落地与进行管理效果评估，公园建立全覆盖监测体系，持续跟踪水位、水质、植被、鸟类、火灾风险等指标。

这种尊重湿地生态系统历史规律，水与火协同的管理模式，既修复了以荸荠属湿草甸、千层林等关键生境，支撑赤颈鹤等珍稀物种恢复，又有效管控火灾风险，解决长期以来的保护困境。



图4 Tram Chim的火管理
Fig. 4 Fire management in Tram Chim

Wetland Management in Tram Chim National Park, Vietnam

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Tram Chim National Park is located in Dong Thap Province, in the Mekong Delta of Vietnam. Covering 7,588 hectares, it was officially edesigned as a national park in 1999. It is the most representative floodplain wetland reserve of the Plain of Reeds (Dong Thap Muoi) and a key site for tropical wetland biodiversity in Southeast Asia. The park once supported the most important habitat for the Eastern Sarus Crane in the lower Mekong River, hosting up to 60% of the regional population. Its unique wetland ecosystem comprises intact wet grasslands, *Melaleuca* swamp forests, and seasonal floodplains.

The native ecosystem of Tram Chim is a seasonally inundated reed plain wetland, where hydrological dynamics drive ecosystem processes. Historically, during the annual rainy season, floodwaters from the Mekong River--combined with regional rainfall--would inundate the park to a depth of 2-3 meters, creating extensive sheet flow. During the dry season, water would recede gradually, establishing a natural wet-dry cycle. Four core plant communities are distributed across the park-- *Eleocharis*, *Ischaemum rugosum*, *Panicum repens*, and wild rice--arranged along a gradient of elevation. Low-lying areas with year-round standing water are dominated by aquatic plants such as lotus, while the higher ground is occupied by *Melaleuca cajuputi*, accompanied by more than 80 native tree and shrub species. Low-intensity, high-frequency natural fire is an important component of the ecosystem: it removes litter, promotes *Melaleuca* seed germination, and maintains grassland structure to provide foraging habitat for waterbirds. Hydrology and fire together have shaped a stable and diverse wetlandlandscape.

However, over the past several decades, park management fell into the trap of a single-minded focus on fire prevention. To protect *Melaleuca* forests from fire, managers long relied on maintaining high water levels using dikes and canals in an attempt to eliminate fire risk. This, however, triggered a cascade of ecological degradation. Prolonged high water levels suppressed tuber formation in *Eleocharis* plants, leading to food shortages for Eastern Sarus Cranes and subsequent population decline. Flooding slowed organic matter decomposition, causing an accumulation of leaf litter and debris, which in turn greatly increased the risk of high-intensity fires. Dikes blocked natural sheet flow, resulting in water acidification and fragmentation of fish habitat. Canal embankments became corridors for the spread of the invasive species *Mimosa pigra*; between 2000 and 2002, its invaded area surged from 450 to 1,800 hectares, while native grasslands continued to degrade. This “fire prevention at the expense of ecology” approach ran counter to the park's mission of protecting the native wetland system.

In 2006, the park introduced an integrated water and fire management strategy, restructuring the wetland management system around the restoration of natural ecological rhythms. The park is divided into five independent management zones (A1-A5). In terms of hydrological management, the perennial high-water-level model was abandoned, and historically appropriate dry-season water level targets were established for the wetland. Water levels are progressively controlled using sluice gates to restore seasonal wet-dry cycles. At the same time, new water control facilities have been built, and internal canal dikes have been removed to restore sheet flow processes, improve water connectivity, and create conditions for fish migration and plant community recovery.

In terms of fire management, the positive role of fire in wetland ecology has been formally recognized. The park continues to conduct prescribed burning in grasslands to reduce litter loads and lower the risk of wildfires. Pilot prescribed burning in *Melaleuca* forests, combined with community involvement in collecting

dead wood and mowing grass, promotes forest regeneration while managing fire risk.

For invasive species, a combination of techniques including “burning + plowing + water level regulation” has been used to remove *Mimosa pigra*. The community has been mobilized to process the species into animal feed and mushroom substrate, achieving synergies between ecological management and local livelihoods.

To ensure the implementation of management measures and evaluate management effectiveness, the park has established a comprehensive monitoring system that continuously tracks indicators such as water level, water quality, vegetation, bird populations, and fire risk.

This management model, which respects the historical ecological patterns of the wetland ecosystem and integrates water and fire management, has not only restored key habitats such as *Eleocharis* wet grasslands and *Melaleuca* forests to support the recovery of rare species including the Eastern Sarus Crane, but has also effectively controlled fire risk and resolved the long-standing conservation dilemma.

尼泊尔的黑颈鹤

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尼泊尔境内分布有四种鹤：赤颈鹤、灰鹤、蓑羽鹤和黑颈鹤。其中，仅赤颈鹤是留鸟，灰鹤和蓑羽鹤每年冬季迁徙至尼泊尔越冬，黑颈鹤则仅在繁殖季有零星记录，属于迷鸟。在这四种鹤中，对黑颈鹤的了解是最少的。

尼泊尔关于黑颈鹤的观测记录非常有限。历史观测记录见于卡斯基县和朗唐国家公园，近年稳定观测记录则来自利米山谷——一个位于乌姆拉县的重要鸟类与生物多样性保护区（IBA）。除此之外，2025 年 5 月，当地居民在木斯唐县的洛曼塘地区记录到了一对黑颈鹤。不断增加的记录表明尼泊尔存在适宜黑颈鹤生存的栖息地，同时表明亟需在尼泊尔针对黑颈鹤开展更多探索和系统性调查。

黑颈鹤在繁殖季（4-8 月）到访尼泊尔。然而，此前从未有该物种在尼泊尔繁殖的记录。为了探索黑颈鹤的繁殖状况，尼泊尔鸟类保护协会（BCN）组建调查队，前往观测记录最多的利米山谷开展调查。该保护区内，共有四个曾记录到黑颈鹤的关键区域：Sakya 河谷、Gyau 河谷、Ngin 河谷和 Cholanmyok 湖。调查队于 2024 年和 2025 年对这些区域进行了调查。2024 年，调查队在所有区域均未发现任何黑颈鹤个体。2025 年，调查队在 Sakya, Gyau 和 Cholanmyok 仍未观察到黑颈鹤，但在 Ngin 河谷成功观察到了一对黑颈鹤。这次调查是一个重要的里程碑，因为调查队记录到了一只黑颈鹤幼鸟。这一发现首次证实了黑颈鹤在尼泊尔存在繁殖行为，并充分说明必须在尼泊尔持续开展监测，并大范围调查潜在栖息地。

利米山谷不仅是黑颈鹤的栖息地。这片谷地也是尼泊尔重新发现野牦牛（*Bos mutus*）的区域。同时栖息着多种珍稀野生动物：喜马拉雅狼（*Canis lupus chanco*）、雪豹（*Panthera uncia*）、欧亚猞猁（*Lynx lynx*）、藏狐（*Vulpes ferrilata*）、藏野驴（*Equus kiang*）、藏原羚（*Procapra picticaudata*）、藏绵羊（*Ovis ammon hodgsoni*）、岩羊（*Pseudois nayaur*）等等。尽管这里是野生动物的重要栖息地，但当地政府对这片区域的保护投入与关注度仍显不足。

如今，利米山谷完整的原生荒野生态正遭受各种活动的影响。公路建设正在深入河谷腹地；利米拉普恰是能够眺望冈仁波齐峰与玛旁雍错湖的点位，常年有大量朝圣游客往来；而一条通往湿婆昆达、正在焦河谷施工的新建公路，或将进一步加剧人类活动对区域野生动物的干扰。此外，放牧模式的改变，也带来了另一个生态隐患，过去利米山谷的草场主要供家牦牛、犏牛（牦牛与黄牛的杂交后代）

和马匹觅食，这类牲畜对原生地貌与植被的稳定发挥了重要作用。近年来，大量山羊和绵羊的牧民带着牧羊犬来到了利米山谷。据牧民估计，山羊和绵羊的数量数以千计。如此庞大的数量极有可能对利米山谷的资源造成巨大压力。此外，自由游荡的牧羊犬可能对黑颈鹤和其他野生动物构成威胁。同时，涌入谷地的牧民大多为外来人口，牧民数量增加或将提高非法盗猎活动的发生。

如果及时采取适当行动，上述生态问题是可以得到控制的，现在是行动的最佳时机。可落地的保护措施包含：采用更生态友好的方式运营新修建的道路；面向到访游客开展宣教，让其了解栖息地的生态敏感性与自身活动带来的潜在风险，并建立监管措施。同时，面向牧民和当地居民开展科普宣传，讲解栖息地重要性、野生动物的保护价值，以及民众可参与保护工作的途径，能够借助公民科学，将各类负面生态影响转化为保护助力。依托本地利益相关方、政府主管部门的支持，同时借鉴鹤类各分布国的成熟经验，尼泊尔有潜力成为这种珍稀鸟类——黑颈鹤的又一处安稳栖息家园。

Black-necked Crane in Nepal

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Nepal is home to four different species of crane: Sarus Crane, Common Crane, Demoiselle Crane and Black-necked Crane. Among them Sarus Crane is the only resident species. Common Crane and Demoiselle Crane visits Nepal during winter migration whereas Black-necked Crane comes as vagrant in the breeding season. Black-necked Crane is least known species of crane in Nepal among the four.

In Nepal, Black-necked Crane has been very limited records. The historical records are from Kaski District and Langtang National Park whereas regular records have been made recently from Limi Valley, an Important Bird and Biodiversity Area (IBA) in the Humla District. Besides these, a pair of Black-necked Crane was recorded by local people in the Lo Manthang area of Mustang District in May 2025. The growing records suggest presence of suitable habitats in Nepal and highlight the need of more explorative and systematic surveys for the species in Nepal.

Black-necked Crane visits Nepal during the breeding season (April-August). However, there had been no previous records of the species breeding in Nepal. Thus, to explore the breeding status of Black-necked Crane, a team from Bird Conservation Nepal (BCN) surveyed the Limi Valley IBA, the area with most known records. In the IBA, there are four key areas from where Black-necked Crane had been recorded: Sakya River Valley, Gyau River Valley, Ngin River Valley and Cholaunggyok Lake. Thus, the team surveyed these areas in the year 2024 and 2025. In the year 2024, the team could not find any individual of the species in all these areas. In 2025 too, the team did not observe Black-necked Crane in Sakya, Gyau and Cholaunggyok, but were successful in observing a pair of Black-necked Crane in the Ngin River Valley. This observation became an important milestone, as this time the survey team were able to record a juvenile of the species. This observation provided the first evidence of Black-necked Crane breeding in Nepal and strongly highlights the need of continued monitoring and extensive exploration of potential habitats in Nepal.

The Limi Valley IBA is more than a habitat for Black-necked Crane. The valley is where Wild Yak (*Bos mutus*) was re-discovered for Nepal. It also supports diverse wildlife: Himalayan Wolf (*Canis lupus chanco*), Snow Leopard (*Panthera uncia*), Eurasian Lynx (*Lynx lynx*), Tibetan Fox (*Vulpes ferrilata*), Kiang (*Equus kiang*), Tibetan Gazelle (*Procapra picticaudata*), Tibetan Argali (*Ovis ammon hodgsoni*), Blue Sheep (*Pseudois nayaur*) and many more. Despite being an important habitat for wildlife, attention from the government for its conservation is still lacking.

The Limi Valley IBA now faces changes in its intact wilderness. Road construction is reaching deep

inside the river valleys. Flow of religious tourists to Limi Lapcha, from where Mount Kailash and Lake Mansarovar are visible, was evident but a new road being constructed in the Gyau River Valley to reach Shiva Kunda is likely to magnify the impact to the wildlife in the region. Also, the change in herding practice raises another concern. Before, the landscape of Limi Valley was foraging ground for domestic yaks, jhoppas (hybrid of yak and cow), and horses who played important role in keeping the landscape intact. But recently, goat and sheep herders have reached Limi Valley and along with them are herder dogs. The herders estimate the numbers of goat and sheep in thousands. This large number is highly likely to put immense pressure on the resource of Limi Valley. In addition, the herder dogs, that roams freely might be a threat to the Black-necked Crane and other wildlife. Also, hunting might escalate with the growing number of herders that are primarily from outside Limi Valley.

The issues can be kept under control, if taken proper action in time. And no time is better than now. The utilization of newly constructed roads in a more nature-friendly manner, sensitizing and educating the visitors about the sensitivity of the habitat and the risk they might pose, and establishing regulatory measures might be some steps to put forward. Likewise, conducting awareness programs among the herders and local people about the importance of the habitat, wildlife and ways they can contribute to the conservation, might turn the negatives to positive in the form of citizen science. With the support of local stakeholders, government authorities and experience from range countries, Nepal can be another haven for the majestic bird, Black-necked Crane.

国际鹤类基金会中国黑颈鹤项目历史概要（1988-2026）

李凤山

国际鹤类基金会，美国

1988 年 2 月，国际鹤类基金会 International Crane Foundation (ICF) 主席乔治·阿其博 George Archibald 首次到达中国黑颈鹤分布地贵州草海。自此，ICF 与中国的合作伙伴们携手努力，为这一高原物种的生存繁衍开展了将近 40 年保护工作。项目区域覆盖云南、贵州、四川和西藏等，项目活动涵盖科学研究、社区发展、保护管理、环境教育等多个方面（表 1）。

ICF 中国的黑颈鹤项目取得了举世瞩目的成就，主要亮点包括：（1）黑颈鹤卫星跟踪——中国最早开展的鸟类卫星跟踪项目之一；（2）云南高原黑颈鹤普查——中国首个针对单一物种的区域性协调调查；（3）黑颈鹤乡土教材——开发并讲授以黑颈鹤为主题的本土环境教育教材；（4）草海的社区发展和保护——以自然保护为前提，开展的小额信贷和农户减贫扶持；（5）黑颈鹤保护网络——建立并持续运行覆盖多个省区的黑颈鹤保护协作网络。

在 ICF 投身黑颈鹤保护这 40 年中，该物种的生存状况得到了极大改善。上世纪八、九十年代，黑颈鹤曾是世界 15 种鹤类中被了解最少的物种，如今，它已成为研究较为深入的鹤类之一。其受威胁等级由 IUCN 红色名录中的“濒危”（Endangered），先后调整为“易危”（Vulnerable）、“近危”（Near Threatened）。

ICF 黑颈鹤项目的成功，离不开中国各地各级合作伙伴的鼎力支持（见表 1），也离不开众多资助单位和个人的慷慨帮助，主要包括：贵州省人民政府、福特基金会、贵州省林业厅、国际渐进组织、加拿大矿业公司、美国林务局、Fondation Hans Wilsdore、日本经团连自然保护基金、John D & Catherine T MacArthur 基金会、Liz Claiborne & Art Ortenberg 基金会、Lynde & Harry Bradley 基金会、Sam Evans，德国湿地基金会和 Heather Henson。

表 1 国际鹤类基金会黑颈鹤项目一览

项目名称	时 间	主要活动成果	主要合作机构
国际鹤类基金会访问 贵州草海	1988	乔治·阿其博主席带领代表团于 2 月份访问草海，这是 ICF 人员首次到访黑颈鹤在中国的分布地。	贵州省环境保护局、贵州草海国家级自然保护区管理处
全球和区域性黑颈鹤 数量普查	1988-1990	协调全球黑颈鹤冬季数量调查（1988/1989 和 1989/1990 冬季），分别记录到为 705 和 1615 只，其中中国境内分别为 408 和 1310 只。	贵州省科学院、西北高原生物研究所、云南省林业厅
	2001-2004	云贵高原黑颈鹤数量调查（三个冬季）：数量分别为 3261、3488、3562 只，全面摸清了云贵高原黑颈鹤的数量、分布及栖息地状况。	云南省林业厅、昆明动物研究所
云南中甸县（现香格里拉县）黑颈鹤调查及纳帕海栖息地保护和管理合作	1989-1992	调查中甸黑颈鹤数量，观察黑颈鹤行为生态，探讨利用 GIS 分析黑颈鹤的生态与土地利用关系。1989 年 1 月，在纳帕海和碧塔海共记录到 98 只黑颈鹤。	云南省林业厅、云南纳帕海自然保护区、美国威斯康星大学
西藏项目	1991	西藏黑颈鹤繁殖调查，重点调查班戈、申扎、萨迦、仲巴、那曲、多雄等县，记录到黑颈鹤 298 只，其中包括 32 对繁殖对。	西藏高原生物研究所
	1996	黑颈鹤的生态与农业耕作活动的关系研究	西藏农业厅
	2006	开展西藏黑颈鹤环境教育活动包括开发《黑颈鹤启蒙教育》教材并在拉萨地区授课	西藏高原生物研究所
	2009-2010	西藏日喀则地区黑颈鹤相关监测（包括分布、数量及变化；输电线路的影响）；黑颈鹤环境教育	西藏高原生物研究所
	2009-2015	西藏黑颈鹤数量普查（多次），其中 2014 年记录到 5558 只，而 2009 年仅记录到 3657 只。	西藏高原生物研究所、全国鸟类环志中心、西藏林业厅
黑颈鹤卫星跟踪项目	2005-2007	滇东北地区黑颈鹤卫星跟踪项目：（1）在云南大山包和贵州草海捕捉、标记黑颈鹤；（2）识别黑颈鹤东部种群的迁徙路线，增强对其繁殖地的理解和认识；（3）开展黑颈鹤环境教育	云南省林业厅、全国鸟类研究中心、昆明动物研究所
	2008-2010	纳帕海黑颈鹤卫星跟踪项目：（1）开展黑颈鹤中部种群的捕捉、标记；（2）识别中部种群的迁徙路线和繁殖地；（3）首次较全面识别黑颈鹤在甘孜地区的繁殖地	昆明动物研究所、全国鸟类环志中心、中国探险学会

续表 1. 国际鹤类基金会黑颈鹤项目一览

项目名称	时 间	主要活动成果	主要合作机构
贵州草海社区发展和自然保护项目	1993-2018	(1) 利用 GIS 分析黑颈鹤的生态与土地利用关系； (2) 开展黑颈鹤行为生态和迁徙研究； (3) 开展渐进项目，为村民提供小额赠款，提高村民的自主能力； (4) 建立村寨发展基金（小额信贷），由村民自主管理； (5) 制定并实施村级保护和发展兼顾规划； (6) 实施社区林业项目：在草海流域山谷与村民合作种草种树，防治自然坡地和农田地带的水土流失； (7) 建立农民草海保护协会，搭建社区与保护区之间的桥梁； (8) 开展环境教育活动，开发最早也是数量最多的乡土教材，组织授课、冬夏令营及能力建设活动。草海的环境教育与后来在若尔盖开展的环境教育项目相互合作，并横向发展，建立了迁徙路线层面的环境教育网络，提升了自然保护意识，推动了区域性黑颈鹤保护行动。	草海国家级保护区、贵州省环保局（后期为贵州省林业厅）、云南地理研究所
若尔盖项目	2009/2019	大若尔盖地区黑颈鹤普查，首次比较系统地调查并掌握大若尔盖地区（四川若尔盖、红原、阿坝县及甘肃玛曲和碌曲县）黑颈鹤分布和数量。根据实际观察，2009 年记录 728 只，2019 年记录 475。根据 2009 年的调查结果估算，整个大若尔盖地区黑颈鹤为 2635 只。	昆明动物研究所、四川省林业厅
	2012-2019	(1) 四川若尔盖湿地自然保护区的黑颈鹤科研和保护（黑颈鹤的繁殖生态、黑颈鹤的繁殖与牧业活动的关系、建立若尔盖黑颈鹤的种群监测体系） (2) 开展环境教育活动（乡土教材的开发和授课、夏令营、教师培训和交流）	四川省林业厅、四川大学、若尔盖湿地国家级自然保护区
区域性活动	2012-	建立和运行黑颈鹤保护网络。自 2012 年建立以来，共举办 9 届黑颈鹤保护网络年会。在《中国鹤类通讯》上，不定期设立“黑颈鹤网络”专栏，推动了黑颈鹤的研究和保护工作。	昆明动物研究所、全国鸟类环志中心及各级林业和自然保护部门
	2024-	黑颈鹤迁徙网络保护项目 2024 年 9 月启动，涵盖中国、印度、不丹和尼泊尔四国的黑颈鹤科研和保护行动。中国的项目包括云南、四川、甘肃和青海等，项目活动为科学研究、黑颈鹤保护网络运行与维护、迁徙安全评估以及环境教育。	昆明动物研究所、西南林业大学、兰州大学、全国鸟类环志中心

Table 1. Overview of ICF Black-necked Crane Project.

