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Hong Kong Firefly Survey Report 2020-2021

Yiu Vor

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

Email: yuuvor@hkentsoc.org

ABSTRACT

Hong Kong Firefly Survey Team was established in 2020 July. 34 members from the public were recruited. After intensive lectures and field trainings, members did the surveys in 4 different modes - looking for unknowns, clarifying the range of restricted species, monitoring population trend of restricted species and surveying new sites. Totally, 210 surveys were done from 2020 December to 2021 June, involving 23 separated sites, and total distance of survey is about 432km. One targeted unknown was found, new location records of various species were added. Population of two restricted species was found to have significant reduction. Two probably undescribed firefly species were found. Establishment of Firefly Survey Team is found to be an effective way to diffuse knowledge and interest on fireflies to the public. It also brings more people to work for firefly conservation and research. Other possibilities are proposed.

Key words: Lampyridae, firefly surveys, Hong Kong

INTRODUCTION

Firefly diversity in Hong Kong is surprisingly high, 29 species have been reported, of which 9 species are endemic to Hong Kong (Yiu, 2017). However, distribution and population data are deficient for all the 29 species, resulting from insufficient surveying efforts. According to the map showing the location of visited sites in Hong Kong and frequency of visits for firefly survey from 2009 to 2020 by Yiu (2020), the following deficiency are noticed:

1. east, west and north New Territories were less visited;
2. except the 2 largest islands - Lantau Island and Hong Kong Island, all other Islands were not studied yet;
3. comparatively less sites on Lantau Island and Hong Kong Island had been explored;
4. very few surveys had been done in urban and sub-urban areas, as well as in villages in the New Territories, and;
5. frequency of visits to most sites is inadequate

On the other hand, the very high human population density in Hong Kong are causing various threats to the survival of these curious living organisms. Examples are habitat loss, habitat degradation, land pollution and light pollution.

The missions of the Hong Kong Firefly Survey Team are:

1. for conservation purpose, conduct persistent and systematic surveys on Hong Kong fireflies;
2. to bring together people involved in firefly conservation and research to exchange knowledge;
3. for advancement and diffusion of knowledge in Hong Kong fireflies;

Open recruitment was announced on a specific website: <http://hkentsoc.org/hongkongfireflysurvey/>, on the Hong Kong Entomological Society Facebook Page, on the HKWildlife.net Facebook Group as well as the on the HKWildlife.net Forum. After three weeks of recruitment, 38 applications were received. Applicants were selected according to their education background, physical fitness, night hiking ability and experience, photography and videography skills. 34 members were finally accepted (Fig. 1).

Members were required to pay HK\$2000 (HK\$1800 for Hong Kong Entomological Society Member) and HK\$1600 will be refunded to members who have fulfilled all of the following commitments:

1. 100% attendance to lectures;
2. at least 60% attendance to practical trainings;
3. at least 5 additional field surveys done;
4. at least 50% attendance to meetings.

Four lectures on firefly biology, firefly ecology, firefly morphology and anatomy, firefly classification, firefly identification, firefly survey methods, skills and safety; were conducted on: July 4 2020 (Sat) 19:00 - 21:00; July 8 2020 (Wed) 19:00 - 21:00; July 15 2020 (Wed) 19:00 - 21:00; July 22 2020 (Wed) 19:00 - 21:00. The last two lectures were conducted online owing to the legal restriction on social gathering during the outbreak of COVID-19. At the end of the final lecture, members were required to attend an online test, passing grade is 20/35.

Practical training were conducted in the following dates and places, for different observation targets:

August 1, 2020 (Sat) 19:00 - 22:00, Sze Lok Yuen, for *Lamprigera taimoshana* larvae, *Pygoluciola qingyu* adults and larvae and *Diaphanes lampyroides* larvae;

August 8, 2020 (Sat) 19:00 - 22:00, Sha Lo Tung, for *Absocondita terminalis* adults;

August 22, 2020 (Sat) 19:00 - 22:00, Fung Lok Wai, for *Pteroptyx maipo* adults and *Pyrocoelia analis* adults;

October 24, 2020 (Sat) 18:00 - 21:00, Tai Po Kau Nature

Reserve, for *Diaphanes citrinus* adults and *Pyrocoelia lunata* adults;

November 14 (Sat) 2020 18:00 - 21:00, Tai Mo Shan, for *Lamprigera taimoshana* adults, *Pyrocoelia lunata* adults;

December 12 (Sat) 2021 18:00 - 21:00, Ng Tung Chai, for *Diaphanes lampyroides* adults.

Due to the legal restriction on social gathering during the outbreak of COVID-19. The trainer (Yiu) prepared a 20-30 minutes video for each field site. The video introduces safety precautions, clothing, lighting equipment, observation points, observation skills, features and behaviour of the target species, the habitat and different surveying skills. Individual team members went to the field sites separately. Team members were required to use a GPS logging device – smart phone or sport smart watch, to log the route they have gone through and then submit the record to the trainer. They were required to walk along the designated routes not less than 1km for not less than 1 hour, to check for fireflies. All sighting records, as well as photo and video records were required to be submitted to the trainer.

After the training lectures and practical trainings, team members attended an online meeting on arrangement of the coming firefly surveys and firefly survey methods.

MATERIALS & METHODS

Trained members of the Hong Kong Firefly Survey Team were arranged to do surveys in small groups of 2-3 persons. For every survey site, the route map, requirements, methods, location of observation points and a short video showing the site and route were provided to the members beforehand. Each survey should last for 60 minutes or more. After each survey, members were required to fill in an online Firefly Survey Record Form.

There are four different modes of survey to be done from December 2020 to June 2021:

Survey mode 1- Looking for unknowns. Members were required to walk along designated routes in a slow pace – not faster than 2km/h, and check for the targets. The routes are more or less 2 km long.

1a. *Diplocladon atripennis* female, which is wingless, much larger than the male, displays spectacular 33 light spots (Li, 2008). Surveys were done in Tai Po Kau and Ng Tung Chai where male adults had been recorded. 22 members participated, and 16 surveys were done in Tai Po Kau and 26 surveys were done in Ng Tung Chai; from April 10 to May, 30, 2021.

1b. *Stenocladus* sp. female. The female of *Stenocladus bicoloripes* is known to be wingless and display weak green light from the whole body (Yiu, 2017). Surveys were done in Tai Po Kau and Tai Tong, where

Stenocladus sp. male was recorded a number of times. 20 members participated, and 11 surveys were done in Ng Tung Chai and 19 surveys were done in Tai Po Kau, from April to May, 2021.

Survey mode 2 - Clarifying the range of restricted species. Members were required to walk along designated routes in a slow pace – not faster than 2km/h, and check for the target species. The routes are from 2 km to 4 km long.

2a. *Rhagophthalmus hiemalis*. 13 sites with similar land features and vegetation as the sites with records of the species were selected, namely Tai Tong Nature Trail, Tsing Yi Nature Trail, Robin's Nest, Cloudy Hill North, Cloudy Hill South, Lan Nai Wan, Shui Long Wo, Sha Tin Pass, Black's Link, Mount Parker, Pak Mong, Fat Mun Ancient Path, Mui Wo. 23 members participated and 45 surveys were done from late December to Early March, 2021.

2b. *Oculogryphus chenghoiyanae*, 3 different routes with similar land features and vegetation as the sites with records of the species were selected, namely Tei Tong Tsai Country Trail, Wong Lung Hang Country Trail, Nei Lak Shan Country Trail. 7 members participated and 11 surveys were done in May, 2021.

Survey mode 3 - Monitoring population trend of restricted species. Members were required to walk along designated routes in a slow pace – not faster than 2km/h, check every encountered light spots and count the number of the target species found along the two sides of the routes – transect count. The routes are from more or less 2 km long. Similar counting was done along the same routes in previous years.

