



Linkage of habitat conditions and decline of green-winged teal (*Anas crecca*) population in the Huajiang wetland of Taiwan

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The population of green-winged teal (*Anas crecca*) has greatly declined worldwide. Similar decline trend was observed in the Huajiang wetland that the population has dropped from 7000 teals in 2007 to 207 in 2013. The Huajiang wetland is an important wintering habitat for migratory teals in the northern Taiwan, and has been designated as an important bird area (IBA). Previous study found that low slope (0.7 to 1.4 %), distance to the nearest vegetation less than 4 m, and the above mean sea-level ranged from 0.3 to 0.7 m are the three major suitable habitat criteria for teals. To understand how habitat conditions in the Huajiang wetland affect the population of green-winged teal, we investigated the effects of multiple variables including air temperature, suspended sediment, river flow, wetland terrestrialization, and government dredgement on the teal decline problems, by a system dynamic model using STELLA Architect. The wetland area was estimated by data of observed river flow and suspended sediment, with associated carrying capacity of the river water. The simulated wetland area was then used as a surrogate for the terrestrialization status. Based on the suitable habitat criteria, we assigned an area index to represent the negative terrestrialization impact on the teal population. We further modeled the teal migration behavior by considering effects of seasons and temperatures. The results showed that dependent on the river flow directions, the Xindian River had a higher contribution to the Huajiang wetland terrestrialization than the Dahan River, which further worsen the habitat conditions for the teal population. As a result, we suggested that embedding the suspended sediment control into the reservoir management plans and dredging periodically may be effective remediation strategies to sustain the population of the green-winged teals, and these findings can be used as guidelines for governments to improve wetland management.