Project	Time	Main achievements	Key cooperative institutions
ICF Visits Caohai, Guizhou	1988	In February, Dr. George Archibald, Director of ICF, led a delegation to visit Caohai. This was the first time ICF personnel visited a Black-necked Crane site in China.	Guizhou Provincial Environmental Protection Bureau, Guizhou Caohai National Nature Reserve Management Office
Global and Regional Black-necked Crane Censuses	1988-1990	Coordinated global winter Black-necked Crane surveys (winters 1988/1989 and 1989/1990), recording 705 and 1,615 individuals respectively, of which 408 and 1,310 were in China.	Guizhou Academy of Sciences, Northwest Plateau Institute of Biology, Yunnan Provincial Forestry Department
	2001-2004	Yunnan-Guizhou Plateau Black-necked Crane surveys (three winters): counts of 3,261, 3,488, and 3,562 individuals respectively, comprehensively determining the population, distribution, and habitat status of Black-necked Cranes on the Yunnan-Guizhou Plateau.	Yunnan Provincial Forestry Department, Kunming Institute of Zoology
Black-necked Crane Survey in Zhongdian County (now Shangri-La County), Yunnan and Habitat Protection & Management Cooperation in Napahai	1989-1992	Surveyed Black-necked Crane numbers in Zhongdian, observed behavioral ecology, and explored the use of GIS to analyze the relationship between crane ecology and land use. In January 1989, 98 Black-necked Cranes were recorded at Napahai and Bitahai.	Yunnan Provincial Forestry Department, Yunnan Napahai Nature Reserve, University of Wisconsin (USA)
Tibet Projects	1991	Investigated Black-necked Crane breeding in Tibet, with focus on Baingoin, Xainza, Sagya, Zhongba, Nagqu, and Doixung counties. Recorded 298 Black-necked Cranes, including 32 breeding pairs.	Tibet Plateau Institute of Biology
	1996	Research on the relationship between the ecology of Black-necked Cranes and agricultural farming activities	Tibet Department of Agriculture
	2006	Conducted Black-necked Crane environmental education activities in Tibet, including development of “Black-necked Crane Early Education” teaching materials and teaching in Lhasa.	Tibet Plateau Institute of Biology
	2009-2010	Monitored Black-necked Cranes in Shigatse Prefecture, Tibet (distribution, population, and changes, including impact of powerlines); Black-necked Crane environmental education.	Tibet Plateau Institute of Biology
	2009-2015	Conducted multiple Black-necked Crane censuses in Tibet, recording 5,558 individuals in 2014 compared to only 3,657 in 2009.	Tibet Plateau Institute of Biology, National Bird Banding Center, Tibet Forestry Department

Table. 1 Overview of ICF Black-necked Crane Project

Project	Time	Main achievements	Key cooperative institutions
Black-necked Crane Satellite Tracking Project	2005-2007	Black-necked Crane Satellite Tracking Project in Northeast Yunnan: (1) Captured and marked Black-necked Cranes at Dashanbao in Yunnan and Caohai in Guizhou; (2) Identified migration routes of the eastern Black-necked Crane population, enhancing understanding of their breeding grounds; (3) Conducted Black-necked Crane environmental education.	Yunnan Provincial Forestry Department, National Bird Banding Center, Kunming Institute of Zoology
	2008-2010	Black-necked Crane Satellite Tracking Project in Napahai: (1) Captured and marked Black-necked Cranes of the central population; (2) Identified migration routes and breeding grounds of the central population; (3) First relatively comprehensive identification of Black-necked Crane breeding grounds in Ganzi Prefecture.	Kunming Institute of Zoology, National Bird Banding Center, China Exploration & Research Society
Community Development and Nature Conservation Project in Guizhou Caohai	1993-2018	(1) GIS analysis of crane ecology and land use; (2) Behavioral ecology and migration research; (3) Provided micro-grants to villagers through a Trickle Up Program, enhancing local capacity; (4) Established community trust funds (micro-credit) managed by villagers; (5) Developed and implemented integrated village conservation and development plans; (6) Implemented community forestry projects: cooperated with villagers to plant grass and trees in Caohai lake catchment valleys to control soil erosion on slopes and farmland; (7) Established a farmers' Caohai Conservation Association, building a bridge between communities and the reserve; (8) Carry out environmental education activities, develop the earliest and most extensive local school teaching materials, and organize lectures, winter and summer camps, and capacity-building activities. The environmental education in Caohai cooperates with the environmental education project later carried out in Ruorgai, and establish an environmental education network at the migration route level, enhancing awareness of nature conservation, and promoting regional protection actions for Black-necked Cranes.	Caohai National Nature Reserve, Guizhou Provincial Environmental Protection Bureau (later Guizhou Provincial Forestry Department), Yunnan Institute of Geography

Table 1. Overview of ICF Black-necked Crane Project.

Project	Time	Main achievements	Key cooperative institutions
Ruoergai Projects	2009/2019	Greater Ruoergai region Black-necked Crane census: first systematic survey of Black-necked Crane distribution and population in the Greater Ruorai region (including Ruoergai, Hongyuan, and Aba counties in Sichuan, and Maqu and Luqu counties in Gansu). Based on actual observations: 728 recorded in 2009, 475 in 2019. Based on 2009 survey results, the estimated Black-necked Crane population for the entire Greater Ruoergai region was 2,635.	Kunming Institute of Zoology, Sichuan Provincial Forestry Department
	2012-2019	(1) Research and conservation of Black-necked Cranes in Sichuan Ruoergai Wetland Nature Reserve (breeding ecology, relationship between crane breeding and livestock grazing activities, establishment of a population monitoring program for Ruoergai Black-necked Cranes); (2) Environmental education activities (development and teaching of local school education materials, summer camps, teacher training and exchanges).	Sichuan Provincial Forestry Department, Sichuan University, Ruoergai Wetland National Nature Reserve
	2012-	Established and operated the Black-necked Crane Conservation Network. Since its establishment in 2012, nine annual meetings of the Black-necked Crane Conservation Network have been held. A "Black-necked Crane Network" column has been established in China Crane News, promoting research and conservation of Black-necked Cranes.	Kunming Institute of Zoology, National Bird Banding Center, forestry departments and nature reserves at various levels
Regional Activities	2024-	Black-necked Crane Migratory Network Conservation Project (launched in September 2024): Includes Black-necked Crane research and conservation actions in four countries: China, India, Bhutan, and Nepal. Project sites in China include Yunnan, Sichuan, Gansu, and Qinghai. Project activities include scientific research, operation and maintenance of the Black-necked Crane Conservation Network, migration safety assessment, and environmental education.	Kunming Institute of Zoology, Southwest Forestry University, Lanzhou University, National Bird Banding Center



图 1 1987/1988 冬季，国际鹤类基金会乔治·阿其博带领观鸟团来草海，与草海科研和摄影人员合影（国际鹤类基金会资料）

Fig. 1 In the winter of 1987/1988, George Archibald of the International Crane Foundation led a birdwatching group to Caohai, posing for a group photo with Caohai research and photography staff (Photo provided by ICF)



图 2-3 1989 年元月，ICF 团队队员在纳帕海计数黑颈鹤，观察黑颈鹤的越冬行为（Jim Harris & Jeb Barzen 摄）

Fig. 2-3 In January 1989, ICF team members counted Black-necked Cranes and observed their wintering behavior at Napahai (Photo by Jim Harris & Jeb Barzen)



图4 国际鹤类基金会副主席哈里斯（左1）与贵州草海自然保护区管理局副局长陆玉学（右1）访问草海参与社区发展和保护项目的农户（约1998年）（国际鹤类基金会提供）

Fig. 4 ICF Deputy Director Harris (first from left) and Lu Yuxue (first from right), Deputy Director of the Guizhou Caohai Nature Reserve Administration, visit local farmers participating in community development and conservation projects at Caohai (circa 1998). (Photo provided by ICF)



图5 青藏高原生物研究所和国际鹤类基金会的研究人员在西藏开展黑颈鹤调查。两家单位从1990年开始合作，在黑颈鹤数量、栖息地、繁殖和越冬生态、环境教育等方面开展了大量工作。图为野外工作的国际鹤类基金会比索普博士和青藏高原研究所仓决卓玛研究员（国际鹤类基金会提供）

Fig. 5 Researchers from the Tibet Plateau Institute of Biology and the International Crane Foundation conducting a Black-necked Crane survey in Tibet. The two organizations have cooperated since 1990, carrying out extensive work on Black-necked Crane population numbers, habitat, breeding and wintering ecology, and environmental education. The photo shows Dr. Bishop of ICF and Senior Scientist Tsamdrol Drolma of the Tibet Plateau Institute of Biology working in the field (Photo provided by ICF)



图6 2004年3月，国际鹤类基金会主席乔治·阿其博、云南省林业厅副厅长郭辉军和安徽大学教授王岐山参加云贵高原黑颈鹤调查总结会时合影（国际鹤类基金会资料）

Fig. 6 In March 2004, George Archibald (President of ICF), Guo Huijun (Deputy Director of the Yunnan Provincial Forestry Department), and Wang Qishan (Professor at Anhui University) pose for a group photo at the Yunnan-Guizhou Plateau Black-necked Crane Survey Summary Meeting (Photo provided by ICF)



图7 2005年夏季，黑颈鹤卫星跟踪项目团队调查黑颈鹤迁徙停歇地和繁殖地，昆明动物研究所杨晓君研究员（右1）、全国鸟类环志中心研究生高立波以及四川若尔盖自然保护区副局长张明在若尔盖观察标记的黑颈鹤（钱法文 摄）

Fig. 7 In the summer of 2005, the Black-necked Crane satellite tracking project team investigated migration stopover sites and breeding grounds of Black-necked Cranes. Yang Xiaojun (first from right, Professor at Kunming Institute of Zoology), Gao Libo (second from left, graduate student from the National Bird Banding Center), and Zhang Ming (first from left, Deputy Director of Sichuan Ruorgai Nature Reserve) observe marked Black-necked Cranes in Ruorgai (Photo by Qian Fawen)



图8 2005-2006年，由昆明动物研究所、全国鸟类环志中心、国际鹤类基金会、云南省林业厅共同合作，在云南大山包黑颈鹤国家级自然保护区为黑颈鹤佩戴卫星跟踪器。昆明动物研究所伍和启（左）和大山包保护区道美标准备放飞一只黑颈鹤（李凤山 摄）

Fig. 8 In 2005-2006, a collaborative effort by the Kunming Institute of Zoology, the National Bird Banding Center, ICF, and the Yunnan Provincial Forestry Department fitted Black-necked Cranes with satellite trackers at the Yunnan Dashanbao Black-necked Crane National Nature Reserve. Wu Heqi (left, from Kunming Institute of Zoology) and Dao Meizhun (from Dashanbao Reserve) prepare to release a Black-necked Crane (Photo by Li Fengshan)



图9 2012年，首届黑颈鹤网络年会在昆明召开（李凤山 摄）

Fig. 9 In 2012, the First Annual Meeting of the Black-necked Crane conservation Network was held in Kunming (Photo by Li Fengshan)



图10 2016年，国际鹤类基金会、美国林务局、四川若尔盖国家级自然保护区在若尔盖观察黑颈鹤，协助若尔盖保护区建立黑颈鹤监测体系。图为美国林务局迁徙物种协调员Greg Butcher（左）和若尔盖保护区的如学在哈丘湖计数黑颈鹤（李凤山 摄）

Fig. 10 In 2016, the International Crane Foundation, the U.S. Forest Service, and Sichuan Ruoergai National Nature Reserve observed Black-necked Cranes in Ruoergai, assisting the Ruoergai Reserve in establishing a Black-necked Crane monitoring program. The photo shows Greg Butcher (left), Migratory Species Coordinator of the U.S. Forest Service, and Ruxue from Ruoergai Nature Reserve counting Black-necked Cranes at Haqiu Lake (Photo by Li Fengshan)



图11 2025年，黑颈鹤迁徙网络保护项目四国合作伙伴讨论项目进展及年度计划（崔芳洁 摄）

Fig. 11 In 2025, partners from four countries of the Black-necked Crane Migratory Network Conservation Project discuss project progress and annual plans (Photo by Cui Fangjie)

A Brief Introduction to Black-necked Crane Conservation Program in China by International Crane Foundation from 1988-2026

LI Fengshan
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In February 1988, George Archibald, Director of the International Crane Foundation (ICF), visited Caohai in Guizhou Province, a wintering area of the Black-necked Crane in China. Since then, ICF and its Chinese partners have worked together for nearly 40 years to ensure the long term the survival of this plateau crane species. ICF's Black-necked Crane program in China covers Yunnan, Guizhou, Sichuan, and Tibet while activities have spanned scientific research, community development, conservation management, and environmental education (Table 1).

ICF Black-necked Crane program in China has achieved remarkable results that have drawn worldwide attention. Key highlights include: (1) satellite tracking of Black-necked Cranes, one of the earliest bird satellite tracking initiatives in China; (2) the Yunnan-Guizhou Plateau Black-necked Crane census, the first regional coordinated survey for a single species in China; (3) development and teaching of local school environmental education materials focused on the Black-necked Crane; (4) community-based development and conservation at Caohai, featuring microfinance and poverty alleviation for farmers closely linked to nature conservation; and (5) the establishment Black-necked Crane Conservation Network, strongly enhancing research and conservation efforts on this species among provinces and regions, and research and conservation institutions.

Over the past 40 years that ICF has devoted to Black-necked Crane conservation, the species' status has improved greatly. In the 1980s and 1990s, the Black-necked Crane was the least known among the world's 15 crane species. Today, it has become one of the best-known crane species and its conservation status on the IUCN Red List been downlisted from “Endangered” to “Vulnerable” and then to “Near Threatened”.

The success of ICF's Black-necked Crane project would not have been possible without the strong support of partners at various levels across China (Table 1), nor without the generous assistance of numerous funding organizations and individuals, including the People's Government of Guizhou Province, Ford Foundation, the Forestry Department of Guizhou Province, Trickle Up Program, Continental Minerals Corporation, U.S. Forest Service, Fondation Hans Wilsdorf, Keidanren Nature Conservation Fund, John D. & Catherine T. MacArthur Foundation, Liz Claiborne & Art Ortenberg Foundation, Lynde & Harry Bradley Foundation, Sam Evans, Stiftung Feuchtgebiete, and Heather Henson.