3a. *Oculogryphus chenghoiyanae*, surveys were done along a footpath in Tei Tong Tsai. 15 members participated, 17 surveys were done in May, 2021.

3b. *Rhagophthalmus hiemalis*, surveys were done along a foot path in Lin Fa Shan (MacLehose Trail Section 9). 17 members participated and 31 surveys were done from late December, 2020 to February, 2021.

Survey mode 4 - Surveying new sites - Smaller Islands. Members were required to visit selected small Islands. Four members participated and 7 survey were done in Cheung Chau, Peng Chau and Sharp Island in May, 2021.

RESULTS

Survey results

Survey mode 1a - Looking for *Diplocladon atripennis* female.

Both male and female adult was not found.

Survey mode 1b. Looking for *Stenocladus* sp. female.

A mating pair of the *Stenocladus* sp. was photographed by a team member Fung Chun Sang at night, on April 14, 2021 in Tai Po Kau (Fig. 2). A larviform firefly recorded in Kuk Po, at 20:10, on May 30, 2013 (Fig. 3) has the same external features with the record by Fung, 2021. Body length approximately 10mm in resting position, compressed, tapering gradually anteriorly, widest at the 2nd to 6th abdominal segments which are almost identical, 7th abdominal segment slightly narrower, 8th abdominal segment broadly tapering posteriorly. All tergites not heavily sclerotized and are not explanate. Whitish in colour as a whole. Each thoracic tergite bears a large pair of brownish black trapezoidal markings which are narrowly separated in the middle. The 1st and 2nd abdominal tergite have similar markings, but colour at the interior and posterior part is diffused and leaving a pair of more or less triangle markings. The markings on the 3rd to 6th abdominal tergite are even more diffused and the colour is brown. On the 7th abdominal tergite, the markings become a pair of blur, light brownish, widely separated. The 8th abdominal tergite has a large reddish brown marking in the middle. Light spots were observed, but there is no clear record of one or two pairs of light spots. The phenomenon of whole body of the female glows weakly, as in *Stenocladus bicoloripes*, is not recorded.

Survey mode 2a - Clarifying the range of *Rhagophthalmus hiemalis*

A new location record of was discovered. 3 female adults of *Rhagophthalmus hiemalis* were recorded by team members Lau Chin Fan and Li Man Yi in Shatin Pass, at around 20:00 on January 17, 2021.

Survey mode 2b. - Clarifying the range of *Oculogryphus chenghoiyanae*

In all the 11 surveys, neither female nor male adult was recorded.

Survey mode 3a - Monitoring population trend of *Oculogryphus chenghoiyanae*.

Amongst the 17 surveys done in May, 2021, female adults were recorded in only 4 surveys, highest number was three and lowest was one. Comparing with the data recorded from 2014 to 2020 (Fig. 4), there is a significant drop of 80% for the population of female *Oculogryphus chenghoiyanae* in the past 7 years.

Survey mode 3b - Monitoring population trend of *Rhagophthalmus hiemalis*.

Average number of female adults recorded from the surveys done from late December, 2020 to February, 2021, is 0.65. Compared with the data from December 2012 to January 2014, a reduction rate of 88% is detected (Yiu, 2021).

Survey mode 4 - Surveying new sites - Smaller Islands.

No firefly was detected.

Other findings

1. *Stenocladus bicoloripes* was recorded in Lung Fu Shan and Pokfulam, Hong Kong Island, both are new location record.

2. *Pyrocoelia lunata* was recorded in Lung Fu Shan and Pokfulam, Hong Kong Island, both are new location record.

3. A *Lamprigera taimoshana* was predated by a harvestmen near Sze Lok Yuen, Tai Mo Shan. This is the first predation record of *L. taimoshana*, observed by Fong Ka Po on November 17, 2020, around 19:50.

4. A *Luciola* nr. *nicolleti* was recorded on May 15, in Ng Tung Chai – a new flight period record. Previously only known to fly between late February to early April.

5. Around 10 *Aquatica leii* were recorded on April 6 and April 15, 2021 by Poon Lai Ngo Celia in Wong Yue Tan, Tai Po, a new location record.

6. A *Vesta sinuata* was recorded on March 11 by Poon Lai Ngo Celia in Tai Po Kau Nature Reserve, a new location record.

7. *Rhagophthalmus motschulskyi* was recorded on April 17 by Poon Lai Ngo Celia in Wu Kau Tang, a new location record.

8. *Rhagophthalmus motschulskyi* was recorded on March 27 and March 31 in Mui Wo, the first record in Lantau Island.

9. Two probably undescribed firefly species were found.

Totally, 210 surveys were done from 2020 December to 2021 June, involving 23 separated sites, and total distance of survey is about 432km.

Further work

Hong Kong Firefly Redlisting Working Group was established in July, 2021, with 7 members coming from the Firefly Survey Team. The working group has started doing assessment of local firefly species and going to submit the assessments to IUCN Red List Authority.

DISCUSSION

Joining the Firefly Survey Team is a whole year commitment. Even under the strict legal requirements on social distancing, all the training events were successfully run and all the 34 teams members completed the trainings and passed the exam. For the firefly surveys, each members are required to do 5 or more surveys. At the end, only 2 persons were unable to fulfil the requirement. Number of surveys per head is $210/34 = 6.2$. The highest number of surveys done by

one person is 13.

Providing intensive trainings and assigning survey work is an effective way to diffuse knowledge and interest on fireflies to the public. It also brings more people to work for firefly conservation and research. The survey team has contributed substantial survey efforts for our better understanding of Hong Kong Fireflies.

The Hong Kong Firefly Survey Team should continue. Actually the Team 2021-22 was established in July 2021. In terms of the format, a number of questions are worth considering:

1. Should the survey formats and targets be more diversified or more focused?
2. Should the survey team last longer, for example 2 years?
3. Could the survey be done in ad-Hoc or task force format? A group of people trained for a specific survey purpose, for example transect count of a particular species. The commitment is less and last for a shorter period of time, but more focused and specialized on a target.

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FIGURES



Figure 1. The Hong Kong Firefly survey Team 2020-2021. Photo by author.



Figure 2. A mating pair of *Stenocladus* sp. Photo by Fung Chun-Sang.



Figure 3. Female *Stenocladus* sp. Photo by author.

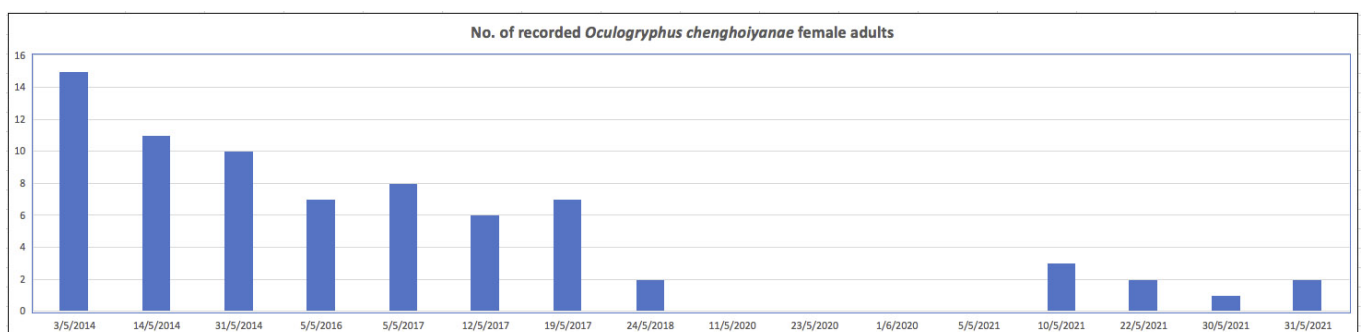


Figure 4. Number of recorded *Oculogryphus chenghoiyanae* female adults from 2014 to 2021.

