SHORT COMMUNICATION

Hong Kong dragonflies: Key species and sites

Graham T. Reels

Email: gtreels@gmail.com

Key words: Hong Kong, Odonata, distribution status, key dragonfly sites, conservation significance, species assessment metric

Dragonflies were surveyed at 33 sites across the territory of Hong Kong Special Administrative Region over the period 2016-2017. Surveys included identification of larvae, exuviae and adults, and involved 92 separate site visits. The chosen sites covered the whole spectrum of dragonfly habitats in Hong Kong, with the exception of actively managed fish ponds and reservoirs. Twenty-two of the study locations had been identified as key dragonfly sites by Wilson (1997). An annotated check list of Hong Kong Odonata was compiled, listing 128 taxa. Comparison of local distribution of dragonflies during this study with that recorded by Wilson (1997) indicated that only three species had undergone significant decline in the intervening two decades, while several others (including the conservation-significant *Mortonagrion hirosei* Asahina, 1972 and *Orthetrum poecilops* Ris, 1919) had considerably extended local distributions. Twenty-eight species of particular conservation importance for Hong Kong were identified and ranked, using a species conservation value assessment metric. The data from surveys conducted by Reels were occasionally augmented with species records made by private individuals during the survey period (taken as the calendar years 2016 and 2017), where those particular species were not observed by the principal researcher. Nevertheless, some 27 taxa on the Hong Kong check list were not recorded during the study, including the 14 that are presumed locally extinct, vagrants, or of uncertain status, and two confirmed species, *Stylurus clathratus* and *Indothemis carnatica*, that were not known from Hong Kong until after 2017 (AFCD, 2019; Wilson, 2019).

Eight of Wilson's key dragonfly sites were found to no longer merit such status. Fourteen of the original "key dragonfly sites" were reconfirmed; two of these were expanded to include adjacent dragonfly-rich areas, and four new key dragonfly sites were proposed. Sites were evaluated by species richness, number of species of conservation importance, and by means of a species conservation value metric applied to the entire dragonfly species assemblage present at each site. By all such measures, Sha Lo Tung / Hok Tau was determined to be Hong Kong's premier dragonfly site.

The work was reported in detail in Reels (2019) and Reels (2020). A summary of key findings is given in Table 1.

Wilson and Reels (1999) proposed a metric for using dragonflies in wetland evaluation in tropical southern China. This was subsequently used by Reels (2013) to compare a range of sites across southeastern China. The metric assigns an aggregate value to each dragonfly species on the basis of a number of point-scoring categories (these can then be tallied up species by species to give an aggregate score for a particular site). A modified version of the metric was adopted in this study, to make it appropriate to the Hong Kong context.

Species-richness is only one measure of a dragonfly site's importance. A perhaps more informative measure is provided by use of a species conservation value metric. This combines crude species richness with an objective evaluation of aggregate conservation importance of a site's dragonfly community. The metric used in this study clearly identified Sha Lo Tung / Hok Tau as containing by far the most important dragonfly assemblage in Hong Kong.

ACKNOWLEDGMENTS

The study was funded by the School of Biological Sciences of the University of Hong Kong. The author wishes to thank Professor David Dudgeon for providing him with the opportunity to undertake this study. Mr Keith Wilson provided an update on the condition of Kau Sai Chau pond and other useful information. Ms Lily Ng gave logistical support for field and laboratory work. Mr Ken So provided useful references and a great deal of information on recent important dragonfly records in Hong Kong. Ms Kin Keibun gave occasional assistance in the field. The author thanks Bill Ho, Tommy Hui, Mahler Ka, Bergman Ng and Edmond Sham for allowing use of some of their recent (2016-2017) important dragonfly records.

REFERENCES

AFCD, 2019. New dragonfly record to Hong Kong: *Indothemis carnatica* (Fabricius, 1798). Available from https://www.afcd.gov.hk/english/conservation/hkbiodiversity/news/20180411.html?fbclid=IwAR1xdQnKFqyt5ZObIncnDjPs-OUn2AmFy546f06Uuo7VxyFoE077QzH_ELw, accessed on 6 April 2021.