越南社区发展与社区保护案例分享

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一、社区发展：生态水稻种植

该项目推行的生态水稻种植模式，最初曾尝试申请有机大米认证。但由于种植户无法控制灌溉水源，周边农田的污染水会不可避免地流入，无法满足有机认证的严格要求。基于这一现实，项目转而采用“生态种植标准”，以改善土壤条件、提升生物多样性为核心，更贴合当地实际。

为保障农户积极性，建立了“政府+企业”的保价收购机制。政府负责质量管控与信誉担保，确保

种植符合生态标准；企业则以高于市场价的保价收购达标水稻。当市场价格下跌时，农户可获得保价保障，避免亏损；当市场价格上涨时，收购价同步提升，但涨幅低于市场涨幅。该机制类似农业保险，有效降低了市场波动风险，让农户能够明确预估收益，因此深受认可。

生态种植标准包含三项核心要求：一是禁止秸秆焚烧，要求秸秆还田自然分解或使用生物制剂，从源头减少碳排放；二是限制高毒农药使用，明确禁用清单，保障稻米品质与生态环境；三是科学配比肥料，目前采用 50% 有机肥与 50% 化肥的搭配，目前优质有机肥供应不足，未来将逐步提高有机肥比例。

该模式实施成效显著。产量方面，尽管减少了化肥和化学农药用量，但通过改善种子质量和优化种植管理，产量与传统模式持平，每公顷可达 7-8 吨，处于当地较高水平。收益方面，农户平均收益较传统种植提升 20%。

项目形成了清晰的多方分工协作体系：农业与环境部负责制定标准、质量管控及认证担保；企业负责保价收购，打通产销链路；国际鹤类基金会（ICF）提供技术支持与农户培训，助力再生农业模式推广。

结合当地自然条件，项目还联动了传统稻田养鱼模式。每年 7-10 月的洪水季节，农户在收割夏秋稻后、待洪水上涨入田时养鱼、待洪水退去即可收获，这一做法可为农户带来约 30% 的额外增收。叠加生态水稻种植 20% 的增收，整体收益提升更为显著。

与此同时，该模式实现了生态与经济效益的双赢：优化种植方式改善了稻田生态环境，为本地鱼类提供了适宜栖息地，促进了生物多样性恢复。这也为赤颈鹤的野外放归提供了潜在栖息地，有助于恢复其野外栖息地环境。项目规模稳步扩大，过去四年间从 20 公顷试点增长至 70 公顷。

二、社区保护：湄公河鱼类保护区

在越南湄公河三角洲，一项由当地居民自发发起的河流鱼类保护项目取得了显著成效。项目发起人自幼目睹鱼类资源因过度捕捞而日渐枯竭，于 2024 年 2 月正式启动保护行动，目标是让河流恢复到开发前的自然状态。

项目初期，发起人在河道中投放大量树木，利用树枝形成物理屏障，既阻止了渔网作业，又为鱼类提供了天然的庇护所和繁殖空间。随后，项目购买并放流了 1 吨小型鱼苗，一周后确认鱼苗仍留在该水域。两年后，区域内鱼类的种类和数量均显著增加，放流的鱼群顺利长大，还吸引了其他野生鱼类聚集。

政府部门很快注意到这一成效。从 2024 年 2-9 月，仅用 6 个月便将最初 3 公里长的河段正式认定为鱼类保护区，禁止一切捕捞活动。此后，在社区民众的广泛认可和自发组织下，保护范围不断扩大，目前总长度已增至约 10 公里。如今，保护工作由社区自主管理，政府提供政策支持。

项目现有固定工作人员 9 名，发起人担任负责人。运营资金主要来自社区捐赠（现金与物资），没有政府常规投入，所有捐赠由寺庙统一管理。首次鱼苗放流的全部资金由发起人家庭承担。

社区深度参与是项目成功的关键。当地民众普遍认为保护鱼类能带来好运，这与传统的放生祈福文化高度契合。人们踊跃捐赠资金、食物、劳力，自发为项目提供支持。虽然具体参与人数尚未系统记录，但社区高涨的积极性成为项目持续运转的重要动力。

随着项目影响力扩大，民众自行放生的行为增多，其中可能混入外来物种，带来生态入侵风险。为此，项目设置了明确的标识牌“可放生本地鱼类物种标识牌”加以引导。项目初期对违规携带的放流生物仍允许放生，仅告知“下次勿再携带”；目前管控已更加严格。同时，当地非政府组织与寺庙合作，为工作人员提供放流管理培训，以规范放生行为。

目前，项目尚未开展系统的科学鱼类监测，区域内具体鱼类物种数量等基础数据尚属空白。为此，发起人所在大学已承诺提供学术支持，未来将开展物种多样性编目研究，系统统计物种数量与种群丰度。这一社区保护模式以低成本、高参与度为特点，充分发挥了传统文化与社区自治的力量，为越南湄公河流域鱼类资源恢复和湿地生物多样性保护提供了有益借鉴。



图 1 湄公河保护区鱼类标识

Fig. 1 Fish identification sign in the Mekong Sanctuary

Case Study on Community Development and Conservation in Vietnam

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1. Community Development: Ecological Rice Cultivation

The ecological rice cultivation model promoted by this project initially sought organic certification. However, because farmers cannot control irrigation water sources —polluted runoff from surrounding farmlands would inevitably flow in — the strict requirements for organic certification proved unattainable. In response, the project adopted an “ecological farming standard” better suited to local conditions, focusing on improving soil health and enhancing biodiversity.

To maintain farmer motivation, a guaranteed-price purchasing mechanism involving the government and enterprise was established. The government oversees quality control and provides credit guarantee to ensure that the cultivation meets ecological standards. Enterprises purchase compliant rice at a guaranteed price higher than the market rate. When market prices fall, farmers benefit from the guaranteed floor price, insulating them from losses; when market prices rise, the purchase price increases as well, though at a slower rate. This mechanism, similar to agricultural insurance, effectively buffers farmers against market volatility, allows them to estimate their income with confidence, and is therefore highly valued by the local community.

The ecological farming standard includes three core requirements: First, a ban on straw burning, requiring straw to be returned to the field for natural decomposition or treated with biological agents to reduce carbon emissions at the source. Second, restrictions on the use of highly toxic pesticides, with a clear list of prohibited substances, to ensure rice quality and ecological health. Third, fertilizer application is

scientifically formulated, currently using a 50-50% blend of organic and chemical fertilizers. Due to a shortage of high-quality organic fertilizer, the proportion of organic fertilizer will be gradually increased in the future.

The results of this model have been significant. In terms of yield, despite reduce use of chemical fertilizers and pesticides, improvements in seed quality and cultivation management have kept yields on par with traditional methods, reaching 7-8 tons per hectare, a relatively high level locally. In terms of income, farmers' average income has increased by 20% compared with traditional cultivation.

The project has established a clear, multi-party collaboration framework. The Department of Agriculture and Environment is responsible for standard setting, quality control, and certification oversight. Enterprises are responsible for guaranteed price purchasing, bridging production and sales. The International Crane Foundation (ICF) provides technical support and farmer training, promoting the adoption of regenerative agricultural practices.

Leveraging local natural conditions, the project has also integrated traditional rice-fish farming. During the flood season from July to October each year, after harvesting the summer-autumn rice crop and before floodwaters rise into the fields, farmers raise fish and harvest them when the waters recede. This practice generates approximately 30% additional income for farmers. Combined with the 20% income increase from ecological rice cultivation, the overall income benefit is substantial.

Moreover, this model achieves a win-win for ecology and the economy: Optimized cultivation practices improve the paddy field ecosystem, provide suitable habitat for native fish species, and promote biodiversity restoration. This also offers potential habitat for the reintroduction of the Sarus Crane into the wild, supporting the restoration of natural foraging areas. The project scale has steadily expanded, growing from a 20-hectare pilot to 70 hectares over the past four years.

2. Community Conservation: Mekong River Fish Sanctuary

In the Mekong Delta of Vietnam, a river fish conservation project, initiated spontaneously by local residents, has achieved remarkable results. Having witnessed the depletion of fish resources due to overfishing since childhood, the project founder officially launched the conservation initiative in February 2024, aiming to restore the river to its natural, pre-development state.

In the initial phase, the founder placed large numbers of trees into the river channel, using the branches to form physical barriers that both prevent net fishing and provide natural shelter and breeding spaces for fish. Subsequently, the project purchased and released one ton of fingerlings; a week later, it was confirmed that the fingerlings remained in the area. Two years later, both the species richness and overall fish population in the area had significantly increased. The released fish had grown successfully and also attracted other wild fish to congregate.

Government authorities quickly noticed this success. Within just eight months, from February to September 2024, a 3-kilometer stretch of the river was officially designated as a Fish Sanctuary, where all fishing was prohibited. Since then, driven by widespread community recognition and voluntary grassroots coordination, the protected area has continued to expand, currently reaching approximately 10 kilometers in total length. Today, conservation efforts are managed autonomously by the community, with policy support from the government.

The project currently has 9 regular staff members, with the founder serving as the leader. Operational funds primarily come from community donations (cash and supplies); there is no regular government funding. All donations are managed by a local temple. The founder's family covered all costs associated with the initial fish release.

Broad community participation is key to the project's success. Local people generally believe that protecting fish brings good luck, closely aligning with traditional cultural practices of releasing captive

animals as a merit-making or blessing-seeking act. People actively donate money, food, and labor, providing voluntary grassroots support. Although the exact number of participants has not been systematically recorded, this high level of community enthusiasm is a crucial driver of the project's sustainability.

As the project's influence grows, the number of people independently releasing fish has increased, which may introduce invasive species and pose ecological risks. To address this, the project has installed clear signage listing locally permitted fish species for release. Initially, the project allowed the release of non-permitted species brought by participants violation, simply asking them not to bring them again; management has since become stricter. Additionally, local NGOs collaborate with temples to provide staff training on release management.

Currently, the project has not yet conducted systematic scientific fish monitoring, and basic data, such as species abundance and population counts, are still lacking. In response, the university where the founder works has committed to providing academic support, and future research will involve cataloguing species diversity to systematically document species richness and population abundance. This community-based conservation model, characterized by low cost and high participation, effectively leverages traditional culture and community self-governance, providing a valuable reference for fish resource restoration and wetland biodiversity conservation in the Mekong River basin, Vietnam.

南非农民携手合作，首笔保护鹤类栖息地碳信用收益兑付

JODI Legge

国际鹤类基金会，南非

南非，2026 年 1 月 15 日讯——南非首个经核实的大型土壤碳汇项目，将完成超 9 万公顷（22.26 万英亩）的不可替代的德拉肯斯堡草原的生态保护。该项目同时也是全球首批大规模应用 Verra 的 VM0026 可持续草地管理方法学的碳汇项目之一。Verra 是全球碳信用认证领域的权威机构。

国际鹤类基金会联合濒危野生动物信托基金会取得阶段性重大成果，近期正式获得官方签发的 805,971 个核证碳单位（VCU）。这项支撑草原长期、可持续保护的重要里程碑，依托 20 多年持续深耕落地，也是双方携手守护南非德拉肯斯堡地区鹤类栖息地的共同履约成果。

所有核证碳单位均经过独立审计，其气候效益已核验确认，在项目设计、建模和实施方面展现出卓越的科学严谨性和准确性。

该项目于 2018 年 7 月启动，项目范围覆盖德拉肯斯堡山脉沿线，从北部的姆普马兰加省一直延伸到南部的东开普省。项目绝大部分土地通过与私人土地所有者签订的长期生物多样性管理协议进行管理。地块入选标准包含三项核心条件：一是为肉垂鹤、蓝鹤、灰冠鹤提供关键栖息生境，生态价值突出；二是具备可观土壤固碳潜力；三是土地所有者承诺落实可持续放牧与火情管控措施。

该项目采用 Verra 的 VM0026 可持续草地管理方法学，为气候和生物多样性带来了益处，并通过改善土壤健康、水分渗透和牧草生产力，显著增强了农业韧性。在一个日益受干旱和气候多变性影响的地区，这些因素是农场长期稳定性的关键。恢复草地生态系统有助于大宗商品生产者在维持可行运营的同时，促进生物多样性更好地发挥功能，使传粉昆虫、猛禽、鹤类以及众多依赖草地的物种受益。

此类碳汇项目无法替代减排行动、实现净零排放路径的核心工作，仅作为配套补充手段。基于自然的气候解决方案（NBS），是重建生态系统、提升景观生态韧性的重要组成部分。项目持续向农户兑付碳信用收益，这笔资金反哺可持续土地管护工作，帮助农户优化土地利用模式，提升应对气候变化的适应能力与抗风险水平。



图 1 我们的团队正与德拉肯斯堡地区的土地所有者合作，恢复蓝鹤及其他野生动物的重要草地栖息地（Sara Gavney Moore 摄/国际鹤类基金会）

Fig. 1 Our team is collaborating with landowners in the Drakensberg region to restore vital grassland habitat for Blue Cranes and other wildlife (Sara Gavney Moore/International Crane Foundation)

国际鹤类基金会、濒危野生动物信托基金会联合维艾克特（WeAct）机构，现已启动第二个监测周期，监测时段为 2023 年 1 月 1 日至 2027 年 12 月 31 日。该项目的下一阶段为志同道合、致力于保护的 land 所有者提供了作为合作伙伴加入的机会。这将使保护范围再扩大 5.4 万公顷（13 万英亩），从而加强该地区的生态和农业成效。

所有参与者都已承诺至少 40 年的合同期。这一承诺提供了一种可持续的融资机制，将碳信用收入重新投入保护工作，从而创造真正的长期农业韧性和改善农村生计。各项目合作方将持续为参与农户提供配套支持，并持续推进监测体系完善、项目范围拓展、碳汇核证等相关工作。

First Carbon Credits Payments to Protect Crane Habitat Received in Partnership with South Africa's Farmers

JODI Legge

International Crane Foundation, South Africa

South Africa – January 15, 2026 – More than 90,000 hectares (222,600 acres) of irreplaceable Drakensberg Grasslands will now be conserved as part of South Africa's first large-scale, verified soil carbon project, and one of the world's first that is applying Verra's VM0026 Sustainable Grassland Management methodology at this scale. Verra is the world's leading authority for carbon credit certification.

The International Crane Foundation, in partnership with the Endangered Wildlife Trust, has reached an important milestone, recently receiving official issuance of 805,971 Verified Carbon Units (VCUs). This important milestone for long-term, sustainable grasslands conservation is the product of more than 20 years of work and is part of a joint commitment to saving crane habitat in the Drakensberg region of South Africa.

These VCUs are independently audited and confirmed climate benefits, demonstrating exceptional scientific integrity and accuracy in project design, modelling, and implementation.

The project, which began in July 2018, spans along the Drakensberg range, from Mpumalanga in the north to the Eastern Cape in the south. Most of the land is managed through long-term biodiversity stewardship agreements with private landowners. The properties were selected for their ecological importance for Wattled, Blue, and Grey Crowned Cranes, their potential for soil carbon sequestration, and their landowner's demonstrated commitment to sustainable grazing and fire management.

Using Verra's VM0026 Sustainable Grassland Management methodology, the project delivers benefits for climate and biodiversity, significantly enhances agricultural resilience by improving soil health, water infiltration, and forage productivity. These are critical factors for long-term farming stability in a region increasingly affected by drought and climate variability. Restoring grassland ecosystems helps commodity producers maintain a viable operation while enabling better functioning biodiversity, benefiting pollinators, raptors, cranes, and numerous grassland-dependent species.

Carbon projects like this do not replace the need to reduce emissions or efforts to secure a pathway to net zero, but rather complement them. Nature-based (NBS) climate solutions are an essential part of rebuilding the ecosystem and creating resilience in the landscape. Financial support, in the form of ongoing credits to farmers, in turn supports ongoing sustainable land management and enables farmers to engage in land use activities to support adaptation and resilience in the face of a changing climate.

The International Crane Foundation and the Endangered Wildlife Trust, in partnership with WeAct, are already underway with the second monitoring period, which will run from January 1, 2023, to December 31, 2027. This next phase of the project creates an opportunity for like-minded conservation-oriented landowners to join the project as partners. This will expand the conservation footprint by 54,000 hectares (130,000 acres), strengthening ecological and agricultural outcomes across the region.

All participants have committed to a minimum of a 40-year contract horizon. This commitment provides a sustainable financing mechanism to reinvest carbon revenue into conservation, creating real long-term agricultural resilience and rural livelihood improvement. The project partners remain committed to supporting participating landowners and enhancing future monitoring, expansion, and verification efforts.

不丹黑颈鹤保护知识分享研讨会：跨区域合作的保护实践

杨波 张琦

国际鹤类基金会，北京 100088

2025 年 11 月，国际鹤类基金会代表应邀前往不丹，参加由不丹皇家自然保护协会（RSPN）主办的黑颈鹤保护知识分享研讨会，并随后出席了在普布季卡（Phobjikha）山谷举行的黑颈鹤节庆活动。此行不仅加深了对不丹黑颈鹤保护工作的理解，也见证了社区参与和传统文化在保护实践中的独特价值。

研讨会于 11 月 8 日在廷布 RSPN 总部举行，来自中国、印度、尼泊尔、不丹和日本的 45 位代表参会，涵盖研究机构、非政府组织及政府部门等多元利益相关方。会议围绕黑颈鹤当前的保护实践、合作机制与未来方向展开深入讨论，聚焦中亚迁徙通道上的跨区域、多利益方协同。与一般学术会议不同，本次研讨会的核心议题是：保护行动如何有效落地，并与当地社区生计相结合。这一主题贯穿了各国代表的报告。

来自印度、尼泊尔和中国的研究人员及保护实践者，分别从宗教文化背景、科学监测体系、环境教育和政策支持等角度分享了各自的经验与挑战，展示了不同生态和社会条件下跨境保护工作的适应能力。



图 1 参会人员合影

Fig. 1 Group photo of participants

不丹的保护实践成为研讨会的一大亮点。当地保护工作者、保护区人员和非政府组织员工介绍了不丹全国黑颈鹤保护的进展。自 2018 年以来，针对鹤类面临的主要威胁（如天敌捕食、过度放牧、人为干扰和非法采集），不丹实施了一系列针对性措施，在减少干扰、改善栖息地质量和提升繁殖地安全性方面取得了可衡量的成效。



图 2 Bumdeling 保护区的工作人员介绍保护工作

Fig. 2 Staff from the Bumdeling Protected Area introduce conservation work

当地保护工作者还分享了保护行动对社区生计、收入结构以及人们对自然认知的积极影响。通过参与栖息地保护和文化传播等活动，当地社区日益成为保护的参与者和受益者。这些来自基层的声音印证了一个重要结论：只有当保护行动回应并满足当地需求时，保护才能真正持续。RSPN 坚持以社区参与为基础，为稳定、长期的保护成果提供了有力支撑。

研讨会还讨论了保护项目的筹资与可持续性。RSPN 介绍了其保护融资框架和长期规划，涵盖栖息地保护、环境教育和社区发展等分阶段目标。在圆桌讨论中，各国代表就保护筹资、资源调动和公

众参与等议题交换了经验与看法。整场研讨会以开放而务实的交流方式，加强了跨国合作，帮助与会者在实践层面形成了更清晰的共识：有效的黑颈鹤保护依赖于科学、社区和持续资金支持三者之间的长期协作。

2025 年 11 月 11 日，普布季卡山谷举行了“黑颈鹤节”。该节日由 RSPN、当地旅游局及地方政府共同主办。节日最早于 1999 年在国际鹤类基金会的指导下设立，旨在提升保护意识，同时庆祝不丹丰富的文化遗产。随着时间推移，节日的组织管理已转由 Gangtey - Phobji 环境管理委员会（一个由政府部门和社区代表组成的地方机构）负责。

节日期间，三所当地学校的师生表演了鹤舞，并设置了主题展示区，集中呈现该地区的自然景观、社区文化遗产及黑颈鹤保护成果。这些活动极大地增进了与会者对当地历史与文化的理解。该节日不仅展示了本地艺术才华，还有效提升了游客与当地居民的参与热情。



图 3 当地学生表演鹤舞

Fig. 3 Local students perform crane dance

以黑颈鹤为核心打造的特色主题节日，有效搭建起国际生态交流桥梁，持续吸引全球生态爱好者到访参与。2025 年不丹黑颈鹤节共吸引 600 余名国际游客前来参会观展，活动自 2013 年起统一收取 8 美元/人观光门票（本地社区参与活动不收费），门票收入优先用于本届活动场地运维、民俗展演及组织开支，结余资金统一留存，专项投入下一届节日活动筹备、栖息地巡护及社区生态保护工作。



图 4 “黑颈鹤节”开幕式

Fig. 4 Opening ceremony of the “Black-necked Crane Festival”

开幕式后，与会代表沿着一条湿地探索与观鸟步道前行，该路线连接了村庄、农庄和手工艺作坊。这条路线让代表们亲身体验了社区生态旅游从规划、实施到服务的全过程，全面了解了当地社区的发展现状。

值得一提的是，在节日前，代表团入住当地社区民宿，深度融入了周边社区生态旅游项目的合作与关系建设。在 RSPN 的协调下，这一本地生态旅游项目有效架起了游客与当地家庭之间的桥梁。它不仅为农户创造了兼顾生态保护与经济创收的平台，也为游客提供了体验乡村生活的独特机会。

Black-necked Crane Conservation Workshop in Bhutan: Conservation Practices through Cross-Regional Cooperation

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In November 2025, representatives of the International Crane Foundation were invited to Bhutan to participate in a Black-necked Crane Conservation Workshop hosted by the Royal Society for Protection of Nature (RSPN), and subsequently attended the Black-necked Crane Festival held in the Phobjikha Valley. This trip not only deepened participants' understanding of Black-necked Crane conservation efforts in Bhutan but also allowed them to witness the unique value of community participation and traditional culture in conservation practice.