What can be found from the observation records of Hong Kong Odonata over the past decade? (Part 2)

Kelvin Wu Ka-Lun

Tsuen Wan, N.T., Hong Kong.

Email: kelvinklwu@gmail.com

ABSTRACT

The author's observation records of Hong Kong Odonata adults between 2011 and 2020 are reviewed. Sites and dates of the records of 111 species are summarized. It shows that, in general, the flight periods of most lotic species occur between April and June, while those for the lentic species are more spread out from April to November. Conservation importance of the 109 sites visited are evaluated following the assessment metric in Reels (2020). Sha Lo Tung is the top-ranked site, outscoring the more species-rich sites at Luk Keng, Hok Tau and Sham Tseng. Temporal and spatial distribution of local Zygoptera is discussed, with brief accounts on several restrictedly distributed species.

Key words: Odonata, Zygoptera, Assessment Metric, Hong Kong

INTRODUCTION

Part 1 of this article described the 13 new Hong Kong Odonata species records after 2011. In Part 2, the author's observation records of all adult Odonata species between 2011 and 2020 are discussed, particularly on their spatial and temporal distribution, with brief accounts on local damselfly species (suborder Zygoptera). Discussion on the remaining dragonflies (suborder Epiprocta) will be covered in Part 3, which will also discuss the new Odonata species records since publication of Part 1 and suggestions for citizen Odonata survey.

MATERIALS & METHODS

The author's photographic records of adult Odonata from 2011 to 2020 are summarized. Field observation records between 2017 and 2020 are supplemented to the data set. Only records that can be identified to species level are included, except two Gomphidae species which will be explained in Part 3, while doubtful sightings of closely resembling species are discarded.

Each entry of record contains the date, the site and the scientific name of each species observed. Only a single entry is put into the data set if there are more than one individual of that particular species occur at the same site on the same date. Sightings of the same species at the same site on a different date or that on the same date at a different site are treated as separate records. Details about gender, behaviour (e.g. mating, flying in tandem, oviposition) and (in more recent entries) the approximate number of individuals are remarked for

each record, but these are not analyzed in the present study.

It should be noted that particulars of the visits (e.g. the choice of sites, duration and frequency each year with respect to dry / wet seasons) were not chosen following commonly adopted methods for scientific study. Sampling effort between months or sites is not directly comparable, yet this does not affect the discussion in this article.

RESULTS

A total of 3,444 Hong Kong Odonata observation records from 2011 to 2020 are reviewed. These encompass 111 species, including 32 for Zygoptera and 79 for Epiprocta. Records were taken during 552 visits to 109 sites over the territory. Figure 1 shows the locations of these sites, which are grouped according to their geographical location.

The total number of species recorded by month over the past decade is illustrated in Figure 2. These data show that the flight periods of Odonata adults are highly seasonal. Most species are on the wing from late spring to early autumn. During the winter months (December to February) only few species would still be active as adults. Emergence starts to bloom in April, with the peak numbers of recorded species in June and July.

It should be noted that since the current review is largely based on photographic records, data on visits that yielded no Odonata record are not included. The flight period information here provides an insight rather than a vigorous investigation result.

The ten most species-rich sites and the species recorded are listed in Appendix 1. Species checklist follows Ka (2021), except that *Asiagomphus* spp. records are not distinguished (to be explained in Part 3) and the unidentified *Sympetrum* sp. is discarded. Over 40 species are recorded in five of these sites. It is worth noting that there is no direct relationship between the number of visits and species richness of the sites. Five of the top ten sites are located in New Territories North.

DISCUSSION

Site conservation value assessment

Reels (2020) considered that species richness alone does not fully reflect the conservation importance of an Odonata site, and adopted an assessment metric proposed by Wilson and Reels in an unpublished

proceeding in 1999 for evaluating the conservation values of major sites. Each species is allocated a score based on their distribution, biology, population trend etc. For each site, a total score is given by adding up the scores of each species that is recorded there. Species scores listed in Reels (2019) are adopted in the current study. For newly recorded but regularly seen species (e.g. *Gynacantha ryukyuensis* and *Indothemis carnatica*), a conservative score of 1 is adopted, pending further review of the scoring criteria. A short discussion on the species scores will be included in Part 3.

Scores of the top ten sites are listed in Appendix 2. Sha Lo Tung receives the highest score despite ranking fourth in species richness, mainly due to the numerous Gomphidae species that can be found there. Many of the Hong Kong gomphid species are with more than half of their distribution range inside southeast China according to Reels (2019). The most species-rich site, Hok Tau, ranks second. Their scores well exceed lower ranked sites. This generally aligns with the assessment in Reels (2020), in which the combined Sha Lo Tung / Hok Tau site ranked first, implying the high conservation value under this assessment metric. While Luk Keng ranks second in species richness, its score ranks fourth, partly due to the vast number of common Libellulidae species in lowland area.

Temporal and spatial distribution of Zygoptera species in Hong Kong

Tam et al. (2011) listed 37 species of Zygoptera species that occur in Hong Kong, four of which are said to be historical records, namely *Euphaea opaca*, *Ischnura asiatica*, *Ischnura rufostigma* and *Paracercion hieroglyphicum* and not seen in recent years. While *Lestes praemorsus* (nominate subspecies *L. p. praemorsus*) has not been classified as historical, only photos from Singapore showing another subspecies *L. p. decipiens* were included, and according to enthusiasts this species has not been recorded in the past decade either. The author's record of 32 species over the past decade generally aligns with Tam et al (2011). A single male *Ischnura rufostigma* was collected in New Territories West on 20 March 2020 (AFCD, 2020) (Fig. 10), and whether the population has been re-established in Hong Kong remains unknown.

Appendix 3 illustrates the number of Zygoptera species recorded in each month. Most of the species start to emerge in April, which is also the peak number of species recorded among the months. Species richness decreases from above 20 during summer months to around 15 to 17 during late summer and autumn months from September to November. Very few species are on the wing during winter and there is no record in January.

In Appendix 3, the 32 Zygoptera species are roughly divided into lentic species (slow flowing streams, ponds and swamps, mostly in lowland areas) and lotic species (fast flowing streams or seepages, mostly in upland wooded areas) according to their occurring habitats.

There is no strict definition for and boundary between each grouping, and some species may occur in both types of habitats.

Following this classification, it can be seen from Appendix 3 that lotic species richness peaks in April and May, and drops rapidly after June. This is particularly the case for the two species of Rhipidolestidae and four species of Platystictidae (Fig. 3) which are only recorded from late spring to middle summer. Their short flight period may also account for their late discovery compared with other Hong Kong species: five of these six species were first described from Hong Kong specimens in 1987 (*Prosticta taipokauensis*) and between 1996 and 1997 (*Rhipidolestes janetae*, *Drepanosticta hongkongensis*, *Prosticta beaumonti* and *Sinosticta ogatai*). Lentic species richness, on the other hand, remains above 10 from April to November and generally increases towards late summer.

The five most species-rich sites for Odonata are also the ones which are most species-rich for Zygoptera. Tan Shan River, ranked 8th for overall Odonata species richness, tied with Sha Lo Tung and Wu Kau Tang at the 4th place in terms of Zygoptera richness. It is a lowland, gentle gradient stream, a habitat which has been disappearing in Hong Kong over the past two to three decades due to urban development and flood prevention works.

