**Supplementary Material**

Rapid growth of the Bar-headed Goose A*nser indicus* wintering population in Tibet, China: 1991–2017

MARY ANNE BISHOP, DONGPING LIU, GUOGANG ZHANG, DROLMA TSAMCHU, LE YANG, FAWEN QIAN and FENGSHAN LI

**Contents**

Appendix S1. Historical Information Available on Bar-headed Goose *Anser indicus* in Tibet.

Table S1. Comparison of habitat use of Bar-headed Geese by winter survey, Tibet Autonomous Region, China.

**Appendix S1.** **Historical Information Available on Bar-headed Goose *Anser indicus* in Tibet**

Personnel associated with the early 1900’s British invasion of Tibet provided the first regional bird lists that included the Bar-headed Goose (*Anser indicus)*. Walton (1906) noted that some Bar-headed Geese apparently overwintered at the lake Dochen (Hram) Tso (~85 km southwest of Gyangzê). He also observed that in April there were “very large and numbers” inhabiting in the highly cultivated fields of the Gyangzê plain. Ludlow lived in Gyangzê and Lhasa in the 1920’s and 1940’s, respectively, and explored southeast Tibet in the 1930’s and 1940’s. He described the Bar-headed Goose during winter as common around Gyangzê, abundant at Lhasa, and in “immense numbers” on the lake Yamdrok Tso in March. He noted that the Bar-headed Goose wintered on the Yarlung Tsangpo River east to Tamnyen, just above the confluence of the Yarlung Tsangpo and the Nyang River, and as far north as Yigrong Tso (Ludlow 1928, 1944, 1950, 1951).

With an economy dependent on farming and livestock (primarily yak, cattle, sheep, goats) and the dominant religion Buddhism that discouraged killing wild animals (Waddell 1905), the Bar-headed Goose was historically not considered a major foodstuff. Tung (1996) in her description of Tibetan society during the 1940’s noted that Tibetans “frowned on the killing for food of small animals” because of the numbers needed to feed people, whereas killing large animals (for example yak, cattle, sheep) minimized the number killed. Both Walton (1906) and Ludlow (1928, 1944, 1950) observed that Bar-headed Goose eggs were sold at markets and that geese were hunted and therefore wary in some areas of Tibet. However, both men also noted how tame Bar-headed Geese were, including around major cities such as Lhasa and Gyangzê.

**References**

Ludlow, F. (1928) Birds of the Gyantse Neighbourhood, Southern Tibet.—Parts II & III. *Ibis* *70*: 51-73, 211-232

Ludlow, F. (1944) The birds of south‐eastern Tibet. *Ibis* 86:43-91, 176-208, 348-389.

Ludlow, F. (1950) The birds of Lhasa. *Ibis* *92:* 34-45.

Ludlow, F. (1951) The birds of Kongbo and Pome, South‐east Tibet. *Ibis* *93:*547-578.

Tung, R. J. (1996) *A portrait of lost Tibet*. Univ. California Press.

Walton, H. J. (1906) On the birds of southern Tibet. *Ibis* 48: 57-84, 225-256.

Table S1. Comparison of habitat use of Bar-headed Geese by winter survey, Tibet Autonomous Region, China. For 1991-1992, observations of flying birds are excluded; January 2014 data from Liu *et al*. (2017).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | December 1991–January 1992 | | |  | January 2014 | | |
|  |  |  |  |  |  |  |  |
| Habitat | No. flocks | X flock size (range) | No.  birds |  | No. flocks | X flock size (range) | No.  birds |
| Winter wheat | 5 | 127 (10-300) | 635 (6.5%) |  | 140 | 188 (2-1400) | 26,322 (39.3%) |
|  |  |  |  |  |  |  |  |
| Ploughed field | 18 | 88 (10-350) | 1586 (16.3%) |  | 35 | 323 (3-2500) | 11,309 (16.9%) |
|  |  |  |  |  |  |  |  |
| Crop stubble | 31 | 103 (10-265) | 3185 (32.8%) |  | 8 | 66 (5-150) | 530 (0.8%) |
|  |  |  |  |  |  |  |  |
| Pasture | 0 |  |  |  | 20 | 510 (1-6350) | 10,199 (15.2%) |
|  |  |  |  |  |  |  |  |
| Marsh | 14 | 63 (8-200) | 880 (9.0%) |  | 23 | 439 (2-3000) | 10,105 (15.1%) |
|  |  |  |  |  |  |  |  |
| River, Lake, Reservoir, Ponds | 21 | 142 (4-450) | 2984 (30.7%) |  | 24 | 303 (1-3500) | 7261 (10.8%) |
|  |  |  |  |  |  |  |  |
| Other habitats | 9 | 51 (10-150) | 455 (4.7%) |  | 5 | 261 (15-600) | 1305 (1.9%) |
|  |  |  |  |  |  |  |  |
| Total | 98 | 99 (4-450) | 9725 |  | 255 | 263 (1-6350) | 67,031 |

**Reference**

Liu, D., Zhang, G., Li, F., Ma, T., Lu, J. and Qian, F. (2017) A revised species population estimate for the Bar-headed Goose (*Anser indicus*). *Avian Res.* 8: 7.