The workshop was held on November 8 at the RSPN headquarters in Thimphu, with 45 delegates from China, India, Nepal, Bhutan, and Japan, representing diverse stakeholders including research institutions, non-governmental organizations, and government departments. The discussions centered around current conservation practices, cooperation mechanisms, and future directions for Black-necked Cranes, with a focus on cross-regional, multi-stakeholder collaboration along the Central Asian Flyway. Unlike general academic conferences, the core topic of this workshop was how conservation actions could be effectively implemented on the ground and integrated with local community livelihoods. This theme ran throughout the presentations of delegates from all countries.

Researchers and conservation practitioners from India, Nepal, and China shared their experiences and challenges from perspectives of religious, and policy support, demonstrating the adaptability of cross-border conservation work under different ecological and social conditions.

Bhutan's conservation practices became a highlight of the workshop. Local conservation workers, protected area staff, and NGO employees presented progress on Black-necked Crane conservation across Bhutan. Since 2018, in response to the main threats facing cranes (such as predation, overgrazing, human disturbance, and illegal collection), Bhutan has implemented a series of targeted measures, achieving measurable results in reducing disturbance, improving habitat quality, and enhancing breeding site security.

Local conservation workers also shared the positive impacts of conservation actions on community livelihoods, income sources, and people's perceptions of nature. Through activities such as habitat protection and cultural promotion, local communities are increasingly becoming participants in and beneficiaries of conservation. These grassroots voices confirmed an important conclusion that conservation can only be truly sustainable when it responds to and meets local needs. RSPN's commitment to community-based participation provides strong support for stable, long-term conservation outcomes.

The workshop also discussed the financing and sustainability of conservation projects. RSPN presented its conservation financing framework and long-term plans, covering phased targets for habitat protection, environmental education, and community development. In roundtable discussions, delegates from various countries exchanged experiences and views on topics such as conservation financing, resource mobilization,

and public participation. The entire workshop, characterized by open and pragmatic exchanges, strengthened cross-border cooperation and helped participants reach a clearer consensus at the practical level: effective Black-necked Crane conservation relies on long-term collaboration among scientific research, community engagement, and sustained financial support.

On November 11, 2025, the “Black-necked Crane Festival” was held in the Phobjikha Valley. The festival was co-organized by RSPN, the local tourism authority, and the local government. The festival was established in 1999 under the guidance of the International Crane Foundation, aiming to raise conservation awareness while celebrating Bhutan’s rich cultural heritage. Over time, the organization and management of the festival have been transferred to the Gangtey–Phobji Environmental Management Committee (a local body composed of government departments and community representatives).

During the festival, teachers and students from three local schools performed crane dances, and themed exhibition areas were set up to showcase the region’s natural landscape, community cultural heritage, and Black-necked Crane conservation achievements. These activities greatly enhanced participants’ understanding of local history and culture. The festival not only showcased local artistic talent but also effectively boosted engagement from both tourists and local residents.

The distinctive themed festival, centered on the Black-necked Crane, has effectively served as an international platform for ecological exchange, continuously attracting eco-enthusiasts from around the world to visit and participate. The 2025 Bhutan Black-necked Crane Festival attracted over 600 international tourists. Since 2013, a uniform entrance fee of \$8 per person has been charged (local community participation is free). Ticket revenue is used primarily for venue maintenance, folk performances, and organizational expenses for the current festival, with any surplus reserved specifically for the preparation of the next festival, habitat patrolling, and community ecological conservation work.

After the opening ceremony, delegates followed a wetland exploration and birdwatching trail that connects villages, farms, and handicraft workshops. This route allowed delegates to experience the entire process of community-based eco-tourism, from planning to implementation to service delivery, and to gain a comprehensive understanding of local community development.

Before the festival, the delegation stayed in local community homestays, immersing themselves in the cooperative networks and relationship-building efforts of the surrounding community-based eco-tourism projects. Coordinated by RSPN, this local eco-tourism project effectively connects tourists with local families. It not only creates a platform for farmers to generate income in a way that balances ecological protection with economic development, but also offers tourists a unique opportunity to experience rural life.

越南坚江省赤颈鹤数量回升

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赤颈鹤 (*Grus antigone*) 是鹤类中体型最大的物种, 被世界自然保护联盟 (IUCN) 列为易危 (VU) 物种。在越南, 每年 12 月至次年 5 月是赤颈鹤的越冬季节, 主要集中在分布于两个区域: 同塔省的鸟栈国家公园 (Tram Chim National Park) 和坚江省的富美物种-栖息地保护区 (Phu My Habitat-Species Management Area)。

2026 年 4 月下旬，在坚江省富美物种-栖息地保护区及周边区域赤颈鹤数量呈现明显回升态势。4 月 13-15 日，观测到 3 只赤颈鹤；4 月 20 日数量增至 11 只；4 月 22 日记录到 4 只；而在 4 月 26-27 日，在保护区周边区域单次观测到 40 只。这是近几年单次观测数量最高的记录，2025 年单次观测到 23 只。这一连串数据表明，该区域有可能重新成为越南赤颈鹤的重要栖息地。

Population Recovery of Sarus Cranes (*Grus antigone*) in Kien Giang Province, Vietnam

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The Sarus Crane (*Grus antigone*) is the largest species among cranes and is classified as Vulnerable (VU) by the International Union for Conservation of Nature (IUCN). In Vietnam, the wintering season of the Sarus Crane spans from December to May, with primary concentrations in two regions: Tram Chim National Park in Dong Thap Province and the Phu My Habitat-Species Management Area in Kien Giang Province.

In late April 2026, observations indicated a notable increase in the number of Sarus Cranes in the Phu My Habitat-Species Management Area and surrounding regions of Kien Giang Province. Between April 13-15, three individuals were recorded; by April 20, the count had risen to 11; on April 22, four individuals were observed; and during April 26-27, a single survey in areas surrounding the reserve recorded 40 individuals. This represents the highest single-survey count in recent years, surpassing the previous peak of 23 individuals recorded in 2025. These sequential observations suggest that the area may once again serve as an important habitat for the Sarus Crane in Vietnam.

前进一大步：保护美洲鹤至关重要的避难地

CARTER CROUCH

国际鹤类基金会墨西哥湾沿海项目

美洲鹤阿朗撒司——伍德布法罗种群是该物种仅存的自我维系的野生种群。它们在加拿大极北地区繁衍，秋季迁徙至德克萨斯州中部沿海地带越冬。在越冬地，其所面临的最大威胁是栖息地的丧失。因此，确保拥有充足的受保护栖息地，对于该物种的持续健康地恢复至关重要。直到最近几年，国际鹤类基金会（ICF）才开始思考：是否可以在其越冬地购置土地来强化美洲鹤保护工作？我们把这一构想称为“前进一大步”。

2023 年秋季，墨西哥湾沿岸项目制订了为期十年的战略规划。这份规划涵盖了三项自 2011 年 ICF 德州办事处成立以来一直推进的策略：（1）针对美洲鹤及其栖息地开展应用研究；（2）与土地所有者及合作伙伴协作，为美洲鹤提供栖息地；（3）开展宣传教育工作，以提升公众对美洲鹤及其种群恢复工作的认知与关注度。此外，在这个战略规划中，增加了一个新的战略：购置土地，实现对美洲鹤栖息地的长期拥有及管理。这一新战略直接应对阿朗撒司——伍德布法罗美洲鹤种群所面临的最大威胁即栖息地丧失。若能成功实施这一土地购置策略，对该地块的所有权将有力推动我们实现针对美洲鹤所设定的所有其他目标。



图 1 2025 年 12 月， ICF 德州团队成员草场/湿地生态学家凯蒂·费纳尔德，望着眼前新建的沃福百瑞美洲鹤保护区（国际鹤类基金会 Ryan Michalesko 摄）

Fig. 1 Rangeland/Wetland Ecologist Katie Fernald, a member of our Texas team, looks over the new Wolfberry Whooping Crane Sanctuary in December 2025 (Photo by Ryan Michalesko)

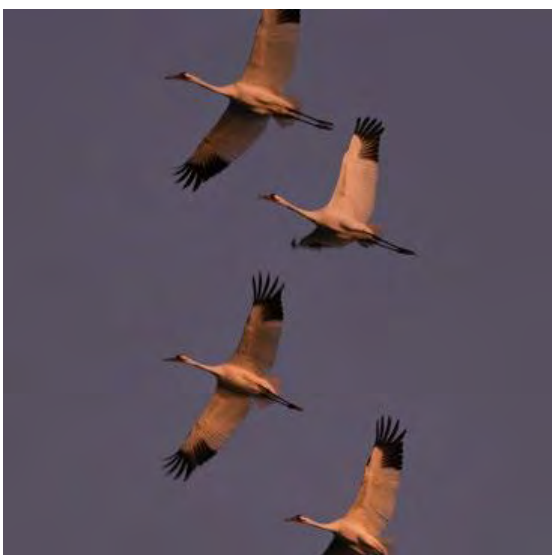


图 2 在沃福百瑞美洲鹤保护区上空飞翔的美洲鹤（国际鹤类基金会 Ryan Michalesko 摄）

Fig. 2 Whooping Cranes in flight over our new Texas property (Photo by Ryan Michalesko)

实现这个战略需要我们解决迄今为止的最大融资。尽管如此，我们乐于面对和迎接这项挑战。在十个项目资金以及来自超过 550 个团体和个人慷慨捐赠的助力下，2025 年 12 月，国际鹤类基金会荣幸地成为了这片占地 1150 英亩（约 465 公顷）的土地的主人——我们将其命名为“沃福百瑞美洲鹤保护区”（Wolfberry Whooping Crane Sanctuary）。沃福百瑞的英文 Wolfberry 为枸杞之意，该保护区得名于“卡罗来纳枸杞”（Carolina wolfberry），这是一种在美洲鹤越冬地的重要食源植物。

保护这片土地仅仅是第一步。今年，我们将制定一个地点管理计划，并启动栖息地恢复项目，以改善美洲鹤及其他依赖湿地和草原生存物种的生境，这些伴生物种包括美洲隼、斑嘴鸭、君主斑蝶、北美鹌、呆头伯劳、莱氏沙鹀、长嘴杓鹀等众多物种。我们深知，保护这片土地将惠及美洲鹤及相关伴生物种。我们也坚信，该项目将有力地强化我们项目十年规划中的其他核心策略。例如，在开展栖息地恢复的同时，我们还将开展相关的科学研究，以便理解和评估生境恢复的效益。2025 年 12 月 4 日，正式接手了这块土地的产权。随后，ICF 德州项目团队与一个大学合作伙伴来到这里，设置长期监测样地，以便监测植物和鸟类对各项管理措施的生态响应。将生境恢复与科学研究紧密结合，能提升我们应用研究工作的深度与广度。我们将向其他土地所有者及管理者分享我们在生态恢复过程中取

得的成功经验与面临的挑战；而我们所提供的建议，也将基于充分的专业认知，并辅以详实的数据作为强有力的支撑。因此，我们的生境恢复工作将进一步巩固我们与各类合作伙伴以及周边土地所有者的协作关系。



图 3 晚霞下的沃福百瑞美洲鹤保护区（国际鹤类基金会 Ryan Michalesko 摄）
Fig. 3 Wolfberry Whooping Crane Sanctuary at Sunset (Photo by Ryan Michalesko)



图 4 鸟瞰沃福百瑞美洲鹤保护区（国际鹤类基金会 Ryan Michalesko 摄）
Fig. 4 Aerial view of Wolfberry Whooping Crane Sanctuary (Photo by Ryan Michalesko)

拥有并管理这片土地，也将有助于我们开展宣传教育、公民科学数据采集以及有志愿者参与的社区生态修复等各种活动，进而与公众建立紧密联系。在获得土地产权 12 天后，ICF 德州项目团队便与志愿者一道，参与了当地的“圣诞鸟类普查”调查活动。奥杜邦学会主办的“圣诞鸟类普查”是全美历史最为悠久的公民科学鸟类调查项目。在历时 6 小时 55 分钟的调查中，我们在新建的沃福百瑞美洲鹤保护区内共记录到 71 种鸟类，其中包括 12 种鸻鹬类、10 种猛禽、7 种涉禽鸟类（包括北美洲两种鹤类）、6 种雁鸭类及 5 种雀类。今后将更好地利用“圣诞鸟类普查”活动及诸多其他契机，强化我们在这地区的工作和影响。

沃福百瑞美洲鹤保护区是国际鹤类基金会成立 52 年以来达成的首笔土地保护协议，是我们墨西哥湾沿岸保护的旗舰项目。以这处保护地为核心来构建我们的德州自然保护项目，将使我们能够进一步扩大 ICF 的影响力。争取并落实这处保护地的权属耗费了大量心血，而其后续管理更是一项重大责任。然而，每当我在保护区看到美洲鹤一家并深知它们为了抵达此地、曾历经 2500 英里的漫长迁徙时，我便确信：这一切的辛勤付出都是十分值得的！

Our Next Big Step: A Vital Sanctuary for Whooping Cranes

CARTER CROUCH

Gulf Coast Programs of International Crane Foundation

The Aransas-Wood Buffalo Population of Whooping Cranes is the last wild self-sustaining population of the species. They breed in far northern Canada and winter in coastal habitats along the Texas Mid-coast, where the biggest threat they face is habitat loss. Securing sufficient protected habitat is vital for their continued recovery. It was only recently that the International Crane Foundation started to wonder if we could take what we called the next big step in Whooping Crane conservation by acquiring a property on their wintering grounds.

In the fall of 2023, our Gulf Coast programs finalized our 10-year strategic plan. The Texas plan included three strategies we'd been working on since our Texas office opened in 2011: 1) Applied research on Whooping Cranes and their habitats, 2) Working with landowners and partners to provide and protect Whooping Crane habitat, and 3) Outreach and education to raise awareness and appreciation for Whooping Cranes and their continued recovery. We also included a fourth strategy that would tackle the biggest threat to Aransas-Wood Buffalo Population cranes head-on: Property acquisition and long-term ownership and management of a crane sanctuary. If we could pull it off, owning the property would advance all our other goals for Whooping Cranes.

Although this was by far the most expensive challenge our program had undertaken, it was a challenge we welcomed. With the help of ten grants and generous donations from over 550 individuals and groups, in December 2025 the International Crane Foundation became the proud owner of a 1,150-acre property we call Wolfberry Whooping Crane Sanctuary. It's named after the Carolina wolfberry, an important food for cranes on their wintering grounds.

Protecting this incredible property was only the first step. This year we will be developing a management plan and initiating projects to restore habitat for Whooping Cranes and other wetland and grassland dependent species like the American Kestrel, Mottled Duck, Monarch butterfly, Northern Bobwhite, Loggerhead Shrike, LeConte's Sparrow, Long-billed Curlew, and many others. While we knew protecting this land would benefit Whooping Cranes and other species, we also believe this project will strengthen the other core strategies in our program's 10-year plan. For example, while we are undertaking restoration, we will also be building our research around understanding the impact of this work. We closed on the property on Dec. 4, and the next day Texas staff were on the property with a university partner establishing longterm monitoring plots for tracking vegetation and bird response to management. Combining restoration with research will strengthen our applied research work. It will also strengthen our collaboration with landowners and partners. We will share our restoration successes and challenges with other landowners and land managers, and our advice will come from an informed place with data to back it up.

Owning and managing the land will also help us connect with the public through outreach events, community science data collection, and community restoration projects with volunteers. Twelve days after closing on the property, Texas staff and a volunteer contributed to the Powderhorn Christmas Bird Count on

the new Wolfberry Whooping Crane Sanctuary. The Audubon Christmas Bird Count is the nation's longest-running community science bird project. In six hours and 55 minutes, we counted 71 bird species on the property, including 12 species of shorebirds, 10 species of birds of prey, seven species of wading birds (including both species of North American cranes), six species of waterfowl, and five species of sparrows. Future Christmas Bird Counts and many other opportunities will build up our outreach and education in the region.

The Wolfberry Whooping Crane Sanctuary was the International Crane Foundation's first conservation land deal in our 52-year history. It's now a flagship of our Gulf Coast programs. Building our Texas conservation program around this conservation property will allow us to increase our impact. Securing this property was a lot of work and managing the property will be a big responsibility. But when I see a Whooping Crane family on the sanctuary and know they made a 2,500-mile migration to get here, it tells me the work is well worth it!

