

Further population size reduction of *Rhagophthalmus hiemalis* in Hong Kong

Yiu Vor

31E, Tin Sam Tsuen, Kam Sheung Road, Yuen Long, N.T., Hong Kong.

Email: yiuvor@hkentsoc.org

ABSTRACT

Transect count method was used to study the population size of *Rhagophthalmus hiemalis*. Importing the data in 2012-2013 and the data in 2021-2022 into the IUCN Red List Criterion A tool: population reduction calculator; the past reduction over 10 years with exponential assumption is -88.5% ; the past reduction over 10 years with linear reduction is -87.0%.

Key words: *Rhagophthalmus hiemalis*, Hong Kong, population size reduction

INTRODUCTION

Rhagophthalmus hiemalis is only known in Hong Kong. Before 2021, it was only found in Tai Mo Shan, Tsuen Kam Au (including a 2 km section of MacLehose Trail Stage 9) and Mui Tsz Lam. One more occurrence locality - Shatin Pass, was discovered in 2020-21 Hong Kong Firefly Surveys (Yiu, 2021). Tsuen Kam Au is the locality housing the largest sub-population of this species.

Flight period of *R. hiemalis* is from late December to February (The early March record in Hong Kong Island is found to be not *R. hiemalis*), but mostly recorded in January. Female adults were often seen displaying conspicuous light on the sparsely vegetated slope surfaces near woodland margins. Number of light displaying females along a transect – 2 km section of MacLehose Trail Stage 9 from Tsuen Kam Au to Lin Fa Shan, had been used as an index for evaluating population size of this species since 2012 December.

A reduction rate of 88% was detected when comparing the number of light displaying females found during 2020-21 surveys with the previous recorded along the same transect. (Yiu, 2021).

The second Hong Kong Firefly Survey Team was established on the World Firefly Day (July 3), 2021. After 8 hours lecture training and 12 hours practical training at night, in the wild, members would take part in firefly surveys. *R. hiemalis* is one of the main subjects of their surveys.

MATERIALS & METHODS

Exactly the same methods as Yiu (2021) was adopted. 15 transect count surveys were done from 24 December 2021 to 27 February 2022. The index of population size found in 2021-22 and that from 2012-13 was entered into the IUCN Red List Criterion A tool: population reduction

calculator, to calculate the population reduction rate.

RESULTS

Please see Yiu (2021) for past records. Results of the transect count done in 2021-2022 are listed on Table 1. The highest count is 1. For 2012-2013, the highest count was 7. Entering the respective date in to the Red List Criterion A tool (IUCN, 2013), the past reduction over 10 years (longer than 3 generations) is -88.5% for the population of *R. hiemalis* under the assumption that the rate of decline has been constant over time (Fig. 1). The past reduction over 10 years (longer than 3 generations) is -87.0% for the population of *R. hiemalis* under the assumption that the reduction of number has been constant over time (Fig. 2).

DISCUSSION

Applying Criterion A2 of the IUCN Red List Assessment – Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased or may not be understood or may not be reversible, the species could be listed in the category of Critically Endangered (IUCN, 2012) , for either of the two assumptions listed above. Finally red list assessment rely on considerations of a number of additional factors, which is in progress.

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TABLE & FIGURES

Date of Survey	No. of light displaying female <i>R. hiemalis</i>
Dec 24, 2021	0
Jan 1, 2022	0
Jan 2, 2022	0
Jan 6, 2022	1
Jan 10, 2022	0
Jan 19, 2022	1
Jan 23, 2022	0
Jan 24, 2022	1
Jan 30, 2022	0
Feb 3, 2022	0
Feb 10, 2022	0
Feb 16, 2022	0
Feb 17, 2022	0
Feb 27, 2022	0

Table 1. Dates of survey and number of recorded adults of *Rhagophthalmus hiemalis*.