The top five species ranked according to the number of sites recorded are *Euphaea decorata* (31 sites), *Ceriagrion auranticum* (31 sites), *Heliocypha perforata* (23 sites), *Prodasineura autumnalis* (23 sites) and *Copera marginipes* (19 sites). Although the two top ranked species, *E. decorata* and *C. auranticum* (Fig. 3), are recorded at the same number of sites, there is difference in the distribution of records by month, with most records of *E. decorata* concentrate between May and August, while those for *C. auranticum* spread out evenly between May and October.

Six species are recorded at two or less sites (status defined in Tam et al. (2011) as "Rare"). Those recorded in two sites are *Lestes nodalis*, *Aciagrion approximans* and *Mortonagrion hirosei*. Other than *L. nodalis*, there are other known sites for the other two species by various observers over the past decade. Three species are recorded at only one site, namely *Agriocnemis lacteola*, *Pseudagrion spencei* and *Prosticta beaumonti*. Brief accounts on the observation records of these six species are given below.

Lestes nodalis (Fig. 5): This is the only remaining Lestidae species regularly seen in Hong Kong in the past decade, usually recorded in Pat Sin Leng and Ha Miu Tin in early spring (February to April in the current data set. Sightings in May in former years). They inhabit seasonal marshes which may become dry during spring time. Females oviposit by piercing the stems of nearby vegetation.

Aciagrion approximans (Fig. 6): Formerly referred to as *Aciagrion tillyardi* in Hong Kong Odonata literatures. This name is now considered as a synonym of *A. approximans* following a review by Kosterin, Constant and Wilson (2014). Tam et al. (2011) mentioned its occurrence at a single location (Pat Sin Leng) with a flight period from May to October, and classified its status as “rare” locally. Enthusiasts found that established communities exist at various streams in the Castle Peak area (pers. comm.). A female was sighted by the author at Cheung Sheung on 12.X.2013. Its distribution at the extreme west and east sides of the New Territories implies that the species may be more common than previously thought, but adults’ life may be cryptic and they readily escape when disturbed according to Tam et al. (2011).

Mortonagrion hirosei (Fig. 7): The author recorded this species in April, August, October and November at two sites in New Territories North, a longer flight period than that stated in Tam et al. (2011). It is known to occur regularly in many other mangrove sites in, for example, Mai Po, Ma On Shan and Lantau Island. Being classified as a vulnerable species by IUCN, this species is found in few places outside Hong Kong, including Guangdong (Zhang, 2018), Taiwan and Japan.

Agriocnemis lacteola (Fig. 8): Over the past decade, this species is only recorded at Cheung Sheung. It was observed to occur in abundance in late summer / early autumn in abandoned paddies, which are also inhabited by vast amount of leeches. It was known from indigenous residents that no pesticide was applied to these paddies, which may further explain the thriving of the species’ remaining community in Hong Kong.

Pseudagrion spencei (Fig. 9): There was only a single sighting of a male in November 2011 at Tan Shan River in the past ten years. Earlier on there were occasional records by others in 2008 and 2009 in Sai Kung and Wu Kau Tang respectively (M Y Lai and Vivi Chan, pers comm.). It is unknown whether this species has become locally extinct, or overlooked due to its small size or close resemblance to *Pseudagrion microcephalum* or *Paracercion melanotum*.

Protosticta beaumonti: It was only recorded in Tei Tong Tsai by the author, but is known to consistently occur at other sites on Hong Kong Island and Lantau Island. Up to now there is no record from the New Territories mainland.

Some species, although recorded at a number of sites, appear to have only restricted distribution in the New Territories. For example, both *Rhipidolestes janetae* and *Calicnemia sinensis* are only recorded at New Territories Central sites but not others, while they can be found on the two biggest islands to the south (Lantau Island for both species and Hong Kong Island for *C. sinensis*). The reason behind so requires further investigation.

The current set of data only records the occurrence of

a particular species at a particular site on a particular date. Abundance of each species during each observation event has not been taken into account. Although restrictedly distributed species occur at only a few localities (e.g. *Aciagrion approximans*, *Agriocnemis lacteola*), vast number of individuals can be found at particular periods of time every year. On the other hand, some other widespread and large species, e.g. *Philaganga vestusta* and *Pseudagrion pruinosum*, are never seen to have more than three or four individuals in a locality at the same time. It is not sure whether it is related to their higher ability of dispersal owing to their size.

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TABLES , FIGURES & APPENDICES

Top 10 sites by species richness		Top 10 sites by assessment metric	
Site	No. of species	Site	Score
Hok Tau	63	Sha Lo Tung	422
Luk Keng	60	Hok Tau	400
Sham Tseng	56	Shing Mun	329
Sha Lo Tung	54	Wu Kau Tang	310
Wu Kau Tang	47	Luk Keng	283
Shing Mun	29	Sham Tseng	275
Tsiu Hang	29	Yuen Tun Ha	226
Tan Shan River	26	Ng Tung Chai	179
Castle Peak	26	Tai Mo Shan	173
Tai Po Kau	24	Tate's Cairn	172

Table 1. Ranking of the top 10 sites based on species richness and conservation value assessment metric.