Bybee, S., Kalkman, V.J., Erickson, R.J., Frandsen, P.B., Breinholt, J.W., Suvorov, A., Dijkstra, K-D.B., Cordero-Rivera, A., Skevington, J.H., Abbott, J.C., Herrera, M.S., Lemmon, A.R., Lemmon, E.M. and Ware, J.L., 2021. Phylogeny and classification of Odonata using targeted genomics. *Molecular Phylogenetics and Evolution* 160: 107-115.

Moore, N.W., 1997. *Dragonflies - Status Survey and*

Conservation Action Plan. Gland, Switzerland and Cambridge, U.K., IUCN/SSC Odonata Specialist Group, IUCN. 28pp.

Reels, G.T., 2013. Assessment of Dragonflies (Odonata). In: *Biodiversity and Conservation of Hainan Yinggeling Nature Reserve*. Kadoorie Conservation China and Hainan Wildlife Conservation Bureau: 373-393.

Reels, G.T., 2018. Hong Kong dragonflies of conservation importance. *Agrion* 22(2): 72-75.

Reels, G.T., 2019. An annotated check list of Hong Kong dragonflies and assessment of their local conservation significance. J*ournal of the International Dragonfly Fund. Faunistic Studies in South-east Asian and Pacific Island Odonata* 30: 1-49. Available from https://atratothemis.com/////////wp-content/uploads/2020/02/jidf2019.pdf, accessed on 6 April 2021.

Reels, G.T., 2020. A ranking of key dragonfly sites in Hong Kong using a species conservation value assessment metric. *Journal of the International Dragonfly Fund. Faunistic Studies in South-east Asian and Pacific Island Odonata* 31: 1-50. Available from https://atratothemis.com/////////wp-content/uploads/2020/02/jidf2020.pdf, accessed on 6 April 2021.

Wilson, K.D.P., 1997. An annotated checklist of Hong Kong dragonflies with recommendations for their conservation. *Memoirs of the Hong Kong Natural History Society* 21: 1-68.

Wilson, K.D.P., 2019. The genus *Stylurus* and resolution of *Stylurus annulatus* (Odonata: Gomphidae) and its close allies in Asia. *Agrion* 23(1): 4-14.

Wilson, K.D.P. and Reels, G.T., 1999. *Dragonflies as Indicators of Wetland Biodiversity in Tropical China*. Conference presentation. International Congress of Odonatology and First Symposium of the Worldwide Dragonfly Association, Colgate University, 11-16 July 1999.

Zhang, H., 2019. *Dragonflies and Damselflies of China*. Chongqing University Press, Chongqing. 1460pp.

TABLES

Species	Remarks
Lestes nodalis	Highly restricted in Hong Kong (three known sites; one unconfirmed in present study).
Drepanosticta hongkongensis	Originally described from Hong Kong. Globally restricted to southeastern China.
Protosticta beaumonti	Male originally described from Hong Kong. Globally restricted to southeastern China. Sparsely distributed in Hong Kong.
Protosticta taipokauensis	Originally described from Hong Kong. Sparsely distributed in Hong Kong.
Sinosticta ogatai	Priority species (Moore, 1997): taxonomically isolated. Originally described from Hong Kong. Globally restricted to southeastern China. Near-endemic to Hong Kong. Sparsely distributed in Hong Kong.
Rhipidolestes janetae	Priority species (Moore, 1997): taxonomically isolated. Originally described from Hong Kong. Globally restricted to southeastern China. Sparsely distributed in Hong Kong.
Philoganga vetusta	Priority species (Moore, 1997): taxonomically isolated.
Calicnemia sinensis	Globally restricted to southeastern China. Sparsely distributed in Hong Kong.
Onychargia atrocyana	Priority species (Moore, 1997): taxonomically isolated.
Aciagrion approximans	Highly restricted in Hong Kong (two known sites; one unconfirmed in present study).
Agriocnemis lacteola	Highly restricted in Hong Kong (one known site).
Mortonagrion hirosei	Near Threatened (IUCN). Priority species (Moore, 1997): unusual biology.
Cephalaeschna klotsae	Data Deficient (IUCN). Highly restricted in Hong Kong (one known site). Globally restricted to southeastern China and Hubei province.
Planaeschna skiaperipola	Globally restricted to southeastern China. Highly restricted in Hong Kong (one known site).
Asiagomphus hainanensis	Globally restricted to southeastern China.
Fukienogomphus choifongae	Originally described from Hong Kong. Globally restricted to southeastern China. Highly restricted in Hong Kong (one known site).
Gomphidia kelloggi	Endangered (IUCN). Globally restricted to southeastern China. Highly restricted in Hong Kong (two known sites, contiguous).
Lamelligomphus hainanensis	Globally restricted to southeastern China.
Leptogomphus hongkongensis	Originally described from Hong Kong. Not recorded from elsewhere in China. Known from one locality in Laos.
Melligomphus guangdongensis	Globally restricted to southeastern China. Sparsely distributed in Hong Kong.
Ophiogomphus sinicus	Data Deficient (IUCN). Globally restricted to southeastern China. Sparsely distributed in Hong Kong.
Sieboldius alexanderi	Data Deficient (IUCN). Globally restricted to southeastern China and Hubei province.
Anotogaster sp. cf *klossi*	Breeding confirmed at one site.
Idionyx claudia	Globally restricted to southeastern China and Yunnan province. Highly restricted in Hong Kong (one known site).
Macromidia ellenae	Originally described from Hong Kong. Globally restricted to southeastern China. Sparsely distributed in Hong Kong.
Macromia katae	Vulnerable (IUCN). Originally described from Hong Kong.
Onychothemis testacea	Priority species (Moore, 1997): taxonomically isolated. Sparsely distributed in Hong Kong.
Orthetrum poecilops	Vulnerable (IUCN). Priority species (Moore, 1997): unusual biology.

