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Carrying capacity of winter geese in the largest freshwater floodplain in different hydrological scenarios

Shaoxia Xia, Zhujian Meng, Jiakun Teng, and Xiubo Yu

Institute of Geographic Science and Natural Resources Research, Chinese Academy of Sciences, Key Laboratory of Ecosystem Network Observation and Modeling, China (xiasx@igsnr.ac.cn)

The maintenance of wetland functions closely relates to the hydrological regime in floodplains. Poyang Lake, a large freshwater floodplain, is one of the most important wintering grounds for geese along East Asian-Australasian Flyway. Wintering geese prefer *Carex* spp as their main food source whose consequent growth is greatly affected by flooding duration and exposure time of the meadow. Therefore, hydrological condition affects the carrying capacity of the geese through wet meadow growth process.

Combining with remote sensing data and Digital Elevation Models, as well as field study, we identified the exposure time of meadow and the effective growth time of *Carex* spp. Applying geese's feeding characteristics with logistic equation, we deduced the time window fit for geese's feeding on vegetation from growth curve. The distribution pattern of *Carex* spp suitable for geese feeding is also mapped according to the flood recession dates and digital elevation model. In addition, we modelled the above ground biomass using the vegetation index and in-situ experiments data in the wintering period of the wet year (2016), the normal year (2015) and the dry year (2006). Therefrom, we estimated the carrying capacity in wintering period referring the daily energy demand of geese in three different hydrological scenarios.

The results show that the exposure time of the dry year is brought forward 41 days and 56 days compared to the normal year and the wet year respectively. Among them, the average biomass of wet year is the highest, which is about 5.7×10^4 t, while it decreased by 12% and 4.4% of those in dry year and the normal year. The carrying capacity of the geese in Poyang Lake in the three hydrological scenarios are all in surplus compared with the actual amount of geese according to the waterbirds survey of the same year. The maximum carrying capacity in the dry year is in September, while in November for the normal and wet year. In general, the growth process of *Carex* spp in the normal year and the wet year match the requirements of wintering geese in their peak period better than the wet year. However, the growth process in dry year may even have negative effects on the feeding of geese. This study is very important for appropriate hydrological regulation and wetland management in Poyang Lake, and for predicting habitat carrying capacity and formulating conservation strategies with scientific data.