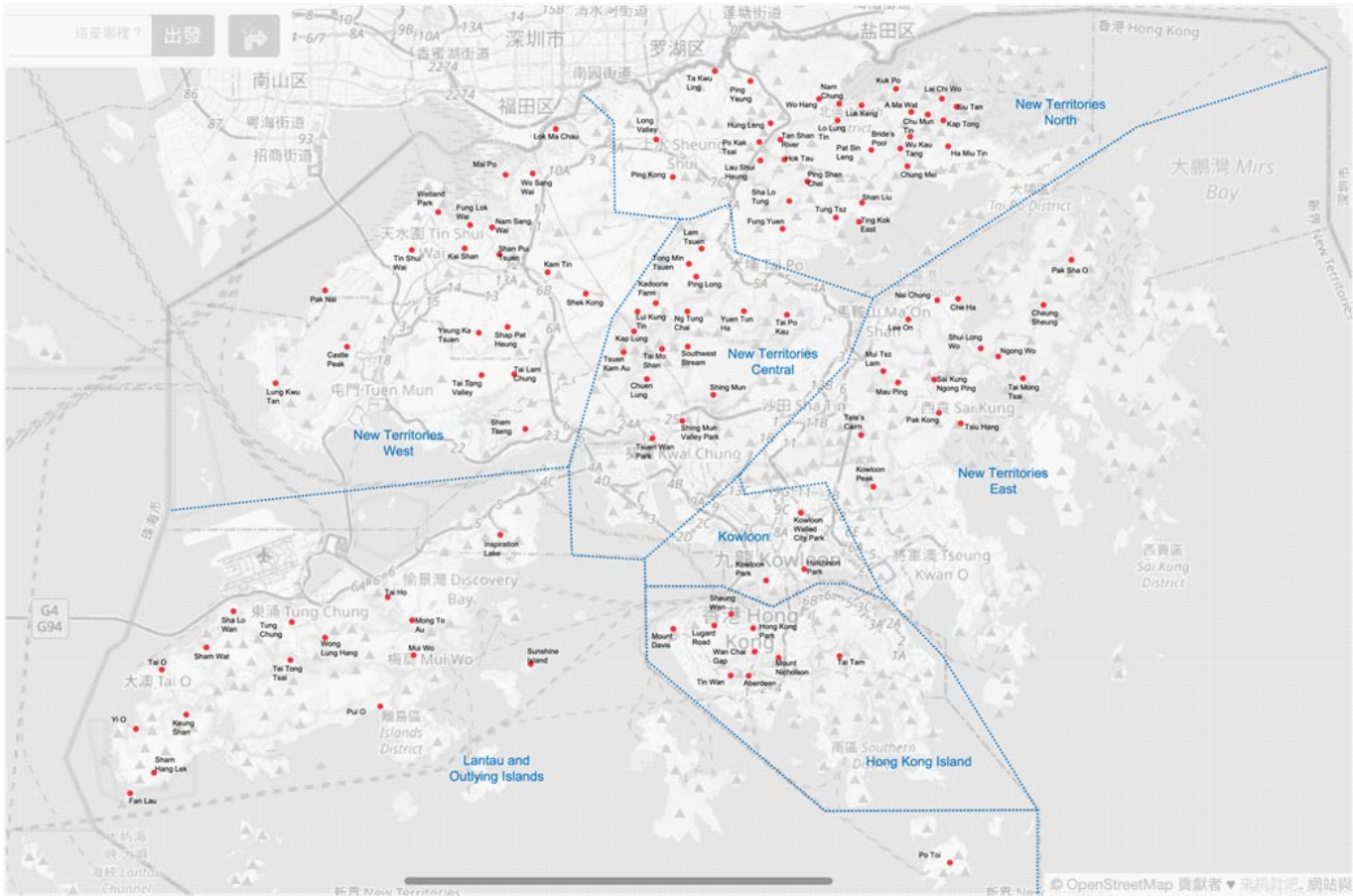


Figure 1. Odonata sites visited by the author between 2011 and 2020. Base map from openstreetmap.org.

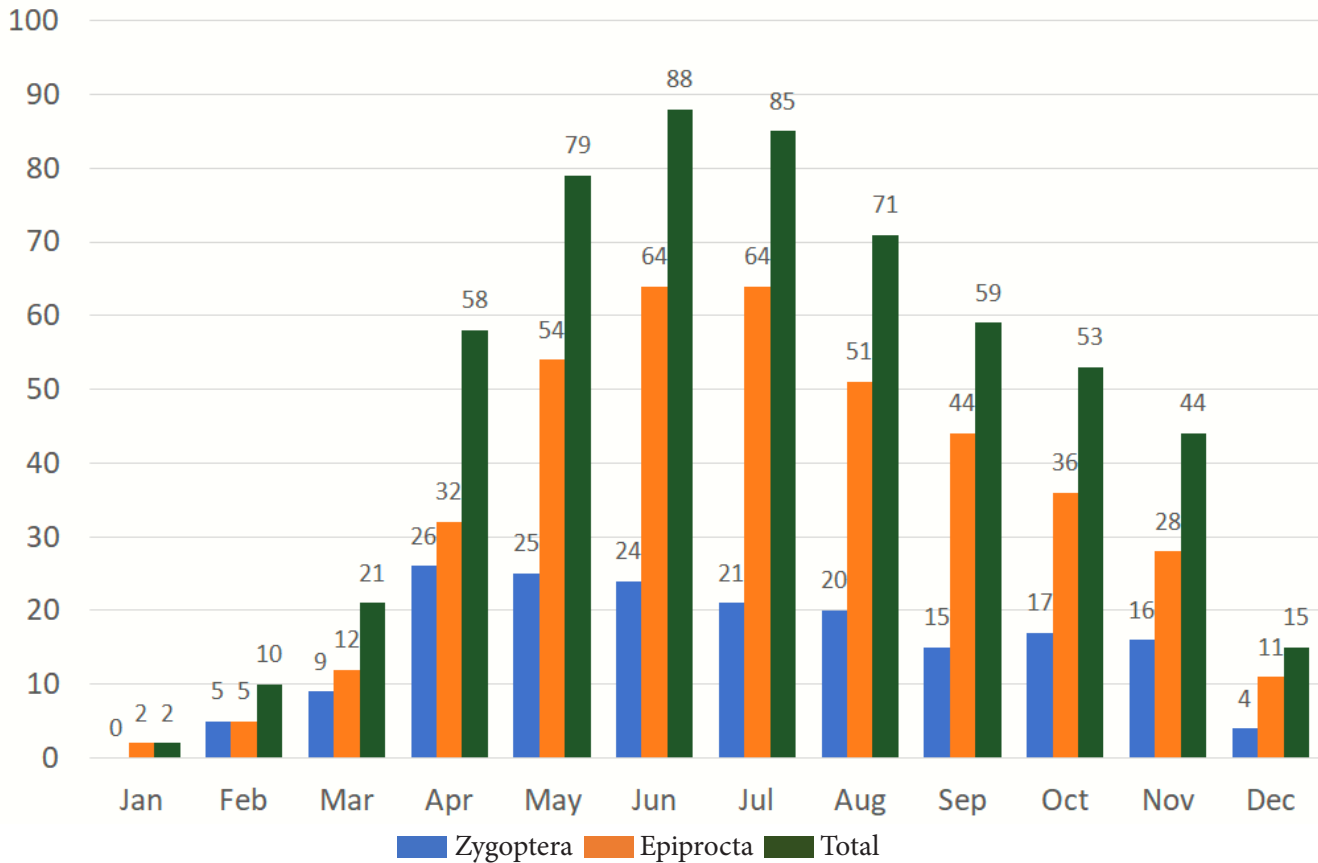


Figure 2. Total number of species recorded in each month from 2011 to 2020.



Figure 3. Adults of the six Hong Kong Rhipidolestidae (top two) and Platystictidae species are only recorded from late spring to middle summer. Apart from *Agriomorpha fusca* (top left), all remaining five species, i.e. *Rhipidoleste janetae* (top right), *Drepanosticta hongkongensis* (middle left), *Protosticta beaumonti* (middle right), *Protosticta taipokauensis* (bottom left) and *Sinosticta ogatai* (bottom right) were first described from Hong Kong specimens. *S. ogatai* is also the type species of its genus. Photos by author.



Figure 4. Two species that are recorded in the most number of sites. (Left) *Euphaea decorata*, a mature female (top) and a teneral male. (Right) A mating pair of *Ceriagrion auranticum*. Photos by author.



Figure 5. Oviposition (in tandem) of two Lestidae species that have been recorded in Hong Kong. (Left) *Lestes nodalis*, occurs regularly at a few seasonal marshes in New Territories North. (Right) *Lestes praemorsus*, considered to have disappeared from Hong Kong. Shown here are individuals of another subspecies *L. p. decipiens* in Singapore. Photos by author.



Figure 6. A mating pair of *Aciagrion approximans*. Photo by author.



Figure 9. The author's only record of *Pseudagrion spencei* in Hong Kong, observed on 13.XI.2011 at Tan Shan River. Photo by author.



Figure 7. *Mortonagrion hirosei* is one of the few Hong Kong Odonata species that can tolerate high salinity habitat. Photo by author.



Figure 10. *Ischnura rufostigma* in northern Guangdong province. The species is thought to be locally extinct before reappearance of a single male in 2020. Photo by author.



Figure 8. *Agriocnemis lacteola* mating. The species can only be found at Cheung Sheung in the past decade. Photo by author.