Table 1. Dragonfly species of conservation interest recorded from Hong Kong [revised and updated from Reels (2018, 2019) with reference to Zhang (2019) and Bybee et al. (2021)]

Rank	Species	Score
1=	*Rhipidolestes janetae* *Fukienogomphus choifongae* *Gomphidia kelloggi*	55
4=	*Sinosticta ogatai* *Planaeschna skiaperipola*	45
6	*Cephalaeschna klotsae*	40
7=	*Idionyx claudia* *Orthetrum poecilops*	35
9=	*Leptogomphus hongkongensis* *Ophiogomphus sinicus* *Macromia katae*	30
12=	*Philoganga vetusta* *Calicnemia sinensis* *Aciagrion approximans* *Agriocnemis lacteola* *Melligomphus guangdongensis* *Anotogaster* sp. cf *klossi*	25
18=	*Drepanosticta hongkongensis* *Protosticta beaumonti* *Mortonagrion hirosei* *Asiagomphus hainanensis* *Lamelligomphus hainanensis* *Macromidia ellenae*	20
24=	*Lestes nodalis* *Protosticta taipokauensis* *Onychargia atrocyana* *Sieboldius alexanderi* *Onychothemis testacea*	15

Table 2. Metric ranking of Hong Kong dragonfly species by conservation value. Full details of metric in Reels (2019).

Rank	Site	Score
1	Sha Lo Tung/Hok Tau	451
2	Hok Tau	347
3	Sha Lo Tung	337
4	Tai Po Kau	276
5	Ng Tung Chai	270
6	Wu Kau Tang	254
7	Tai Mo Shan South	246
8	Sunset Peak	205
9	Luk Keng/Kai Kung Shue Ha composite sites	175
10	Sham Tseng Stream	168
11	Tai Tong Stream	136
12	Luk Keng	130
13	Tan Shan River	123
14	Upstream Tai Lam Reservoir	106
15=	Keung Shan Man Uk Pin	100
17	Kuk Po	99
18	Yung Shue O	93
19	Nam Chung	90
20	Tai Shui Hang	84
21	Kai Kuk Shue Ha	71
22	Shuen Wan	70
23	Hang Cho Stream	67
24	Ma Tso Lung	51
25	She Shan Stream	44
26=	Lung Tsai Ng Yuen Double Island	39
28=	Sheung Tsat Muk Kiu Hong Kong Wetland Park	30
30	Yuen Leng Chai	29
31	Kang Mun Tsui	23
32	Pat Sin Leng Site 2	18
33=	Pat Sin Leng Site 1 Lamma Pond	8
35	Nam Sang Wai	6

Table 3. Metric ranking of Hong Kong dragonfly sites by conservation value. Full site details in Reels (2020).