鹤类生计项目：在蒙古加强鹤类保护并支持当地生计

TUVSHINJARGAL Erdenechimeg 博洛尔玛·亚历山大
蒙古野生动物科学与保护中心

呼尔库-辉腾自然保护区是蒙古国一片生物多样性丰富的草原，对于白枕鹤、白鹤、蓑羽鹤、灰鹤以及其他受威胁的鸟类物种的生存至关重要。近 10 年来，国际鹤类基金会与蒙古国野生动物科学与保护中心共同管理这个保护区，一直致力于实施一种既能保护生态环境，又能增强当地牧民社区经济韧性的保护模式。自 2022 年以来，我们与当地 75 户牧民家庭合作开展“鹤类生计项目”，制作并销售毡毛制品。这个项目不仅帮助当地家庭实现了生计多元化，还增强了他们对环境的守护意识。去年，该项目通过销售拖鞋、装饰品等毡制品，创收近 8000 美元；这些产品主要通过位于威斯康星州巴拉布市的国际鹤类基金会礼品店进行销售。近期，该项目的参与者之一——博洛尔玛·亚历山大，向我讲述了“鹤类生计项目”对她及其家庭所具有的特殊意义。我非常荣幸能将博洛尔玛的故事分享给国际鹤类基金会的朋友们。—— Tuvshinjargal Erdenechimeg



图 1 白枕鹤飞越呼尔库-辉腾自然保护区 (Kang Suggu 摄)

Fig. 1 White-naped Cranes in flight over Khurkh-Khuiten Nature Reserv. (Photo by Kang Suggu)

我的名字是博洛尔玛·亚历山大，与丈夫及三个可爱的孩子住在蒙古国肯特省宾德尔村一个叫巴彦郭勒的小地方。嫁到这里后，我便过着牧民生活，与丈夫一块放牧牛羊。孩子们到了学龄以后，我便搬到苏木住，这样送孩子上学方便，照顾他们上功课。周末的时候，我回到牧场操办家务。像许多牧民妇女一样，我总是在学年期间找机会赚点外快。2022 年 1 月，我听到人们说起“鹤类生计项目”——这是一个专为生活在鹤类地区的牧民家庭免费提供制作毛毡制品的培训活动。出于新鲜好奇，我决定参加这个为期四天的手工培训；当时的我并没有想到，这竟成为一段改变我人生的经历。



图 2 博洛尔玛·亚历山大在缝做鹤饰品（Nandintsetseg Iderbat 摄）

Fig. 2 Bolormaa Alexander sewing crane ornaments (Photo by Nandintsetseg Iderbat)

我学会了如何清洗、处理并整理自家牛羊身上废弃的羊毛，并将它们制作成拖鞋、杯垫以及鹤饰等毛毡制品。以前我曾做过传统的服装，但制作这些毡制品对我来说都是第一次。培训开始的时候，我觉得我自己干不了这事。然而，当培训结束时，我意识到自己已拥有了一切所需的条件：原材料、专业指导，以及其他牧民妇女的好心支持。此外，我还认识了更多的人——在这之前，我很少有机会能与其他当地妇女在一块。

我们的第一笔正式订单是制作 50 双拖鞋和 50 件仙鹤饰品，需要在两个月内完成。我们接到订单的时候正是春季，是一年中最为忙碌的时节，牛犊羊羔生出不久正需照料。在忙着料理家务和小牛羊的同时还要完成这些订单，这确实很不容易。我随后与邻居桑萨尔图雅打伙，相互照应，不明的地方询问培训老师，把这些活儿圆满完成了。那年晚些时候，我们参加了当地举办的“鹤节”，将亲手制作的毛毡制品卖给游客。看到人们对这些作品表现出的浓厚兴趣，这让我感到无比欣慰与满足。靠着赚来的额外收入，我得以给孩子们添置新的衣服，孩子们脸上充满了自豪的笑容，使我永远难忘。自那时起，我们每年都会参加“鹤节”。在“鹤节”活动期间，我们这些妇女通过自己制作的手工艺品，也向人们宣传并提升人们对鹤类保护工作的认知。

自鹤类生计项目启动以来，我和朋友总共制作了 815 件 5 种不同的手工艺品，销售总额超过 1320 万蒙图（约合 3700 美元）。此外，我也会在本地苏木集市上出售一部分手工艺品。无论是在家中操持家务、在牧场照料牲畜、在医院候诊，还是在傍晚陪伴孩子做功课，一有闲功夫我就缝制。我的丈夫和孩子们也会在力所能及的范围内给予我协助。这份共同的事业不仅让我们一家人彼此更亲近了，也让我对自然保护工作有了全新的认识。起初刚加入这个项目时，我并不完全理解制作鹤饰品究竟与野生动物保护有何关联。但现在我已经明白了这个道理：我们亲手制作的每一件作品，其实都在讲述着一个关于鸟类、关于特定地域乃至关于整个社区的动人故事。如今，每到鹤类抱窝的时候，我的家人都会自觉约束家中的牧羊犬，使其远离湿地，以免惊扰并伤害到鹤类；同时，我也会提醒邻居们采取同样的保护措施。当人们看到我们制作的仙鹤主题手工艺品时，往往会好奇地停下来问问，并从中知道一些有关自然保护的知识。正是通过这样的过程，鹤类保护工作才会发生积极的变化。



图 3 博洛尔玛、桑萨尔玛和图夫谢 (Bayardelger Batbayar 摄)
Fig. 3 Bolormaa, Sansarmaa, and Tuvshee (Photo by Bayardelger Batbayar)

Crane Enterprises Program Strengthens Crane Conservation and Supports Local Livelihoods in Mongolia

TUVSHINJARGAL Erdenechimeg Bolormaa Alexander
Wildlife Science and Conservation Center of Mongolia

The Khurkh-Khuiten Nature Reserve is a biodiverse grassland and wetland landscape in Mongolia of key importance to White-naped Cranes, as well as to Siberian Cranes, Demoiselle Cranes, Eurasian Cranes and other threatened bird species. Both the International Crane Foundation and the Wildlife Science and Conservation Center, who now co-manage the Reserve, have spent a little over a decade working to build a conservation model that also strengthens the economic resilience of the area's herding communities. Since 2022, we have been working with 75 local households in production of felt goods for sale. This has helped diversify family livelihoods and strengthen their environmental stewardship. This project generated nearly \$8,000 in revenue last year from the sale of felt products, including slippers and ornaments, largely through the ICF gift shop in Baraboo, Wisconsin. Recently one of the participants, Bolormaa, talked to me about what the Crane Enterprises Program means to her and to her family. I'm delighted to pass on Bolormaa's story to readers of *The Bugle*. - Tuvshinjargal Erdenechimeg

My name is Bolormaa Alexander, and I live with my husband and our three beautiful children in Bayangol, a small herding community in Binder village, Khentii Province. Since getting married, I have lived the life of a herder, raising livestock with my husband. When our children started school, I began spending weekdays in the soum (district) center so I could take them to class and help them study. On weekends, I return to our herding camp. Like many herder women, I'm always looking for ways to earn additional income during the school year. In January 2022, I heard about the Crane Enterprises Program, a free feltmaking training designed especially for herder families who live in crane habitats. I decided to join the four-day hands-on training out of curiosity, not knowing it would be life-changing.

I learned how to wash, process, and prepare discarded wool from my own animals and to make it into felt slippers, coasters, and crane ornaments. I had sewn traditional clothing before, but this was something entirely new. In the beginning, I didn't think I could do it. By the end of the training, I realized that I had everything I needed: raw materials, guidance, and the support of other herder women. I also gained a new sense of connection. Before this, I rarely had the chance to spend time with other local women.

Our first official order was to create 50 pairs of slippers and 50 crane ornaments, to be completed in two months. It was springtime, our busiest season with newborn livestock. It was difficult to manage the work while caring for the animals and my family, but I teamed up with my neighbor Sansartuya. With each other's help and the encouragement of our trainers, we completed the order. Later that year, we participated in our local Crane Festival. It was incredibly rewarding to sell my handmade items directly to visitors and see how interested people were. With the money I earned, I was able to buy clothes for my children. I will always remember their proud smiles. Since then, we have participated in the Crane Festival every year, where our group of women raise awareness about crane conservation through our handmade crafts.

Since we started, my friend and I have made over 815 products in five styles, earning more than 13.2 million MNT (approx. \$3,700 USD) in sales. I also sell some of my crafts locally in our soum center. Whether I'm at home, caring for our livestock, waiting at a hospital appointment, or sitting beside my children doing homework, I use any spare time to sew and create. My husband and children also help me in small ways, and this work has brought us closer together. It has also made me see conservation work differently. When I first joined, I didn't fully understand what making a crane ornament had to do with protecting wildlife. But now I realize that every product we make tells a story about a bird, a place, a community. Today, my family keeps our dogs away from the wetlands during the nesting season to protect the cranes, and I remind my neighbors to do the same. When people see our handmade crane products, they ask questions, and they learn. This is how change begins

欧洲灰鹤禽流感疫情监测报告[☆]

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灰鹤 (*Grus grus*) 途径东欧、中欧和西欧三条迁飞通道。超过 40 万只灰鹤飞越德国, 并在多个停歇区利用约 300 处夜栖地。这些灰鹤来自斯堪的纳维亚半岛和东欧。绝大多数来自瑞典和挪威的个体在前波美拉尼亚海岸 (VR) 停歇; 来自波罗的海国家、芬兰和波兰的灰鹤则在加伦贝克湖、穆里茨地区以及更南部的区域停歇, 例如勃兰登堡州的莱茵卢赫或萨克森-安哈尔特州的凯尔布拉附近。经由下萨克森州的迪普霍尔茨沼泽地停歇区, 灰鹤继续前往法国东北部 (沃夫尔、德尚特科克湖)、法国中部, 最终抵达西班牙的加洛坎塔和埃斯特雷马杜拉——这是西欧迁飞通道灰鹤的主要越冬地。

自 2025 年 10 月初以来, 德国东北部的夜栖地、觅食地, 甚至居民庭院、和高速公路沿线, 不断出现死亡和濒死灰鹤的目击报告。病因很快被确定为高致病性禽流感 (HPAI) 的一种强毒型。当前流行的 H5N1 亚型病毒同样被归类为高致病性, 即致病性极强。该病毒与人类流感病毒亲缘关系密切, 因此“禽流感”这一俗称并非完全没有依据。

禽流感 (又称高致病性禽流感, 简称 HPAI) 是一种危害家禽的严重疾病, 已被认知数十年。在过去 30 年中, 它已演变为对家禽养殖业乃至野生动物构成持续全球性威胁的疫病。除鸟类外, 哺乳动物也越来越多地受到感染。

☆ 转载自 *the Newsletter of the Flint Crane Working Group of Eurasia*

疫情进程与空间扩散

2025 年 10 月 4 日，在梅克伦堡-前波美拉尼亚州的加伦贝克湖首次发现 3 只死亡灰鹤。该地点的死亡数量增长较为缓慢（2025 年 10 月 10 日：22 只；2025 年 10 月 16 日：57 只死亡/濒死灰鹤）。至 10 月底，加伦贝克湖的疫情已基本平息，累计约 100 只灰鹤死亡。

稍晚于加伦贝克湖，穆里茨地区于 2025 年 10 月 12 日检测到禽流感疫情。与勃兰登堡州、萨克森-安哈尔特州和下萨克森州相比，梅克伦堡-前波美拉尼亚州的死亡数量相对较低，总计 560 只（图 1）。

在勃兰登堡州的莱茵卢赫停歇区，2025 年 10 月 12 日在利努姆附近的主夜栖地发现第一只死亡灰鹤。截至 2025 年 11 月 3 日，该地点已报告 2249 只死亡灰鹤（勃兰登堡州总计：4500 只）。

萨克森-安哈尔特州于 2025 年 10 月 15 日在凯尔布拉水库夜栖地发现 6 只死亡灰鹤。下萨克森州的停歇区于 2025 年 10 月 19 日首次报告感染和死亡灰鹤（下萨克森州总计：6000 只，来源：德国鹤类保护协会-下萨克森州地方工作组）。截至 2025 年 11 月 17 日疫情完全平息时，萨克森-安哈尔特州已回收 5433 具灰鹤尸体（该州总计约 6500 只，来源：德国鹤类保护协会-萨克森-安哈尔特州地方工作组）。德国全国估计至少有 20000 只灰鹤死亡。在法国东北部，拉绍塞自然保护区和德尚特科克湖于 2025 年 10 月 20 日计数到数十只死亡灰鹤（截至疫情消退时估计总计 10000-12000 只死亡）。停歇区越靠南，死亡数量明显越少。在波尔多以南约 100 公里的阿尔瑞藏克斯，共回收 190 只死亡灰鹤（来源：阿尔瑞藏克斯保护区 Sophie Laugareil, 2025 年 11 月 12 日）。法国全国估计有 15000-20000 只灰鹤死亡，西班牙估计为 1000-1500 只，其中约 900 只分布于萨拉戈萨附近的加洛坎塔湖大区域。西欧迁飞通道上至少有 40000 只灰鹤死亡，约占该通道迁徙种群数量的 10%。此次疫情对种群的影响将在德国鹤类保护协会 2026 年 3-6 月开展的繁殖地监测项目中进行调查。



图 1 德国境内高致病性禽流感致鹤类死亡分布
Fig. 1 Distribution of HPAI crane victims in Germany

病毒感染的源头目前尚未明确。但 2025 年秋季，勃兰登堡州东北部的肉鸭养殖场曾暴发高致病性禽流感疫情，不排除病毒从养殖场传播至野生鹤群的可能性。

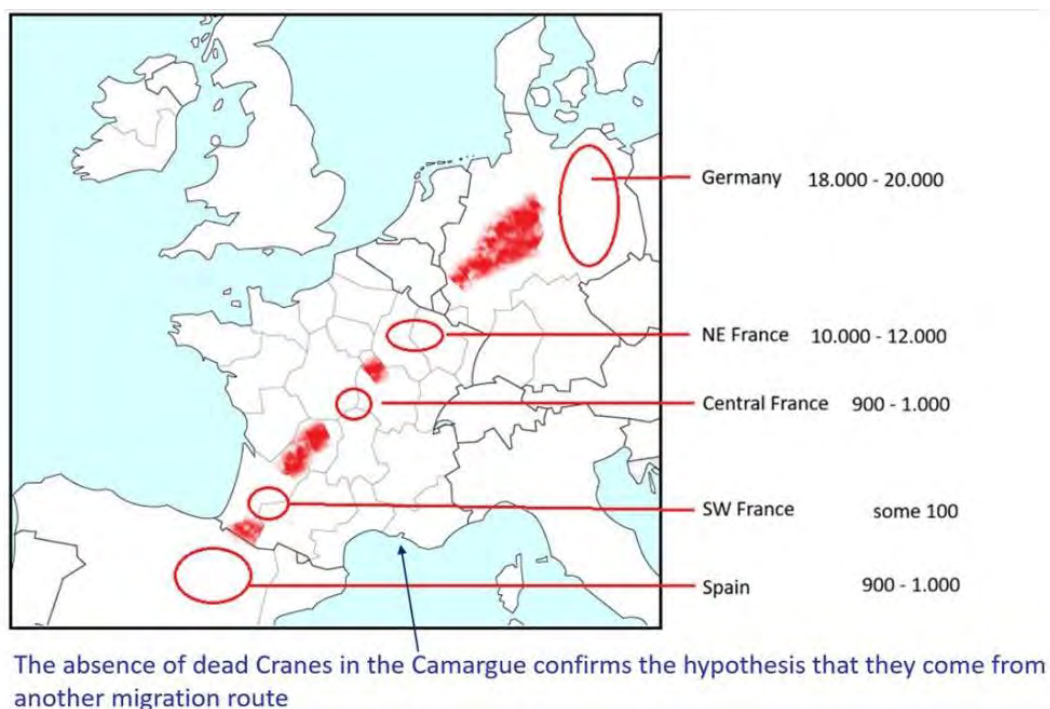


图 2 欧洲境内高致病性禽流感致鹤类死亡分布

Fig. 2 Distribution of HPAI crane victims in Europe. The absence of dead cranes in the Camargue (source: La Tour du Valat) confirms the hypothesis that they use different migration route

注：高致病性禽流感疫情暴发时，必须尽快从环境中清除动物尸体，以遏制病原体的进一步传播。卡马格地区未发现死亡鹤类（数据来源：拉图尔杜瓦拉研究所），这一现象支持了该区域鹤类使用不同迁飞通道的假说

Avian influenza among Eurasian Cranes in Europe

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Eurasian Cranes in Europe use the Eastern, Central and Western European flyways. Over 400,000 cranes fly over Germany and use around 300 roosting sites in various resting regions. They come from Scandinavia and Eastern Europe. Most of the birds from Sweden and Norway rest on the Vorpommern Coast (VR). Cranes from the Baltic States, Finland and Poland rest at Lake Galenbeck, in the Müritz Region and in areas further south, such as the Rhinluch (Brandenburg) or near Kelbra (Saxony-Anhalt). Via the Diepholz Moorland (Lower Saxony) resting area, the birds continue on to north-east France (Woëvre, lac du Der Chantecoq), central France and on to Gallocanta and Extremadura in Spain, the main wintering sites for cranes on the Western European Flyway.

Since the beginning of October 2025, there have been increasing reports of dead and dying cranes at roosting and feeding sites, and even in gardens or on motorways in north-eastern Germany. The cause was quickly identified: avian influenza in one of its most aggressive forms (HPAI). The currently active H5N1 virus is also classified as highly pathogenic, i.e. very pathogenic. It is closely related to the human influenza virus, which means that the colloquial term ‘bird flu’ cannot be completely dismissed.

Avian influenza (also known as highly pathogenic avian influenza, or HPAI for short) is a serious disease affecting poultry that has been known for decades. Over the last 30 years, it has developed into a

permanent and global threat to the poultry industry and, increasingly, to wild animals. In addition to birds, mammals are also increasingly affected.

Course and spatial spread

The first three dead cranes were found on 4 October 2025 at Lake Galenbeck in Mecklenburg-Western Pomerania. There, the numbers rose only slowly (10 October 2025 – 22; 16 October 2025 – 57 dead/dying cranes). At Lake Galenbeck, the event had subsided by the end of October with around 100 dead cranes. With a slight delay, avian influenza was detected in the Müritz Region on 12 October 2025. Unlike in the federal states of Brandenburg, Saxony-Anhalt and Lower Saxony, the numbers in Mecklenburg-Western Pomerania were comparatively low, with a total of 560 victims (Fig. 1). In the Rhinluch resting region in the federal state of Brandenburg, the first dead crane was found on 12 October 2025 at the main roost near Linum. By 3 November 2025, a total of 2,249 dead cranes had been reported from this location (Brandenburg total: 4,500), and in the federal state of Saxony-Anhalt, six dead cranes were discovered at the Kelbra reservoir roost on 15 October 2025. On 19 October 2025, the first infected and dead cranes from the resting areas in Lower Saxony were reported (total for Lower Saxony: 6,000, source: Crane Protection Germany – LAG Lower Saxony). By the time the outbreak had completely subsided on 17 November 2025, the number had risen to 5,433 carcasses (6,500 in total in Saxony-Anhalt, source: Crane Protection Germany – LAG Saxony-Anhalt). The estimated number of dead cranes in Germany is at least 20,000. In north-eastern France, at the nature reserve of Lachaussée and at lake du Der Chantecoq, dozens dead cranes were counted on 20 October 2025 (estimated total of 10,000–12,000 dead cranes until the decline). The numbers decrease noticeably the further south the resting area is located. In Arjuzanx, about 100 km south of Bordeaux, 190 dead cranes were recovered (source: Arjuzanx Reserve – Sophie Laugareil, 12 November 2025). For France as a whole, 15,000-20,000 dead cranes are assumed, while the Fig. for Spain is estimated at 1,000-1,500, of which about 900 birds are in the greater Laguna de Gallocanta area, between Zaragoza and at least 40,000 cranes have died on the Western European flyway. This corresponds to just under 10% of the cranes migrating on this route. The impact on the population will be investigated as part of the breeding site monitoring program of Kranichschutz Deutschland (March-June 2026), among other things.