Species	Hok Tau	Luk Keng	Sham Tseng	Sha Lo Tung	Wu Kau Tang	Shing Mun	Tsiu Hang	Tan Shan River	Castle Peak	Tai Po Kau	Species rating
ZYGOPTERA											
Calopterygidae											
<i>Matrona basilaris</i>											0
<i>Mnais mneme</i>	✓	✓	✓	✓	✓	✓					10
<i>Neurobasis chinensis</i>	✓	✓	✓	✓	✓			✓			1
Chlorocyphidae											
<i>Heliocypha perforata</i>	✓	✓	✓	✓	✓	✓		✓	✓	✓	1
Devadattidae											
<i>Devadatta argyroides</i>											0
Euphaeidae											
<i>Euphaea decorata</i>	✓	✓	✓	✓	✓	✓			✓	✓	10
<i>Euphaea opaca</i>											0
Philogangidae											
<i>Philaganga vestusta</i>	✓	✓	✓	✓	✓	✓					25
Philosinidae											
<i>Philosina alba</i>											0
Rhipidolestidae											
<i>Agriomorpha fusca</i>	✓		✓	✓		✓				✓	13
<i>Rhipidolestes janetae</i>						✓					55
Lestidae											
<i>Lestes concinnus</i>											0
<i>Lestes nodalis</i>											15
<i>Lestes praemorsus</i>											0
<i>Sympecma paedisca</i>											0
Platystictidae											
<i>Drepanosticta hongkongensis</i>											20
<i>Protosticta beaumonti</i>											20
<i>Protosticta taipokauensis</i>			✓	✓	✓	✓					15
<i>Sinosticta ogatai</i>											45
Coenagrionidae											
<i>Aciagrion approximans</i>									✓		25
<i>Agriocnemis femina</i>		✓					✓	✓			3
<i>Agriocnemis lacteola</i>											25
<i>Agriocnemis pygmaea</i>		✓			✓			✓			5
<i>Paracercion calamorum</i>	✓		✓					✓			5
<i>Paracercion hieroglyphicum</i>											0
<i>Paracercion melanotum</i>		✓					✓				1
<i>Ceriagrion auranticum</i>	✓	✓	✓	✓	✓		✓	✓	✓	✓	1
<i>Ischnura asiatica</i>											0
<i>Ischnura senegalensis</i>		✓	✓				✓	✓			3
<i>Ischnura rufostigma</i>											0
<i>Mortonagrion hirosei</i>		✓									20
<i>Pseudagrion microcephalum</i>		✓	✓					✓			1
<i>Pseudagrion pruinsum</i>	✓							✓			1
<i>Pseudagrion rubriceps</i>	✓		✓					✓			1
<i>Pseudagrion spencei</i>								✓			0

Species	Hok Tau	Luk Keng	Sham Tseng	Sha Lo Tung	Wu Kau Tang	Shing Mun	Tsiu Hang	Tan Shan River	Castle Peak	Tai Po Kau	Species rating
Platycnemididae											
<i>Calicnemia sinensis</i>						✓					25
<i>Coelliccia cyanomelas</i>				✓	✓	✓				✓	10
<i>Copera marginipes</i>	✓	✓	✓	✓	✓			✓	✓	✓	1
<i>Onychargia atrocyana</i>	✓	✓		✓							15
<i>Prodasineura autumnalis</i>	✓	✓	✓	✓	✓		✓	✓	✓	✓	1
<i>Prodasineura croconota</i>	✓	✓		✓	✓						10
<i>Pseudocopera ciliata</i>	✓	✓	✓		✓		✓			✓	1
EPIPROCTA											
Aeshnidae											
<i>Anaciaeschna jaspidea</i>		✓									5
<i>Anax guttatus</i>	✓	✓	✓	✓		✓	✓			✓	3
<i>Anax immaculifrons</i>			✓						✓		5
<i>Anax indicus</i>											0
<i>Anax nigrofasciatus</i>			✓								1
<i>Anax parthenope</i>		✓	✓								1
<i>Cephalaeschna klotsae</i>											40
<i>Gynacantha japonica</i>		✓		✓	✓						5
<i>Gynacantha ryukyuensis</i>		✓		✓	✓						1
<i>Gynacantha saltatrix</i>											1
<i>Gynacantha subinterrupta</i>		✓									1
<i>Planaeschna skiaperipola</i>											45
<i>Polycanthagyna erythromelas</i>			✓				✓				1
<i>Polycanthagyna ornithocephala</i>											0
<i>Tetracanthagyna waterhousei</i>	✓			✓	✓	✓					1
Chlorogomphidae											
<i>Chlorogomphus papilio</i>											0
Cordulegastridae											
<i>Anotogaster</i> sp.						✓					25
Gomphidae											
<i>Asiagomphus</i> sp.	✓	✓	✓	✓	✓	✓				✓	20
<i>Burmagomphus vermicularis</i>	✓		✓	✓				✓			10
<i>Euthygomphus koxingai</i>	✓										10
<i>Fukienogomphus choifongae</i>					✓						55
<i>Gomphidia kelloggi</i>	✓			✓							55
<i>Heliogomphus retroflexus</i>											10
<i>Heliogomphus scorpio</i>	✓	✓	✓	✓	✓	✓					10
<i>Ictinogomphus pertinax</i>	✓	✓	✓				✓	✓			1
<i>Labrogomphus torvus</i>	✓		✓								10
<i>Lamelligomphus hainanensis</i>			✓								20
<i>Leptogomphus hongkongensis</i>			✓	✓	✓	✓					30
<i>Megalogomphus sommeri</i>	✓		✓	✓							10
<i>Melligomphus guangdongensis</i>											25
<i>Ophiogomphus sinicus</i>	✓			✓		✓					30
<i>Paragomphus capricornis</i>	✓		✓								1
<i>Sieboldius alexanderi</i>	✓		✓	✓	✓	✓					15
<i>Sinictinogomphus clavatus</i>											1

Species	Hok Tau	Luk Keng	Sham Tseng	Sha Lo Tung	Wu Kau Tang	Shing Mun	Tsiu Hang	Tan Shan River	Castle Peak	Tai Po Kau	Species rating
<i>Stylogomphus chunliuae</i>											15
<i>Stylogomphus</i> sp.											1
<i>Stylurus annulatus</i>											0
<i>Stylurus clathratus</i>											0
Macromiidae											
<i>Epophthalmia elegans</i>	✓	✓	✓								1
<i>Macromia berlandi</i>	✓			✓	✓						10
<i>Macromia katae</i>	✓	✓		✓							30
<i>Macromia urania</i>	✓		✓	✓	✓						10
Synthemistidae											
<i>Idionyx claudia</i>											35
<i>Idionyx victor</i>	✓		✓	✓	✓	✓	✓		✓		10
<i>Macromidia ellenae</i>	✓	✓		✓	✓						20
<i>Macromidia rapida</i>	✓		✓	✓	✓	✓					1
Libellulidae											
<i>Acisoma panorpoides</i>	✓	✓			✓		✓				1
<i>Aethriamanta brevipennis</i>	✓	✓									1
<i>Brachydiplax chalybea</i>	✓	✓		✓			✓	✓		✓	1
<i>Brachythemis contaminata</i>	✓	✓	✓	✓	✓			✓			3
<i>Crocothemis servilia</i>	✓	✓	✓	✓	✓		✓		✓		3
<i>Diplacodes nebulosa</i>		✓			✓						1
<i>Diplacodes trivialis</i>		✓		✓	✓				✓		5
<i>Hydrobasileus croceus</i>	✓	✓	✓	✓	✓		✓		✓		1
<i>Indothemis carnatica</i>							✓				1
<i>Lyrithemis elegantissima</i>	✓	✓	✓	✓	✓	✓	✓			✓	1
<i>Macrodiplax cora</i>		✓									1
<i>Nannophya pygmaea</i>		✓									5
<i>Nannophyopsis clara</i>	✓	✓	✓								1
<i>Neurothemis fulvia</i>	✓	✓	✓	✓	✓		✓		✓	✓	1
<i>Neurothemis tullia</i>		✓	✓		✓						1
<i>Onychothemis tonkinensis</i>	✓										15
<i>Orthetrum albistylum</i>											0
<i>Orthetrum chrysis</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1
<i>Orthetrum glaucum</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1
<i>Orthetrum luzonicum</i>	✓	✓		✓	✓		✓		✓	✓	1
<i>Orthetrum melania</i>											0
<i>Orthetrum poecilops</i>		✓									35
<i>Orthetrum pruinosum</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1
<i>Orthetrum sabina sabina</i>	✓	✓	✓	✓	✓		✓	✓	✓		1
<i>Orthetrum triangulare</i>	✓			✓	✓	✓	✓		✓	✓	1
<i>Palpopleura sexmaculata</i>					✓				✓		5
<i>Pantala flavescens</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1
<i>Potamarcha congener</i>	✓			✓					✓		1
<i>Pseudothemis zonata</i>	✓	✓	✓	✓		✓	✓				1
<i>Rhodothemis rufa</i>	✓	✓	✓								1
<i>Rhyothemis fuliginosa</i>		✓									0
<i>Rhyothemis triangularis</i>	✓	✓	✓	✓						✓	1