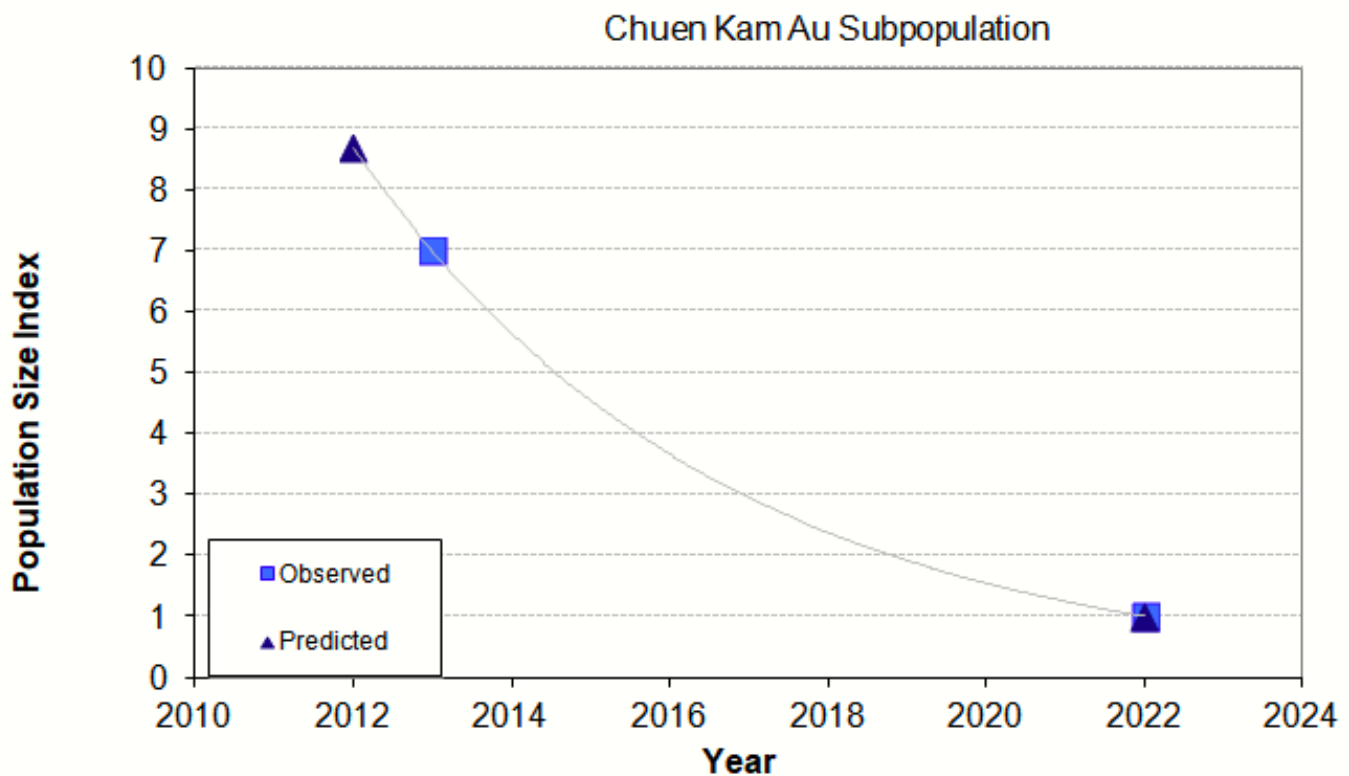


Figure 1. 10-year reduction *Rhagophthalmus hiemalis*, with exponential assumption.

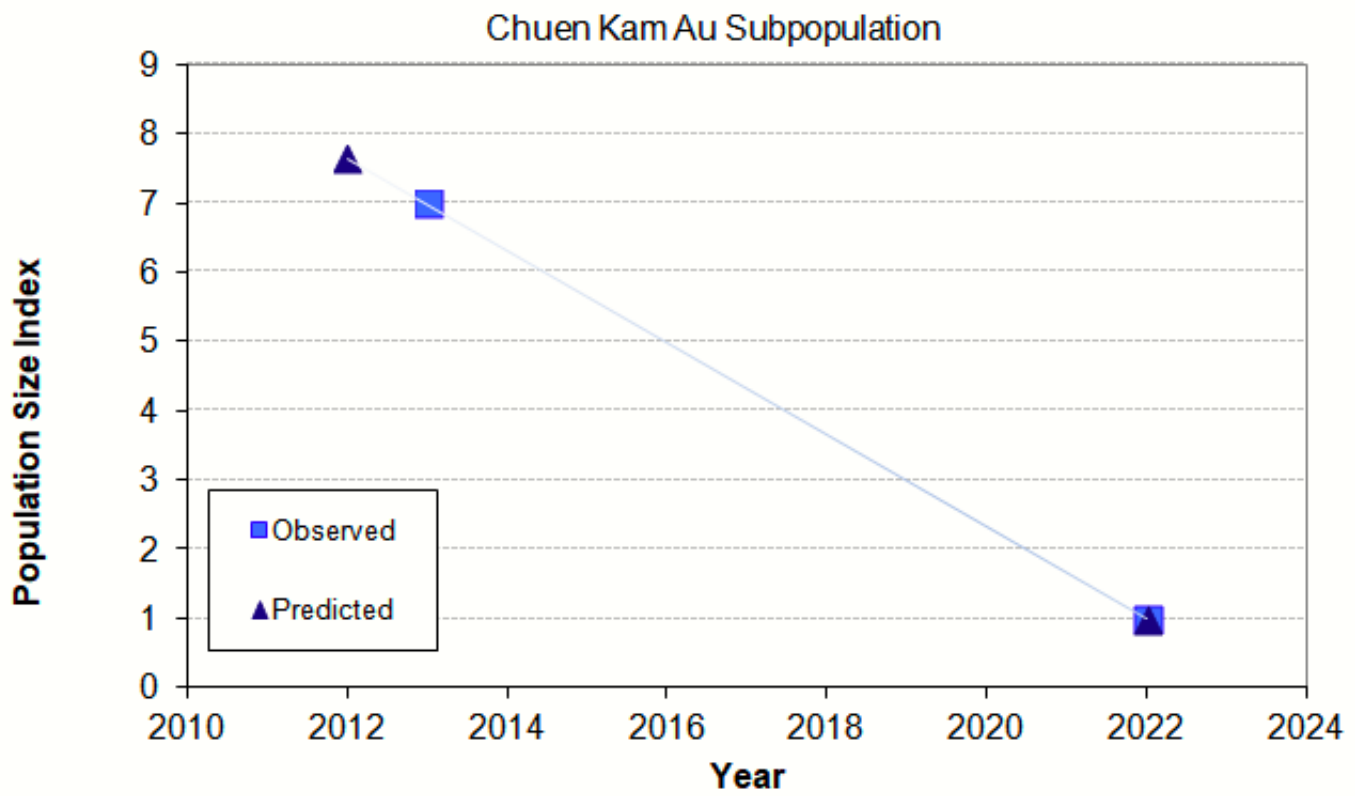


Figure 2. 10-year reduction *Rhagophthalmus hiemalis*, with linear assumption.