The source of the virus infection is not yet known. However, there were HPAI outbreaks in duck fattening farms in north-eastern Brandenburg in autumn 2025. It cannot be ruled out that the virus spread to the crane population from there.

Note: In the event of an HPAI outbreak, it is important that the carcasses are removed from the area as quickly as possible in order to contain the spread of the pathogen.

中亚保护网络鹤类工作组概况[☆]

凯瑟琳·霍尔
中亚保护网络

中亚保护网络（Central Asian Conservation Network, CACN）是一个由非政府组织、专家及保护实践者组成的合作平台，旨在通过协作交流、能力建设、科学研究与数据共享，以及生物多样性保护联合项目，加强中亚地区及中亚迁飞通道沿线的保护行动。该网络于 2024 年由塔吉克斯坦苦盏市的青年环保组织与吉尔吉斯共和国比什凯克市的自然基金会共同发起成立。截至 2026 年 2 月，网络已吸纳来

☆ 转载自 *the Newsletter of the Flint Crane Working Group of Eurasia*

自中亚迁飞通道 14 个国家的 18 家非政府组织成员，以及 50 余名专家和保护实践者。除非政府组织与专家成员外，中亚保护网络也积极与政府机构、区域及国际组织、其他网络和倡议开展合作。

迁徙鸟类及其栖息地保护是中亚保护网络的核心工作方向。在国际层面，由印度政府牵头的《中亚迁飞通道倡议》（Initiative for Central Asian Flyway, ICAF）取得了重要进展，该倡议于 2024 年在乌兹别克斯坦撒马尔罕召开的《保护野生动物迁徙物种公约》（CMS）第 14 次缔约方大会上获得全体缔约方通过（图 1）。



图 1 2025 年 4 月中亚保护网络在吉尔吉斯斯坦比什凯克举行区域迁飞通道研讨会上启动了中亚迁飞通道项目
Fig. 1 The Central Asian Conservation Network launches its Central Asian Flyway programme in Bishkek, Kyrgyzstan, in April 2025, at a regional workshop

吉尔吉斯斯坦自然资源、生态与技术检查部、吉尔吉斯共和国国家科学院的代表，以及哈萨克斯坦、吉尔吉斯斯坦、塔吉克斯坦的非政府组织代表出席了本次研讨会。来自中亚迁飞通道 30 个国家中多数国家的 80 余名保护工作者、专家和研究人員通过线上方式参与了会议。

为支持《中亚迁飞通道倡议》的实施，同时认识到需要一个平台来促进迁飞通道内关键保护主体——非政府组织之间的跨境合作，中亚保护网络于 2025 年 4 月在比什凯克的区域迁飞通道研讨会上正式启动了其中亚迁飞通道（CAF）项目。该项目下设 10 个工作组，积极应对中亚迁飞通道内迁徙鸟类及其栖息地保护面临的各类问题，包括：关键站点网络工作组：致力于构建中亚迁飞通道内迁徙鸟类优先保护地的协同网络，区域中亚迁飞通道数据库工作组：正在开发一个多语言、开放获取的数字平台，用于集中管理中亚迁飞通道内迁徙鸟类及其栖息地相关的数据、知识和资源，环志与标记工作组：目前正在制定适用于中亚迁飞通道的统一彩色标记规范，能源基础设施工作组，物种专项工作组，包括鹤类工作组。

鹤类工作组于 2026 年 1 月 27 日召开启动会议，来自阿富汗、不丹、印度、吉尔吉斯斯坦、俄罗斯、沙特阿拉伯等迁飞通道沿线多个国家的 20 名代表参加了会议。

基于初步讨论，工作组确定将中亚迁飞通道分布的全部 5 种鹤类列为研究与保护优先物种，分别为：蓑羽鹤（*Anthropoides virgo*）：无危（LC）；赤颈鹤（*Antigone antigone*）：易危（VU）；灰鹤（*Grus grus*）：无危（LC）；黑颈鹤（*Grus nigricollis*）：近危（NT）；白鹤（*Leucogeranus leucogeranus*）：极危（CR）。

会议同时强调，由于多数鹤类在迁飞通道内共享相同栖息地，需要推动制定包容性的多物种保护策略和行动计划。会议明确，中亚保护网络的角色是通过其非政府组织成员并联合专家，支持政府在鹤类保护方面的参与、能力建设和具体行动。会议还梳理了中亚迁飞通道鹤类面临的主要问题和风险

因素，包括：种群数量严重下降，其中蓑羽鹤的下降趋势尤为显著。非法捕猎问题突出（巴基斯坦和阿富汗被指出是非法捕猎量极高的地区，尤其是在迁徙瓶颈地带）。高致病性禽流感（HPAI）及疾病传播，这与人工补饲导致的鹤类大规模集群密切相关。生境干扰，包括人类活动干扰、节日期间的噪声干扰（印度尤为突出），以及绿色能源基础设施建设带来的相应生境改造。气候变化影响，可能导致鹤类迁徙路线、越冬地和停歇地发生局部改变，其具体影响机制有待进一步研究。可再生能源基础设施带来的威胁：与会代表提供的证据表明，风电场已导致鹤类改变迁徙路线以避免风电场；太阳能电站等其他设施造成了局部生境破坏；同时，鹤类与能源基础设施碰撞导致死亡的案例也有记录。部分种群的迁飞路线已观察到发生偏移（蒙古、尼泊尔和印度种群尤为明显），这一现象也需要进一步研究。

工作组下一步将制定指导其行动的整体策略和工作计划。

中亚保护网络鹤类工作组的一大优势在于吸纳了其他相关网络、工作组和基金会的成员，包括欧亚鹤类工作组、国际鹤类基金会（ICF）及其下属的中亚与中东鹤类工作组（CAMEC）。我们期待与这些组织开展交流与合作。特别感谢国际鹤类基金会宣布为工作组提供小额资助，用于开展中亚地区鹤类线上非法贸易研究。

如需了解更多信息或申请加入中亚保护网络鹤类工作组，请联系工作组协调员阿尤布·阿拉维先生（阿富汗野化组织：aalavi@orewild.org）。

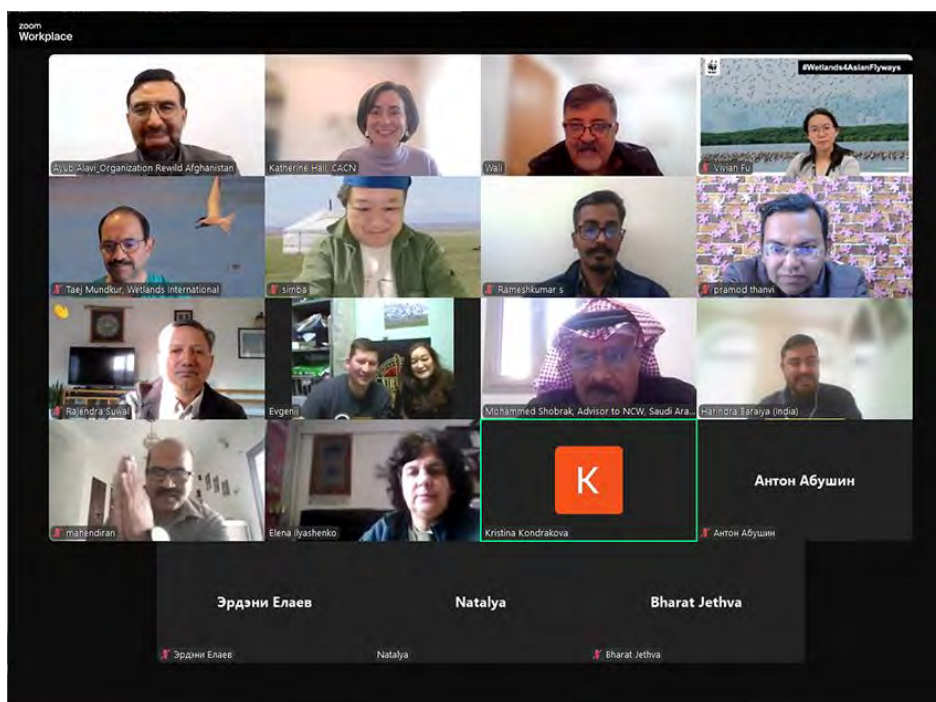


图 2 中亚保护网络鹤类工作组启动会议，2026 年 1 月 27 日

Fig. 2 Kick-off meeting of the Central Asian Conservation Network's Cranes Working Group, 27 January 2026

Crane Working Group of the Central Asian Conservation Network

KATHERINE Hall
Central Asian Conservation Network

The Central Asian Conservation Network (CACN) is a platform for NGOs, experts, and conservation practitioners to enhance conservation action in Central Asia and along the Central Asian Flyway through collaboration, capacity development, scientific research and data sharing, and joint programmes on biodiversity conservation. It was established in 2024 by the Youth Group on Protection of Environment,

based in Khujand, Tajikistan, and the Nature Foundation, based in Bishkek, in the Kyrgyz Republic. As of February 2026, the network counts 18 NGO members from 14 countries of the Central Asian Flyway as well as 50+ experts and conservation practitioners. Additionally, to its NGO and expert members, the CACN is glad to partner with government institutions, regional and international organisations, networks and initiatives.

Conservation of migratory birds and their habitats is the central focus of the CACN. There are exciting developments at the international level around the Initiative for Central Asian Flyway (ICAF), an international initiative led by the Indian Government, and adopted by all parties at the Convention on Migratory Species of Wild Animals (CMS) COP14 in Samarkand, Uzbekistan, in 2024(Fig. 1).

The workshop was attended by representatives of Kyrgyzstan's Ministry of Natural Resources, Ecology and Technical Inspection, the National Academy of Science of the Kyrgyz Republic, and by representatives of NGO from Kazakhstan, Kyrgyzstan, and Tajikistan. Online participants included 80+ conservationists, experts, and researchers from many of the 30 countries.

In support of the ICAF, while at the same time recognising the need for a platform supporting transboundary collaboration among NGOs, a key conservation actor in the flyway, the CACN launched its CAF programme in April 2025 at a regional flyways workshop in Bishkek. Within this programme, ten working groups actively address issues on conservation of migratory birds and their habitats in the Central Asian Flyway. These include the Key Site Network Working Group, focused on developing a coordinated network of priority sites for migratory birds across the Central Asian Flyway; the Regional CAF Database Working Group, which is developing a multilingual, open-access digital platform designed to centralize data, knowledge, and resources related to migratory birds and their habitats across the Central Asian Flyway; a Working Group on Ringing and Tagging, currently developing a harmonised color tagging protocol for the CAF; a Working Group on Energy Infrastructures; and species-focused groups, including the Working Group on Cranes.

The Crane Working Group held its kick-off meeting on 27 January 2026 and was joined by 20 participants from various countries along the flyway, including Afghanistan, Bhutan, India, Kyrgyzstan, Russia, and Saudi Arabia.

Based on the initial discussions, the working group identified the need to consider all five CAF crane species as priority for research and conservation. These are the Demoiselle Crane (*Anthropoides virgo*) (LC); the Sarus Crane (*Antigone antigone*) (VU); the Eurasian Crane (*Grus grus*) (LC); the Black-Necked Crane (*Grus nigricollis*) (NT); and the Siberian Crane (*Leucogeranus leucogeranus*) (CR). The discussion also highlighted the need for promoting inclusive multi-species strategy and action planning, particularly as most cranes share the same habitat in the flyway. It was emphasised that the role of the CACN is to work through NGO members and with experts to support government engagement, capacity and action on crane conservation.

The meeting also highlighted issues and risk factors facing the CAF's cranes. These include a serious decline in populations, notably of the Demoiselle Crane; hunting as a serious concern (with Pakistan and Afghanistan highlighted as locations of particular high volumes of illegal taking, and particularly in migratory bottlenecks); HPAI and disease transmission, which are also linked to artificial feeding causing large congregation numbers; and habitat disturbances, caused by human activities, noise disturbance during festivals (notably in India), as well as green energy infrastructure developments and corresponding habitat transformation. Climate change impacts were also raised as an issue for crane conservation, which results in local changes that may affect crane migratory routes, wintering areas, and stop over areas, with more research needed to better understand these impacts. Renewable energy infrastructures are also a concern, with evidence from meeting participants that wind farms have caused cranes to shift migratory routes to avoid

farms, while local habitat destruction is connected to other installations (e.g. solar farms), and collision with energy infrastructure also an issue, with documented deaths. The observed shift in the flyways of some populations, notably in Mongolia, Nepal and India, also require further study.

Further steps will include the development of a strategy and workplan to guide the actions of the Working Group.

It is a great advantage for the CACN Crane Working Group to include among its numbers members of other networks, working groups, and foundations, such as members of the Crane Working Group of Eurasia, the International Crane Foundation (ICF), and ICF's Central Asian and Middle East Crane Working Group (CAMEC). We look forward to communication and collaboration with these groups. A very big thank you to the International Crane Foundation for announcing its generous support of the working group through a small grant for the study of online illegal trade of cranes in Central Asia.

For more information or applications to join the CACN Cranes Working Group, please contact the Working Group Coordinator, Mr Ayub Alavi (*Organisation Rewild, Afghanistan: aalavi@orewild.org*).

2025 年卡尔梅克共和国与伏尔加河外地区蓑羽鹤繁殖地种群数量持续下降[☆]

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2025 年, 研究人员分阶段开展了蓑羽鹤繁殖监测工作: 4-5 月评估繁殖地种群规模并识别限制因素, 6-7 月测定繁殖成功率。春季调查覆盖阿斯特拉罕州、萨拉托夫州和伏尔加格勒州; 6 月对 4-5 月调查中发现的蓑羽鹤高密度分布区进行了复查。卡尔梅克共和国的调查于 6 月由多个团队同步开展, 其中一支团队包含摄影师米哈伊尔·罗季奥诺夫。

调查采用汽车路线法, 使用双筒望远镜和单筒望远镜进行观测。路线规划覆盖各类水源(自流井、当地称为“胡杜克”的水井、池塘和运河), 并核查我们及其他鸟类学家此前记录的观测点。

阿斯特拉罕州调查结果 4 月 15-18 日, 研究人员调查了伏尔加河右岸的切尔诺亚尔斯基区和叶诺塔耶夫斯基区。切尔诺亚尔斯基区大部分土地已被开垦用于种植甜瓜, 区内有众多从伏尔加河引水的运河, 但多数处于干涸状态。一个显著问题是甜瓜滴灌使用的大量塑料薄膜在收获后未被清理。

叶诺塔耶夫斯基区以稀疏草原植被为特征, 几乎没有天然淡水水体, 仅在牲畜养殖场有供牛群饮水的水井(图 1)。与卡尔梅克共和国养殖场间距 2-3 公里不同, 阿斯特拉罕州的养殖场间距达 5-10 公里。由于植被稀疏且牲畜数量相对较少, 该区域未观察到过度放牧现象。

从北向南, 棕色半荒漠土壤和沙丘逐渐增多, 最初呈斑块状分布; 在叶诺塔耶夫斯基区南部(草原向伏尔加河右岸沙漠过渡地带), 则形成了广阔的沙质地块, 有时甚至会掩埋牲畜养殖场(图 2)。

根据我们的调查和当地牧民的报告, 共记录到 10 对蓑羽鹤, 主要分布在叶诺塔耶夫斯基区北部的干旱草原生境中(图 3)。

4 月 23-27 日, 研究人员调查了萨拉托夫州东部和南部地区——该区域在 20 世纪 90 年代末至 21 世纪初曾记录到蓑羽鹤最高繁殖密度(Zavyalov 等, 2001, 2003)。

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图 1 叶诺塔耶夫斯基区一口水井旁的蓑羽鹤 (E. 伊利亚申科 摄)
Fig. 1 Demoiselle cranes at a well in the Yenotayevsky District (Photo by E. Ilyashenko)



图 2 叶诺塔耶夫斯基区南部的沙丘地块 (V. 伊利亚申科 摄)
Fig. 2 Sand dune massifs in the southern part of the Yenotayevsky District (Photo by V. Ilyashenko)

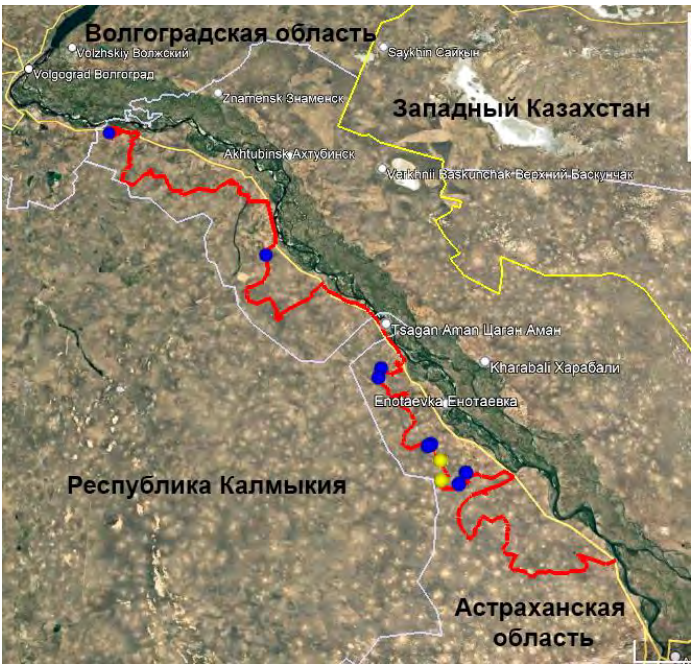


图 3 阿斯特拉罕州调查路线及蓑羽鹤记录点 (黄色圆圈: 我们记录的繁殖对; 蓝色: 牧民报告的记录)
Fig. 3 Survey routes in Astrakhan Oblast and locations of Demoiselle crane records (yellow circles-pairs recorded by us; blue-records reported by farmers)