Species	Hok Tau	Luk Keng	Sham Tseng	Sha Lo Tung	Wu Kau Tang	Shing Mun	Tsiu Hang	Tan Shan River	Castle Peak	Tai Po Kau	Species rating
<i>Rhyothemis variegata</i>	✓	✓	✓	✓	✓		✓	✓			1
<i>Sympetrum eroticum</i>											0
<i>Sympetrum darwinianum</i>											0
<i>Sympetrum fonscolombii</i>											0
<i>Tholymis tillarga</i>		✓	✓						✓		1
<i>Tramea transmarina</i>											0
<i>Tramea virginia</i>	✓	✓	✓	✓	✓		✓		✓	✓	1
<i>Trithemis aurora</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1
<i>Trithemis festiva</i>	✓		✓	✓	✓	✓	✓	✓	✓	✓	1
<i>Trithemis pallidinervis</i>											1
<i>Urothemis signata</i>	✓	✓	✓					✓			1
<i>Zygonyx asahinai</i>				✓		✓					10
<i>Zygonyx iris</i>	✓		✓	✓	✓	✓			✓		1
<i>Zyxomma petiolatum</i>	✓	✓		✓						✓	1
No. of species at each site	63	60	56	54	47	29	29	26	26	24	
No. of visits at each site	47	41	29	35	65	20	12	12	13	16	
Site rating	400	283	275	422	310	274	46	48	82	75	

Appendix 1. Species records at the top 10 sites ranked by species richness.

Species	Sha Lo Tung	Hok Tau	Shing Mun	Wu Kau Tang	Luk Keng	Sham Tseng	Yuen Tun Ha	Ng Tung Chai	Tai Mo Shan	Tate's Cairn	Species rating
ZYGOPTERA											
Calopterygidae											
<i>Matrona basilaris</i>											0
<i>Mnais mnome</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10
<i>Neurobasis chinensis</i>	✓	✓		✓	✓	✓					1
Chlorocyphidae											
<i>Heliocypha perforata</i>	✓	✓	✓	✓	✓	✓				✓	1
Devadattidae											
<i>Devadatta argyroides</i>											0
Euphaeidae											
<i>Euphaea decorata</i>	✓	✓	✓	✓	✓	✓		✓	✓	✓	10
<i>Euphaea opaca</i>											0
Philogangidae											
<i>Philaganga vestusta</i>	✓	✓	✓	✓	✓	✓	✓		✓		25
Philosinidae											
<i>Philosina alba</i>											0
Rhipidolestidae											
<i>Agriomorpha fusca</i>	✓	✓	✓			✓	✓		✓		13
<i>Rhipidolestes janetae</i>			✓				✓				55
Lestidae											
<i>Lestes concinnus</i>											0
<i>Lestes nodalis</i>											15
<i>Lestes praemorsus</i>											0
<i>Sympecma paedisca</i>											0
Platystictidae											
<i>Drepanosticta hongkongensis</i>							✓		✓	✓	20
<i>Protosticta beaumonti</i>											20
<i>Protosticta taipokauensis</i>	✓		✓	✓		✓	✓	✓	✓	✓	15
<i>Sinosticta ogatai</i>							✓			✓	45
Coenagrionidae											
<i>Aciagrion approximans</i>											25
<i>Agriocnemis femina</i>					✓						3
<i>Agriocnemis lacteola</i>											25
<i>Agriocnemis pygmaea</i>				✓	✓						5
<i>Paracercion calamorum</i>		✓				✓					5
<i>Paracercion hieroglyphicum</i>											0
<i>Paracercion melanotum</i>					✓						1
<i>Ceriagrion auranticum</i>	✓	✓		✓	✓	✓	✓				1
<i>Ischnura asiatica</i>											0
<i>Ischnura senegalensis</i>					✓	✓					3
<i>Ischnura rufostigma</i>											0
<i>Mortonagrion hirosei</i>					✓						20
<i>Pseudagrion microcephalum</i>					✓	✓					1
<i>Pseudagrion pruinsum</i>		✓									1
<i>Pseudagrion rubriceps</i>		✓				✓					1
<i>Pseudagrion spencei</i>											0

Species	Sha Lo Tung	Hok Tau	Shing Mun	Wu Kau Tang	Luk Keng	Sham Tseng	Yuen Tun Ha	Ng Tung Chai	Tai Mo Shan	Tate's Cairn	Species rating
Platycnemididae											
<i>Calicnemia sinensis</i>			✓					✓	✓		25
<i>Coeliccia cyanomelas</i>	✓		✓	✓			✓	✓	✓	✓	10
<i>Copera marginipes</i>	✓	✓		✓	✓	✓					1
<i>Onychargia atrocyana</i>	✓	✓			✓						15
<i>Prodasineura autumnalis</i>	✓	✓		✓	✓	✓					1
<i>Prodasineura croconota</i>	✓	✓		✓	✓						10
<i>Pseudocopera ciliata</i>		✓		✓	✓	✓					1
EPIPROCTA											
Aeshnidae											
<i>Anaciaeschna jaspidea</i>					✓			✓			5
<i>Anax guttatus</i>	✓	✓	✓		✓	✓	✓				3
<i>Anax immaculifrons</i>						✓					5
<i>Anax indicus</i>											0
<i>Anax nigrofasciatus</i>						✓	✓			✓	1
<i>Anax parthenope</i>					✓	✓					1
<i>Cephalaeschna klotsae</i>											40
<i>Gynacantha japonica</i>	✓			✓	✓						5
<i>Gynacantha ryukyuensis</i>	✓			✓	✓						1
<i>Gynacantha saltatrix</i>											1
<i>Gynacantha subinterrupta</i>					✓						1
<i>Planaeschna skiaperipola</i>											45
<i>Polycanthagyna erythromelas</i>						✓					1
<i>Polycanthagyna ornithocephala</i>											0
<i>Tetracanthagyna waterhousei</i>	✓	✓	✓	✓							1
Chlorogomphidae											
<i>Chlorogomphus papilio</i>											0
Cordulegastridae											
<i>Anotogaster</i> sp.			✓								25
Gomphidae											
<i>Asiagomphus</i> sp.	✓	✓	✓	✓	✓	✓				✓	20
<i>Burmagomphus vermicularis</i>	✓	✓				✓					10
<i>Euthygomphus koxingai</i>		✓									10
<i>Fukienogomphus choifongae</i>				✓							55
<i>Gomphidia kelloggi</i>	✓	✓									55
<i>Heliogomphus retroflexus</i>											10
<i>Heliogomphus scorpio</i>	✓	✓	✓	✓	✓	✓					10
<i>Ictinogomphus pertinax</i>		✓			✓	✓					1
<i>Labrogomphus torvus</i>		✓				✓					10
<i>Lamelligomphus hainanensis</i>						✓					20
<i>Leptogomphus hongkongensis</i>	✓		✓	✓		✓					30
<i>Megalogomphus sommeri</i>	✓	✓				✓					10
<i>Melligomphus guangdongensis</i>											25
<i>Ophiogomphus sinicus</i>	✓	✓	✓					✓	✓		30
<i>Paragomphus capricornis</i>		✓				✓					1
<i>Sieboldius alexanderi</i>	✓	✓	✓	✓		✓				✓	15
<i>Sinictinogomphus clavatus</i>											1

Species	Sha Lo Tung	Hok Tau	Shing Mun	Wu Kau Tang	Luk Keng	Sham Tseng	Yuen Tun Ha	Ng Tung Chai	Tai Mo Shan	Tate's Cairn	Species rating
<i>Stylogomphus chunliuae</i>							✓	✓			15
<i>Stylogomphus</i> sp.											1
<i>Stylurus annulatus</i>											0
<i>Stylurus clathratus</i>											0
Macromiidae											
<i>Epophthalmia elegans</i>		✓			✓	✓					1
<i>Macromia berlandi</i>	✓	✓		✓							10
<i>Macromia katae</i>	✓	✓			✓						30
<i>Macromia urania</i>	✓	✓		✓		✓					10
Synthemistidae											
<i>Idionyx claudia</i>								✓			35
<i>Idionyx victor</i>	✓	✓	✓	✓		✓		✓		✓	10
<i>Macromidia ellenae</i>	✓	✓		✓	✓						20
<i>Macromidia rapida</i>	✓	✓	✓	✓		✓		✓			1
Libellulidae											
<i>Acisoma panorpoides</i>		✓		✓	✓						1
<i>Aethriamanta brevipennis</i>		✓			✓						1
<i>Brachydiplax chalybea</i>	✓	✓			✓						1
<i>Brachythemis contaminata</i>		✓			✓	✓					3
<i>Crocothemis servilia</i>	✓	✓		✓	✓	✓					3
<i>Diplacodes nebulosa</i>				✓	✓						1
<i>Diplacodes trivialis</i>	✓			✓	✓		✓				5
<i>Hydrobasileus croceus</i>	✓	✓		✓	✓	✓					1
<i>Indothemis carnatica</i>											1
<i>Lyriothemis elegantissima</i>	✓	✓	✓	✓	✓	✓					1
<i>Macrodiplax cora</i>					✓						1
<i>Nannophya pygmaea</i>					✓						5
<i>Nannophyopsis clara</i>		✓			✓	✓					1
<i>Neurothemis fulvia</i>	✓	✓		✓	✓	✓					1
<i>Neurothemis tullia</i>				✓	✓	✓					1
<i>Onychothemis tonkinensis</i>		✓									15
<i>Orthetrum albistylum</i>											0
<i>Orthetrum chrysis</i>	✓	✓	✓	✓	✓	✓	✓			✓	1
<i>Orthetrum glaucum</i>	✓	✓	✓	✓	✓	✓	✓		✓	✓	1
<i>Orthetrum luzonicum</i>	✓	✓		✓	✓		✓	✓		✓	1
<i>Orthetrum melania</i>											0
<i>Orthetrum poecilops</i>					✓						35
<i>Orthetrum pruinosum</i>	✓	✓	✓	✓	✓	✓					1
<i>Orthetrum sabina sabina</i>	✓	✓		✓	✓	✓					1
<i>Orthetrum triangulare</i>	✓	✓	✓	✓			✓		✓	✓	1
<i>Palpopleura sexmaculata</i>				✓							5
<i>Pantala flavescens</i>	✓	✓	✓	✓	✓	✓		✓	✓	✓	1
<i>Potamarcha congener</i>	✓	✓									1
<i>Pseudothemis zonata</i>	✓	✓	✓		✓	✓					1
<i>Rhodothemis rufa</i>		✓			✓	✓					1
<i>Rhyothemis fuliginosa</i>					✓						0
<i>Rhyothemis triangularis</i>	✓	✓			✓	✓					1

Species	Sha Lo Tung	Hok Tau	Shing Mun	Wu Kau Tang	Luk Keng	Sham Tseng	Yuen Tun Ha	Ng Tung Chai	Tai Mo Shan	Tate's Cairn	Species rating
<i>Rhyothemis variegata</i>	✓	✓			✓	✓					1
<i>Sympetrum eroticum</i>	✓	✓		✓	✓	✓					0
<i>Sympetrum darwinianum</i>											0
<i>Sympetrum fonscolombii</i>											0
<i>Tholymis tillarga</i>					✓	✓					1
<i>Tramea transmarina</i>											0
<i>Tramea virginia</i>	✓	✓		✓	✓	✓	✓				1
<i>Trithemis aurora</i>	✓	✓	✓	✓	✓	✓	✓				1
<i>Trithemis festiva</i>	✓	✓	✓	✓		✓	✓		✓		1
<i>Trithemis pallidinervis</i>											1
<i>Urothemis signata</i>		✓			✓	✓					1
<i>Zygonyx asahinai</i>	✓		✓					✓	✓		10
<i>Zygonyx iris</i>	✓	✓	✓	✓		✓	✓	✓	✓		1
<i>Zyxomma petiolatum</i>	✓	✓		✓							1
No. of species at each site	54	63	30	47	60	56	21	15	15	17	
No. of visits at each site	35	47	20	65	41	29	12	8	5	1	
Site rating	422	400	329	310	283	275	226	179	173	172	

Appendix 2. Species records at the top 10 sites ranked by the scores obtained from conservation value assessment metric, following Reels (2020).

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lotic species												
<i>Mnais mneme</i>			✓	✓	✓	✓						
<i>Neurobasis chinensis</i>		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Heliocypha perforata</i>			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Euphaea decorata</i>				✓	✓	✓	✓	✓	✓	✓		
<i>Philaganga vestusta</i>				✓	✓	✓	✓					
<i>Agriomorpha fusca</i>				✓	✓	✓	✓					
<i>Rhipidolestes janetae</i>				✓	✓							
<i>Drepanosticta hongkongensis</i>				✓	✓							
<i>Protosticta beaumonti</i>				✓	✓	✓						
<i>Protosticta taipokauensis</i>				✓	✓	✓						
<i>Sinosticta ogatai</i>				✓	✓	✓						
<i>Calicnemia sinensis</i>				✓	✓		✓					
<i>Coeliccya cyanomelas</i>				✓	✓	✓	✓	✓				
<i>Prodasineura autumnalis</i>				✓	✓	✓	✓	✓	✓	✓	✓	
<i>Prodasineura croconota</i>				✓	✓	✓	✓	✓	✓	✓		
Lentic species												
<i>Lestes nodalis</i>		✓	✓	✓								
<i>Aciagrion approximans</i>					✓	✓				✓	✓	
<i>Agriocnemis femina</i>		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Agriocnemis lacteola</i>								✓	✓	✓		
<i>Agriocnemis pygmaea</i>			✓	✓		✓	✓	✓	✓	✓	✓	
<i>Paracercion calamorum</i>						✓	✓	✓		✓	✓	
<i>Paracercion melanotum</i>							✓	✓	✓	✓	✓	
<i>Ceriagrion auranticum</i>		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Ischnura senegalensis</i>			✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Mortonagrion hirosei</i>				✓				✓		✓	✓	
<i>Pseudagrion microcephalum</i>					✓	✓	✓	✓	✓	✓	✓	
<i>Pseudagrion pruinosum</i>				✓	✓	✓	✓	✓			✓	✓
<i>Pseudagrion rubriceps</i>				✓	✓	✓	✓	✓			✓	
<i>Pseudagrion spencei</i>											✓	
<i>Copera marginipes</i>		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Onychargia atrocyana</i>				✓	✓	✓	✓	✓	✓			
<i>Pseudocopera ciliata</i>				✓	✓	✓	✓	✓	✓	✓		
No. of species in each month	0	5	9	26	25	24	21	20	15	17	16	4

Appendix 3. Observation records of Hong Kong Zygoptera adults by month.