在该州东部的农业区（克拉斯诺帕尔季赞斯基区和奥津斯基区），尽管仍存在适宜栖息地（池塘、农田间的草原斑块、休耕地），但未发现任何蓑羽鹤，而这些区域此前曾有蓑羽鹤繁殖。在杰尔加乔夫斯基区，沿大乌津河和大伊尔吉兹河的调查路线（仍保留部分未开垦草原）也未观察到蓑羽鹤。

在与西哈萨克斯坦接壤的亚历山德罗夫盖斯基区，畜牧业占主导地位，草原未被开垦，共记录到 5 对蓑羽鹤。在几乎完全被开垦的皮捷尔斯基区，同样未发现蓑羽鹤（图 4a, b）。

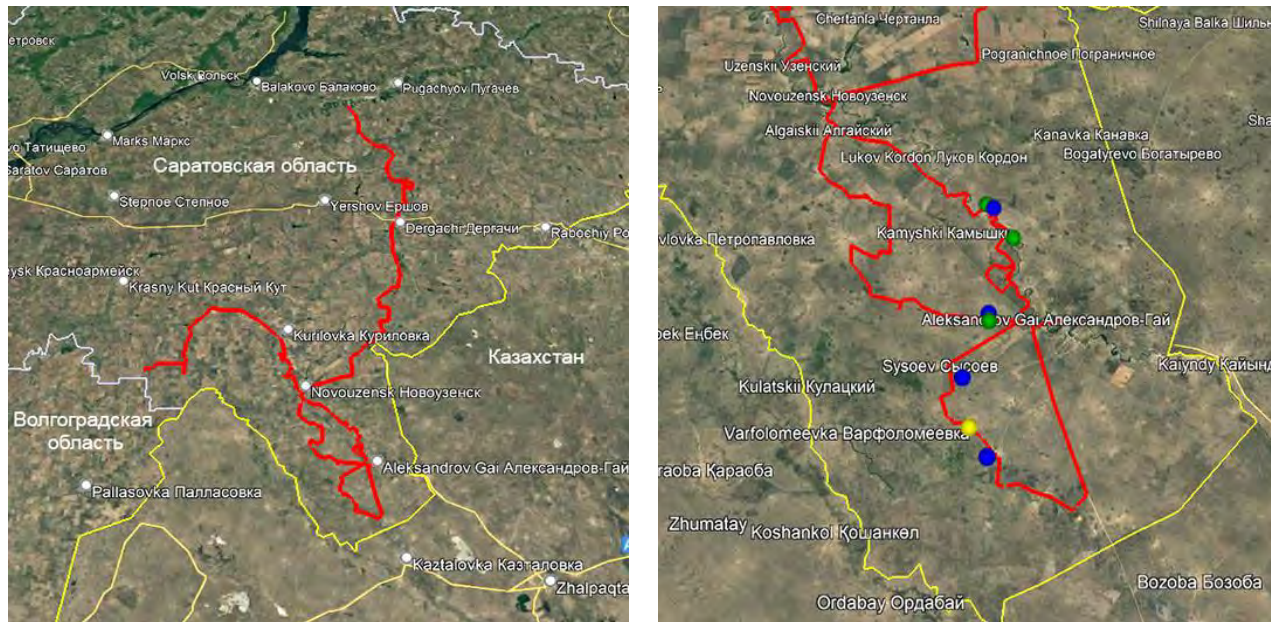


图 4 阿斯特拉罕州调查路线及蓑羽鹤记录点（黄色圆圈：我们记录的繁殖对；蓝色：牧民报告的记录）
Fig. 4 Survey routes in Astrakhan Oblast and locations of Demoiselle crane records (yellow circles-pairs recorded by us; blue-records reported by farmers)

6 月 20-21 日，研究人员对亚历山德罗夫盖斯基区的草原区域进行了复查。该区域被一条从亚历山德罗夫盖通往西哈萨克斯坦的公路分为东西两部分，两地在牲畜养殖场数量和水体可获得性上存在差异：东部更为干旱，几乎没有水体，仅有少数养殖场；西部位于小乌津河及其支流克里沃伊利曼河流域，有一条灌溉渠及其分支穿过，几乎每个养殖场都有人工挖掘的池塘。

在该区域共记录到 4 对蓑羽鹤，其中 2 对各有 1 只雏鸟。在瑟索耶夫农场附近两个池塘之间的低洼地带，观察到一个由 12 只蓑羽鹤和 1 只亚成体灰鹤组成的群体。由于风力强劲，它们未移动，一直在原地觅食（图 5）。



图 5 瑟索耶夫农场附近两个池塘之间洼地中觅食的蓑羽鹤幼鸟群与 1 只灰鹤幼鸟（E. 伊利亚申科 摄）
Fig. 5 A group of young Demoiselle cranes and one young Common Crane feeding in a depression between two ponds near the Sysyov farm (Photo by E. Ilyashenko)

研究人员调查了萨尔平斯卡亚低地北部和伏尔加河外地区。5月5-8日,在萨尔平斯卡亚低地北部(里海繁殖种群分布区)的斯韦特洛亚尔斯基区和十月区,未记录到蓑羽鹤。这些区域的草原已被大规模开垦——甚至道路和草原河岸都被开垦(图6),可供牲畜放牧的面积逐年缩减,仅深沟峡谷仍未被开垦。此前记录的蓑羽鹤草原繁殖地已完全消失(Ilyashenko, 2013)。尽管如此,河流沿岸仍保留有一些适宜筑巢的草原斑块(图7),如果蓑羽鹤种群数量更高,这些区域可能会被重新占据。调查中仅观察到2只亚成体灰鹤:1只在斯韦特洛亚尔斯基区察察村附近的运河旁,另1只在十月区梅什科瓦河谷。



图6 萨尔平斯卡亚低地北部的大规模草原开垦(V. 伊利亚申科 摄)

Fig. 6 Large-scale ploughing of the steppes in the northern part of the Sarpinskaya Lowland (Photo by V. Ilyashenko)



图7 梅什科瓦河谷仍保留的蓑羽鹤适宜栖息地(E. 伊利亚申科 摄)

Fig. 7 Suitable habitats for the Demoiselle crane remain in the valley of the Myshkova River
(Photo by E. Ilyashenko)

4月27日至5月4日,研究人员调查了伏尔加格勒州伏尔加河外地区(旧波尔塔夫斯基区、帕拉索夫斯基区、贝科夫斯基区、尼古拉耶夫斯基区、中阿赫图宾斯基区和列宁斯基区)——伏尔加-乌拉尔繁殖种群分布区。此前,该区域的蓑羽鹤繁殖密度与卡尔梅克共和国部分地区相当(Ilyashenko, 2013; Gugueva 等, 2014; Ilyashenko 等, 2018)。伏尔加格勒州伏尔加河外地区在景观类型、开垦程度、放牧强度(过度或不足)和水资源可获得性上差异显著。最适宜的栖息地位于帕拉索夫斯基区的埃尔顿

自然公园，这里记录到的蓑羽鹤数量最多，放牧压力适中，且有河流注入埃尔顿湖。伏尔加河外地区的其他区域，草原要么被严重开垦，要么被高大植被覆盖（图 8）。养殖场附近常出现严重过度放牧现象，有时甚至导致区域退化为类似沙漠的景观（图 9）。



图 8 伏尔加格勒州伏尔加河外地区高草草原中的非繁殖对（E. 伊利亚申科 摄）

Fig. 8 A non-breeding pair in tall-grass steppe in the Trans-Volga area of Volgograd Oblast (Photo by E. Ilyashenko).



图 9 牲畜养殖场附近因过度放牧退化为荒漠的草原（E. 伊利亚申科 摄）

Fig. 9 Due to severe overgrazing, steppe areas in the vicinity of a livestock farm have turned into desert (Photo by E. Ilyashenko)

整个伏尔加格勒州伏尔加河外地区遍布运河，但多数要么干涸，要么仅部分有水。许多定居点有人工挖掘的供水池塘，大多数牲畜站配备了供牛饮水的水井。在伏尔加河外地区开垦最严重的旧波尔塔夫斯基区，以及沟壑众多的中阿赫图宾斯基区和列宁斯基区，还有以甜瓜田为主的尼古拉耶夫斯基区，均未记录到蓑羽鹤。未开垦土地面积最大的区域位于帕拉索夫斯基区和贝科夫斯基区，共记录到 13 对蓑羽鹤，其中 5 对在埃尔顿湖附近，1 对在索尔达茨科-斯捷普诺耶村附近。6 月 13-21 日对帕拉

索夫斯基区和贝科夫斯基区的复查中，仅记录到 8 对蓑羽鹤（春季为 13 对）（图 10）。其中 6 对有雏鸟（3 对各 1 只，3 对各 2 只）；2 对的雏鸟为 5-10 日龄的绒羽雏，显然来自补产或极晚的窝卵。

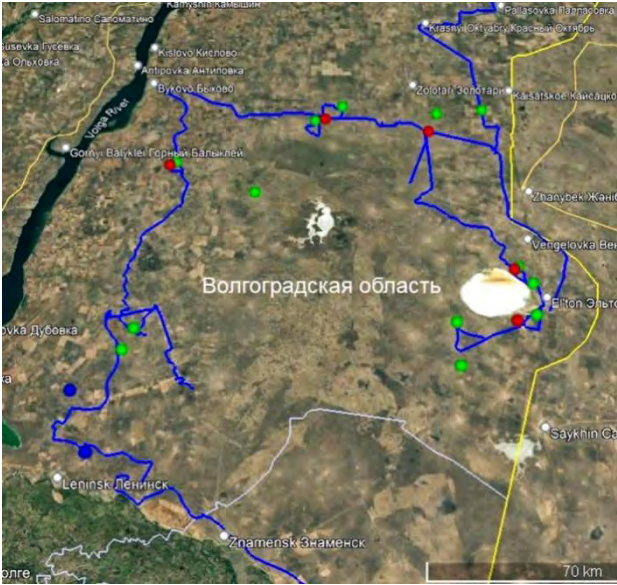


图 10 伏尔加格勒州伏尔加河外地区调查路线及蓑羽鹤记录点：红色圆圈：2025 年 6 月有雏鸟的繁殖对；蓝色：2025 年 6 月无雏鸟的繁殖对；绿色：2025 年 4 月记录的繁殖对

Fig. 10 Survey route and Demoiselle crane records in the Trans-Volga area of Volgograd Oblast: red circles-pairs with chicks in June 2025; blue-pairs without chicks in June 2025; green-locations of registered pairs in April 2025

有趣的是，在戈尔马基村附近池塘旁观察到的一对蓑羽鹤，其两只绒羽雏鸟体型差异极大（图 11）。调查中未记录到非繁殖的蓑羽鹤幼鸟群。



图 11 帕拉索夫斯基区戈尔马基村附近池塘旁带有两只体型差异显著绒羽雏鸟的繁殖对（E. 伊利亚申科 摄）
Fig. 11 A pair with two downy chicks of different sizes near a pond by the settlement of Gormaki, Pallasovsky District
(Photo by E. Ilyashenko)

卡尔梅克共和国的野外工作分三个阶段进行：6 月 9-12 日，调查采利内区和亚什库尔区普列尔根宁斯卡亚倾斜平原的最适宜筑巢生境；6 月 16-22 日，调查凯切涅罗夫斯基区、亚什库尔区、萨尔平斯基区、普里尤特年斯基区和切尔诺泽梅利斯基区；6 月 23-24 日，调查伊基-布鲁尔斯基区。

综合我们的调查和牧民及其他受访者提供的信息，卡尔梅克共和国共记录到 28 对蓼羽鹤，其中 15 对有雏鸟（9 对各 2 只，6 对各 1 只）（图 12）。在普列尔根宁斯卡亚倾斜平原的最适宜栖息地，记录到了 28 对中的 18 对（图 13）。在 15 对繁殖对中，有 3 对的雏鸟为 5-15 日龄的绒羽雏，显然来自补产（图 14），这很可能是由于 5 月寒冷多雨导致第一窝卵损失所致。

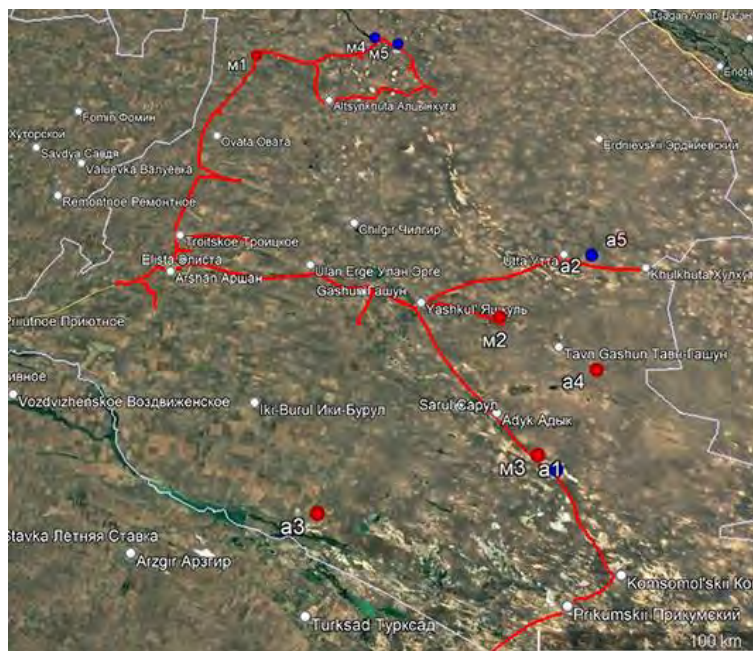


图 12 2025 年 6 月卡尔梅克共和国调查路线 (a) 及蓼羽鹤记录点 (b)：蓝色和红色线条：不同团队的调查路线；红色圆圈：有雏鸟的繁殖对；蓝色：无雏鸟的繁殖对；黄色：非繁殖群分布点

Fig. 12 Survey routes (a) and Demoiselle crane records (b) in the Republic of Kalmykia in June 2025: blue and red lines-routes of different groups; red circles-pairs with chicks; blue-pairs without chicks; yellow-locations of non-breeding groups

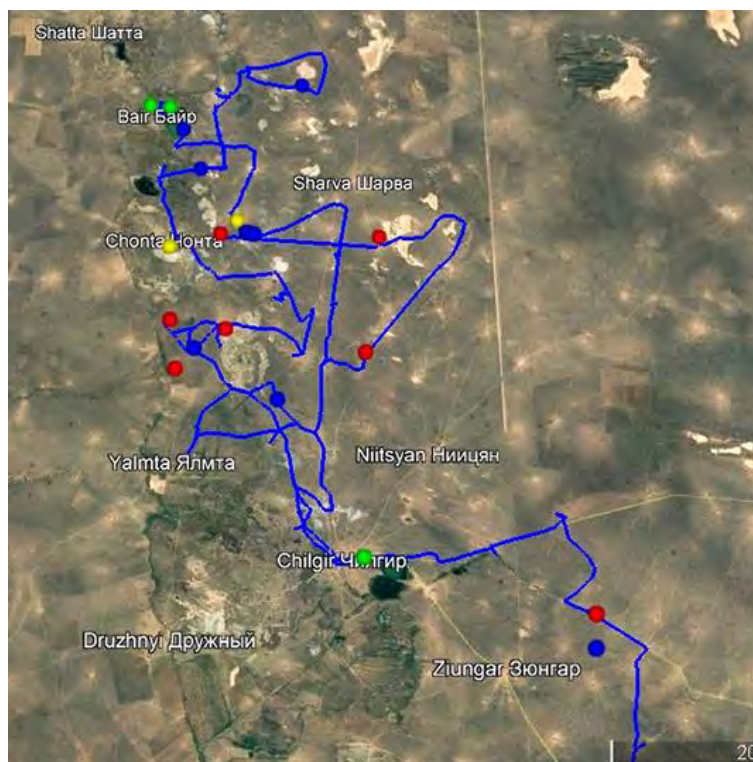


图 13 卡尔梅克共和国亚什库尔与拜尔之间的埃尔根尼倾斜平原——蓼羽鹤最适宜栖息地：红色圆圈：有雏鸟的繁殖对；蓝色：无雏鸟的繁殖对；黄色：非繁殖群分布点；绿色：牧民报告的记录

Fig. 13 The area between the settlements of Yashkul and Bayr on the Ergeni sloping plain — optimal habitats of the Demoiselle crane in the Republic of Kalmykia: red circles-pairs with chicks; blue-pairs without chicks; yellow-locations of non-breeding groups; green-records based on shepherds



图 14 2025 年 6 月 11 日，卡尔梅克共和国亚什库尔区带有两只绒羽雏鸟的繁殖对（K. 孔德拉科娃 摄）

Fig. 14 A pair with two downy chicks in Yashkulsky District, Republic of Kalmykia, 11 June 2025

(Photo by K. Kondrakova)

在梅克莱京斯基自然保护区，观察到一对蓑羽鹤的雏鸟体型差异极大（图 15），与伏尔加格勒州伏尔加河外地区的情况类似。这种显著的体型差异并不常见，因为鹤类雏鸟的年龄差通常为 1~2 天，而此处的年龄差达 8-10 天。遗传学研究表明，这两只雏鸟来自同一只雌鸟。



图 15 2025 年 6 月 21 日，卡尔梅克共和国梅克莱京斯基自然保护区中年龄差为 5-7 天的同窝绒羽雏鸟
(E. 穆德里克 摄)

Fig. 15 Downy sibling chicks with an age difference of 5–7 days in the Mekletinsky Nature Reserve in Republic of Kalmykia, 21 June 2025 (Photo by E. Mudrik)

对蓑羽鹤欧洲分布区繁殖地的年度监测显示，无论是卡尔梅克共和国的适宜栖息地，还是阿斯特拉罕州、伏尔加格勒州和萨拉托夫州的次适宜栖息地，种群数量均呈持续下降趋势。对比数据显示：在卡尔梅克共和国普列尔根宁斯卡亚倾斜平原种群密度最高的区域，2024 年共记录到 102 次观测，涉及 297 只蓑羽鹤，其中包括 86 对繁殖对和 47 只雏鸟；而 2025 年仅记录到 35 次观测，涉及 102 只个体，其中包括 18 对繁殖对和 24 只雏鸟——也就是说，仅一年时间种群数量就下降了 2-3 倍。

在伏尔加格勒州伏尔加河外地区的次适宜栖息地，20 世纪 90 年代末至 21 世纪初的种群数量估计为 400-500 只（Chernobay & Gugueva, 2008），自 21 世纪 10 年代初开始出现下降（Chernobay, 2011）：2011 年记录到 17 对繁殖对（Ilyashenko, 2013）；2014 年为 16 对（Gugueva 等, 2014）；2017 年为 8 对（Ilyashenko 等, 2018）；而 2025 年春季调查记录到 13 对，6 月复查仅为 8 对。导致种群下降的主要限制因素包括持续干旱与水资源减少、过度放牧以及草原的大规模开垦。散养的农场犬捕食雏鸟是对蓑羽鹤繁殖的直接威胁（图 16）。



图 16 狗追逐一对可能已失去雏鸟的蓑羽鹤（E. 伊利亚申科 摄）

Fig. 16 Dogs chasing a pair whose chicks were likely eaten by them (Photo by E. Ilyashenko)

Ongoing Decline in Demoiselle Crane Numbers at Breeding Sites in Kalmykia and the Trans-Volga Region in 2025

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In 2025, monitoring of Demoiselle Crane breeding was carried out in several stages: in April–May to assess population size and identify limiting factors at breeding sites, and in June–July to determine breeding success. In spring, surveys were conducted in the Astrakhan, Saratov, and Volgograd regions. In June, the areas with the highest species occurrence identified in April and May were revisited. In the Republic of Kalmykia, surveys were conducted in June by different groups, one of which included cameraman Mikhail Rodionov.

The surveys were conducted along автомобиль routes using binoculars and a spotting scope. Routes were planned to cover water sources (artesian wells, wells known as “khuduks,” ponds, and canals) and to check locations of previous sightings recorded by us or other ornithologists.

In the Astrakhan Region, from 15 to 18 April, the right bank of the Volga River was surveyed in the Chernoyarsky and Enotayevsky districts. Most of the Chernoyarsky District has been plowed for melon cultivation. There are many canals branching from the Volga, but most of them are not filled with water. A striking feature was the large amount of plastic used for drip irrigation of melon crops, which is not removed after harvest.

The territory of the Enotayevsky District, characterized by sparse steppe vegetation, is almost entirely devoid of natural freshwater bodies. Water is available only at livestock farms from wells drilled to provide drinking water for cattle (Fig. 1). Unlike in Kalmykia, where such farms are located 2–3 km apart, in the Astrakhan Region the distance between them ranges from 5 to 10 km. Because the vegetation is poor and livestock numbers are relatively low, overgrazing has not been observed.

From north to south, brown semi-desert soils and sand dunes become increasingly common, initially occurring in patches and then, in the southern part of the Enotayevsky District-where the steppes transition into the right-bank deserts-forming vast sandy massifs that sometimes bury livestock farms (Fig. 2). Ten pairs of Demoiselle Cranes were recorded mainly in the northern part of the Enotayevsky District in arid steppe habitats, both by us and according to local shepherds (Fig. 3).

In the Trans-Volga area of the Saratov Region, from 23 to 27 April 23, surveys were conducted in the eastern and southern parts of the region, where the highest breeding density of the Demoiselle Crane was recorded in the late 1990s and early 2000s (Zavyalov et al., 2001, 2003).

In the agricultural districts in the east of the region (Krasnopartizansky and Ozinsky), where Demoiselle Cranes had previously nested, no cranes were found, although suitable habitats (ponds, steppe patches among fields, fallow lands) are still present. In the Dergachevsky District, along the survey route following the Bolshoy Uzen and Bolshoy Irgiz rivers-where some unplowed steppe areas remain-no cranes were observed. In the Alexandrov-Gaysky District, which extends slightly into Western Kazakhstan, pastoral livestock breeding predominates and the steppes have not been plowed. It was in this district that five pairs were recorded. In the Pitsersky District, which is almost entirely plowed, cranes were also not detected (Fig. 4a, b).

On 20–21 June, a steppe area in the Alexandrov-Gaysky District was surveyed again. It is divided by a highway running from Alexandrov Gay to Western Kazakhstan into western and eastern parts, which differ in the number of livestock farms and the availability of water bodies. The eastern part is more arid, almost without water bodies and with only a few farms. The western part lies within the basin of the Maly Uzen River and its tributary, the Krivoy Liman. An irrigation canal with branches runs through the area, and nearly every farm has a dug-out pond. Four pairs were recorded in this section, two of them with one chick each.

Near the Sysoev Farm, in a lowland between two ponds, a group of 12 Demoiselle Cranes and one subadult Eurasian Crane were observed. Due to strong winds, they did not move and were feeding in one place (Fig. 5).

In the Volgograd Region, surveys were conducted in the northern part of the Sarpinskaya Lowland and in the Trans-Volga area.

In the northern Sarpinskaya Lowland (the Caspian breeding group), within the Svetloyarsky and Oktyabrsky districts, Demoiselle Cranes were not recorded on 5–8 May. These districts are characterized by extensive plowing of the steppes-even roads and the banks of steppe rivers are being plowed (Fig. 6). The area available for livestock grazing is shrinking each year. Only deep ravines remain unplowed. Previously recorded steppe breeding sites of the Demoiselle Crane (Ilyashenko, 2013) have disappeared. However, despite the widespread plowing, some steppe patches suitable for nesting still remain along rivers (Fig. 7), and these could potentially be occupied by cranes if their population were higher. Two young solitary Eurasian Cranes were observed: one near the settlement of Tsatsa by a canal (Svetloyarsky District) and another in the valley of the Myshkova River in the Oktyabrsky District.

The Trans-Volga area of the Volgograd Region (Staropoltavsky, Pallasovsky, Bykovsky, Nikolayevsky, Sredneakhtubinsky, and Leninsky districts) (the Volga–Ural breeding group) was surveyed from 27 April to 4 May. Previously, the nesting density of the Demoiselle Crane here was comparable to that in some areas of Kalmykia (Ilyashenko, 2013; Gugueva et al., 2014; Ilyashenko et al., 2018).

The Volgograd Trans-Volga area is highly heterogeneous in terms of landscapes, degree of plowing, overgrazing or undergrazing, and availability of water resources. The most favorable habitats are found in the Elton Natural Park in the Pallasovsky District, where the highest number of sightings was recorded. Here, grazing pressure is moderate, and there are rivers flowing into Lake Elton. In the other districts of the Trans-Volga area, the steppes are either heavily plowed or overgrown with tall vegetation (Fig. 8). Severe overgrazing is often observed near farms, sometimes to the point of transforming areas into desert-like landscapes (Fig. 9).

The entire Volgograd Trans-Volga area is crisscrossed by canals, but most of them are either dry or only partially filled with water. Many settlements have dug-out ponds for water supply, and most livestock stations are equipped with wells for watering cattle.

In the Staropoltavsky District—the most extensively plowed area in the Trans-Volga region—as well as in the Sredneakhtubinsky and Leninsky districts, characterized by numerous ravines, and in the Nikolayevsky District, much of which is occupied by melon fields, Demoiselle Cranes were not recorded.

The largest areas of unplowed land remain in the Pallasovsky and Bykovsky districts. A total of 13 pairs were recorded there, including five near Lake Elton and one near the village of Soldatsko-Stepnoye.

From 13 to 21 June, during a repeat survey of the Pallasovsky and Bykovsky districts, eight pairs were registered, compared to 13 pairs in spring (Fig. 10). Of these eight pairs, six had chicks (three pairs with one chick each and three pairs with two chicks each). In two pairs, downy chicks aged 5–10 days had hatched, apparently from repeat or very late clutches.

Interestingly, in a pair observed near a pond by the village of Gormaki, the downy chicks differed greatly in size (Fig. 11). No groups of young non-breeding Demoiselle Cranes were recorded.

In the Republic of Kalmykia, fieldwork was conducted from June 9 to 12 in the most optimal nesting habitats within the Priergeninskaya sloping plain in the Tselinny and Yashkul'sky districts; from 16 to 22 June in the Ketcheneryovsky, Yashkul'sky, Sarpinsky, Priyutnensky, and Chernozemelsky districts; and on 23–24 June in the Iki-Burul'sky District.

In total, in Kalmykia, taking into account information obtained from shepherds and other respondents, 28 pairs were recorded, including 15 pairs with chicks (nine with two chicks and six with one) (Fig. 12). In the most optimal habitats of the Priergeninskaya sloping plain, 18 of the 28 recorded pairs were observed (Fig. 13). Of the 15 breeding pairs, three had downy chicks aged 5–15 days, apparently from repeat clutches (Fig. 14), most likely due to the loss of first clutches during the cold and rainy May.

In the Mekletinsky Nature Reserve, a pair was observed whose chicks differed greatly in size (Fig. 15), similar to a pair in the Volgograd Trans-Volga region. Such a large size difference is unusual, as in cranes the age difference between chicks is typically 1–2 days, whereas in this case it was 8–10 days. Genetic studies showed that the chicks were from the same female.

Annual monitoring of the Demoiselle Crane at nesting sites in the European part of its range has shown a continued population decline both in optimal habitats in Kalmykia and in suboptimal habitats in the Astrakhan, Volgograd, and Saratov regions. For comparison: in Kalmykia, in the area with the highest population density on the Priergeninskaya sloping plain, 102 sightings involving 297 Demoiselle Cranes were recorded in 2024, including 86 pairs and 47 chicks; in 2025, only 35 sightings with 102 individuals were recorded, including 18 pairs and 24 chicks—that is, the population declined two- to threefold in just one year.

In suboptimal habitats of the Volgograd Trans-Volga region, where in the late 1990s and early 2000s the population was estimated at 400–500 individuals (Chernobay & Gugueva, 2008), a decline has been noted since the early 2010s (Chernobay, 2011). In 2011, 17 pairs were recorded there (Ilyashenko, 2013); in 2014, 16 pairs (Gugueva et al., 2014); in 2017, 8 pairs (Ilyashenko et al., 2018); and during our survey in 2025, 13 pairs were recorded in spring and 8 in June.

The main limiting factors are the continuing drought and reduction of water resources, overgrazing, and intensive plowing of the steppes. Predation by free-ranging farm dogs poses a direct threat to chicks (Fig. 16).

尼泊尔首次赤颈鹤 (*Antigone antigone*) 环志

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2025 年 11 月, 北京林业大学 1115 鹤类研究团队、尼泊尔特里布文大学 Dikpal 学者以及尼泊尔蓝毗尼当地保护人员, 共同在尼泊尔蓝毗尼省南部环志跟踪了 6 只赤颈鹤 (*Antigone antigone*) (AviList Core Team, 2025) 个体。赤颈鹤总数约为 15000-17500 只, 有 3 个亚种, 分别为分布在印度北部和尼泊尔的指名亚种 (*Antigone antigone antigone*), 种群数量大约有 8000-10000 只; 分布在越南、柬埔寨、缅甸、老挝和印度东部的东方亚种 (*Antigone antigone sharpii*), 种群数量大约为 1300-1800 只; 另有大约 5000-10000 只澳大利亚亚种 (*Antigone antigone gillae*) 在澳洲栖息 (王岐山等, 2006; Archibald 等, 2020; Sharma 等, 2023; BirdLife International, 2025)。我国曾经分布的赤颈鹤为东方亚种, 分布区域为云南省西南边陲与缅甸、老挝接壤地带 (杨岚, 1987; 王岐山等, 2006), 但有关研究并不丰富, 在 2016 年被中国鸟类红色名录评估为区域灭绝 (张雁云等, 2016)。



图 1 赤颈鹤环志工作照

Fig. 1 Photographs of Sarus Crane banding work

此次环志的 6 只赤颈鹤个体属于指名亚种, 均为尼泊尔境内繁殖出生的幼鹤。在规划时, 每个家庭只环志 1 只幼鹤, 且家庭间保持着一定的距离, 以实现更有效的数据采样。环志过程中, 有尼泊尔政府人员陪同参与, 未有幼鹤受到伤害。此外, 赤颈鹤为体型最高的鹤类, 幼鹤重量均大于 6 kg, 跟踪器重量小于环志个体重量的 0.75%, 远小于国际标准。

通过此次赤颈鹤环志跟踪工作,实现了尼泊尔历史上首次对赤颈鹤的环志跟踪,并且掌握了该区域赤颈鹤居留型的运动模式,截至该稿件撰写时,跟踪个体尚未有长距离、方向性的飞行。此外,尽管尼泊尔赤颈鹤亚种与我国不同,但本次跟踪仍积累了宝贵的一手数据,为我国今后可能的赤颈鹤重引入工作提供相应的支撑信息。

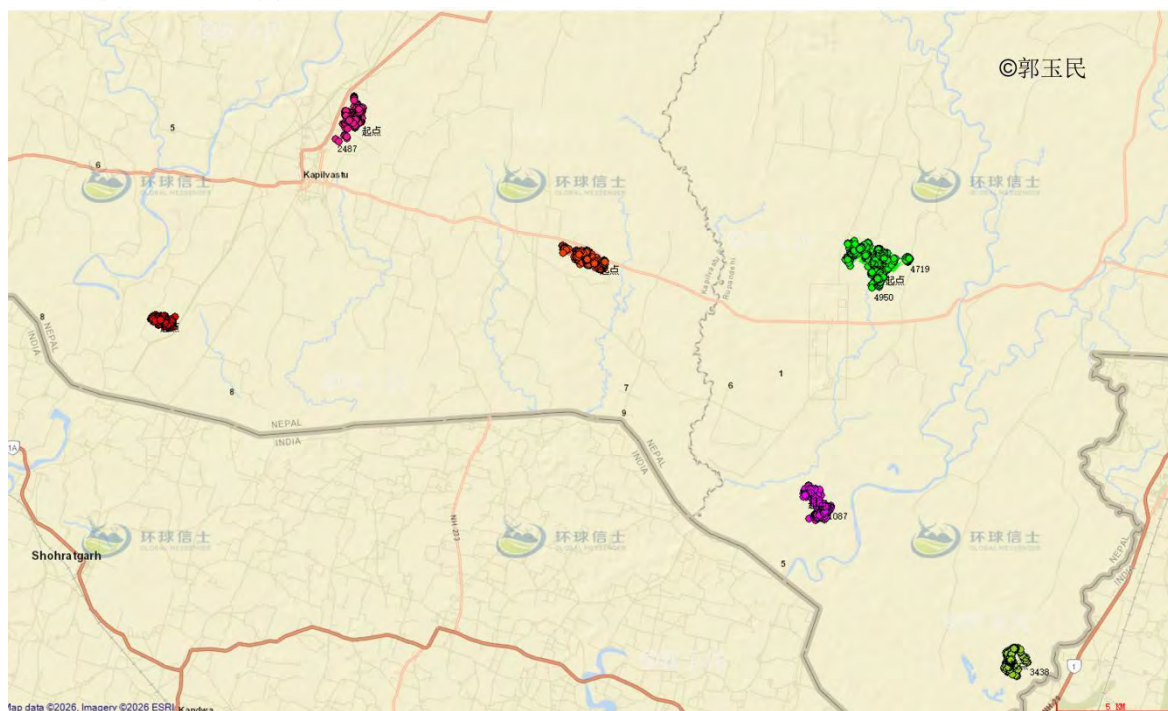


图 2 赤颈鹤跟踪位点
Fig. 2 Tracking locations of Sarus Cranes

First Banding of Sarus Cranes (*Antigone antigone*) in Nepal

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In November 2025, the 1115 Crane Research Team of Beijing Forestry University, together with Dikpal Krishna Karmacharya from Tribhuvan University and local conservation personnel in Lumbini, Nepal, banded and tracked six Sarus Crane (*Antigone antigone*) individuals in southern Lumbini Province, Nepal (AviList Core Team, 2025). The global population of the Sarus Crane is approximately 15,000–17,500 individuals and comprises three subspecies: the *Antigone antigone antigone*, distributed in northern India and Nepal, with an estimated population of approximately 8,000–10,000 individuals; the *Antigone antigone sharpii*, distributed in Vietnam, Cambodia, Myanmar, Laos, and eastern India, with an estimated population of approximately 1,300–1,800 individuals; and the *Antigone antigone gillae*, with approximately 5,000–10,000 individuals inhabiting Australia (Wang et al., 2006; Archibald et al., 2020; Sharma et al., 2023; BirdLife International, 2025). The Sarus Cranes historically distributed in China belonged to the *Antigone antigone sharpii*, occurring along the southwestern border of Yunnan Province adjacent to Myanmar and Laos (Yang, 1987; Wang et al., 2006). However, studies on this population remain limited, and the species was assessed as regionally extinct in China in the Red List of birds in China in 2016 (Zhang et al., 2016).

The six Sarus Cranes banded during this work belonged to the *Antigone antigone antigone* subspecies and were all hatched in Nepal. During the planning stage, it was decided that only one individual would be banded from each family group, and a certain distance would be maintained among family groups to ensure

more effective data sampling. Government officials from Nepal accompanied and participated in the banding process, and no cranes were harmed. In addition, the Sarus Crane is the tallest crane species, and all banded individual weighed more than 6 kg. The transmitters weighed less than 0.75% of the body weight of the banded individuals, far below international standards.

This Sarus Crane banding and tracking work represents the first banding and tracking of Sarus Cranes in the history of Nepal. It has also provided initial information on the movement patterns of resident Sarus Cranes in this region. As of the time of writing, the tracked individuals had not yet undertaken any long-distance, directional flights. Although the Sarus Cranes in Nepal belong to a different subspecies from the one historically distributed in China, this tracking work has generated valuable first-hand data and provides supporting information for the possible future reintroduction of Sarus Cranes in China.

征稿启事

《中国鹤类通讯》是中国动物学会鸟类学分会和中国野生动物保护协会鹤类联合保护专业委员会联合主办的鹤类与水鸟信息交流的内部刊物，主要报道中国鹤类与水鸟的研究、保护、饲养、管理、宣传和教育等工作的动态和阶段成果，也报道国外鹤类研究动态及其他水鸟有关信息，欢迎同行及各界人士踊跃投稿。

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China Crane News is published by China Ornithological Society and United Crane Conservation Committee of China Wildlife Conservation Association. The newsletter specializes in the exchange of information on cranes and other large waterbirds, focusing on research, conservation, breeding, management, and education activities related to these species in China, and also reports relevant information abroad.

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- (3) The article should be concise and include geographic coordinate information for new sighting sites of cranes and other waterbirds.
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- (7) The author takes full responsibility for the content of the article.

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