Recent reptile surveys in Sydney Olympic Park

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We present a summary of the observations on the reptile fauna recorded during annual surveys conducted by members of the Australian Herpetological Society in Sydney Olympic Park, focusing in particular on the last four years. These surveys are part of a more general long-term systematic monitoring program that aims at gaining a better understanding of the distribution, abundance and dynamics of the vertebrate fauna occurring in the Park.

Introduction

The Australian Herpetological Society (hereafter referred to as the AHS) has been conducting surveys of the herpetofauna that is present in Sydney Olympic Park for many years in collaboration with the Sydney Olympic Park Authority (SOPA). These activities are specified in a yearly renewed agreement between the two parties, and are part of a long-term amphibian and reptile monitoring program as originally proposed by Hal Cogger in a document prepared for SOPA that also summarises our knowledge about the frogs and reptiles in the Park up to then (Cogger, 2005), following previous surveys dating back to 1993 and 2003 (Greer, 1993; Denny & Hoye, 2001; Denny, 2002).

The purpose of the current surveys is manifold:

- to gain a better understanding of the reptile diversity, abundance and distribution within the boundaries of Sydney Olympic Park;
- to establish baselines and assess trends; inform management about the status and integrity of the various ecological communities for the implementation of conservation measures;
- to promote the understanding and appreciation of the roles that reptiles play in the Park and in our urban ecosystems in general.

One of the more iconic inhabitants is the Green-and Golden Bell Frog (*Litoria aurea*), and the Park plays a critical role in the conservation of this beautiful yet strongly declining species.

The AHS is responsible for appointing a co-ordinator who is responsible for overseeing all aspects of the surveys, and in particular with the identification of specimens if necessary; recruiting a team of volunteers to undertake the surveys, ensuring they are skilled in reptile surveys, and communicating with, rostering and managing the volunteers throughout the survey period. In addition, prior to the commencement of each survey, the SOPA representative organises an on-site Volunteer Induction Briefing to ensure that the volunteers are aware of potential dangers and local restrictions. For the last few years, the first author of this report has taken up the co-ordinator role. Because of the educational aspects of these activities, we try to organise them in a very inclusive way, and we make them attractive to our younger members. There are some additional benefits also to participating with these excursions, because some of the localities that we visit are in non-accessible areas.

These surveys are usually happening in spring, when reptiles tend to be more active. The AHS provides a team of volunteers to investigate a set of predetermined and established quadrats for the presence and abundance of reptiles. We also document the incidental presence of frogs and other animals if we encounter them while looking for reptiles. This report however will only discuss the reptiles that occur in Sydney Olympic Park and were observed over 2015–2019.

During this period reptile-specific surveys were organised on Saturday 21 February, Saturday 12 September and Saturday 17 October 2015; Saturday 29 October and Sunday 27 November 2016; Saturday 21 October and Sunday 12 November 2017; Saturday 22 September and Sunday 21 October 2018; and Sunday 22 September and Saturday 19 October 2019. From spring 2015 onwards the number of reptile surveys was reduced to two per year, whereas before the AHS ran up to four such events per season. All the data are entered in the appropriate biodiversity databases by the SOPA staff who oversee these excursions.

For the current species nomenclature we decided to follow Cogger (2018). Other literature useful for the identification of reptiles in the Sydney area and NSW are Griffiths (2012), and Swan *et al* (2017).

Results

Before 2005, 13 species of reptiles (and 7 species of frogs) had been recorded from Sydney Olympic Park. These observations included some species for which there was only anecdotal evidence of their presence within the boundaries of the Park, as discussed below.

AHS survey quadrats cover a broad range of habitat types, and the abundance of reptiles reflects this variation (Figures 1 and 2). The existing wildlife database of Sydney Olympic Park Authority is supplemented with incidental and opportunistic observations by various other people, SOPA staff and otherwise, at other times and places in the Park. Eighteen species of locally-native reptiles are now known to occur in the area, although a number of species appear to be either very rare or are perhaps easily overlooked. Compared with our pre-2005 knowledge, some reptile species have been added to the list of animals known to occur in the Park, yet for some other species no evidence of their continued presence exists at this stage despite many years of systematic monitoring. One should however keep in mind that some of the fossorial reptile species display very cryptic behaviour, and some species are active at different times of the day, and so their potential presence may not easily be confirmed because of the limitations imposed by the survey methodology.

Each quadrat that is scheduled to be surveyed on a particular day is visited for a set time period. The volunteers disperse and cover the plot in an organised and methodological way, carefully monitoring for the presence of reptiles and looking under tree trunks and rocks, taking great care that everything that is moved is returned to its original position to minimise the disturbance of the habitat. An overview of the current plots is given in Figure 1, and the observed distributions of the various reptile species are at Figure 3.

Snakes in particular appear to be quite rare, which is perhaps appreciated more by the large number of day visitors (and their pets) than by the more intrepid naturalist, with only one snake—a Blackish Blind Snake (*Anilios nigrescens*)—encountered during our actual reptile surveys (in 2013; Figure 4). This is a fossorial species that can become active on the surface at night. As indicated in Figure 3, there are a few more recent incidental observations of the Red-bellied Black Snake (*Pseudechis porphyriacus*), Green Tree Snake (*Dendrelaphis punctulatus*), and some Carpet Pythons (*Morelia spilota variegata*). The latter subspecies is not native to the Sydney area and so are either escapees or hitchhikers with cargo. Needless to say, these animals are removed from the Park and relocated to a new home with a friendly AHS member or so. There is one pre-2015 record of the native Diamond Python (*Morelia spilota spilota*) from within the boundaries of the Park. A significant part of the diet of the Red-bellied Black Snake consists of frogs, and the species has been observed adjacent to some of the frog ponds and elsewhere in 2015 and 2017, but not during the recent systematic AHS surveys. There are also incidental recordings of road-killed specimens (one from 2015), and we are aware of one intrepid individual that made it into the Silverwater Correctional Complex before 2015. It is encouraging to note that there are recent incidental observations of Green Tree Snakes, recorded twice in 2018 at different sites in the Park.

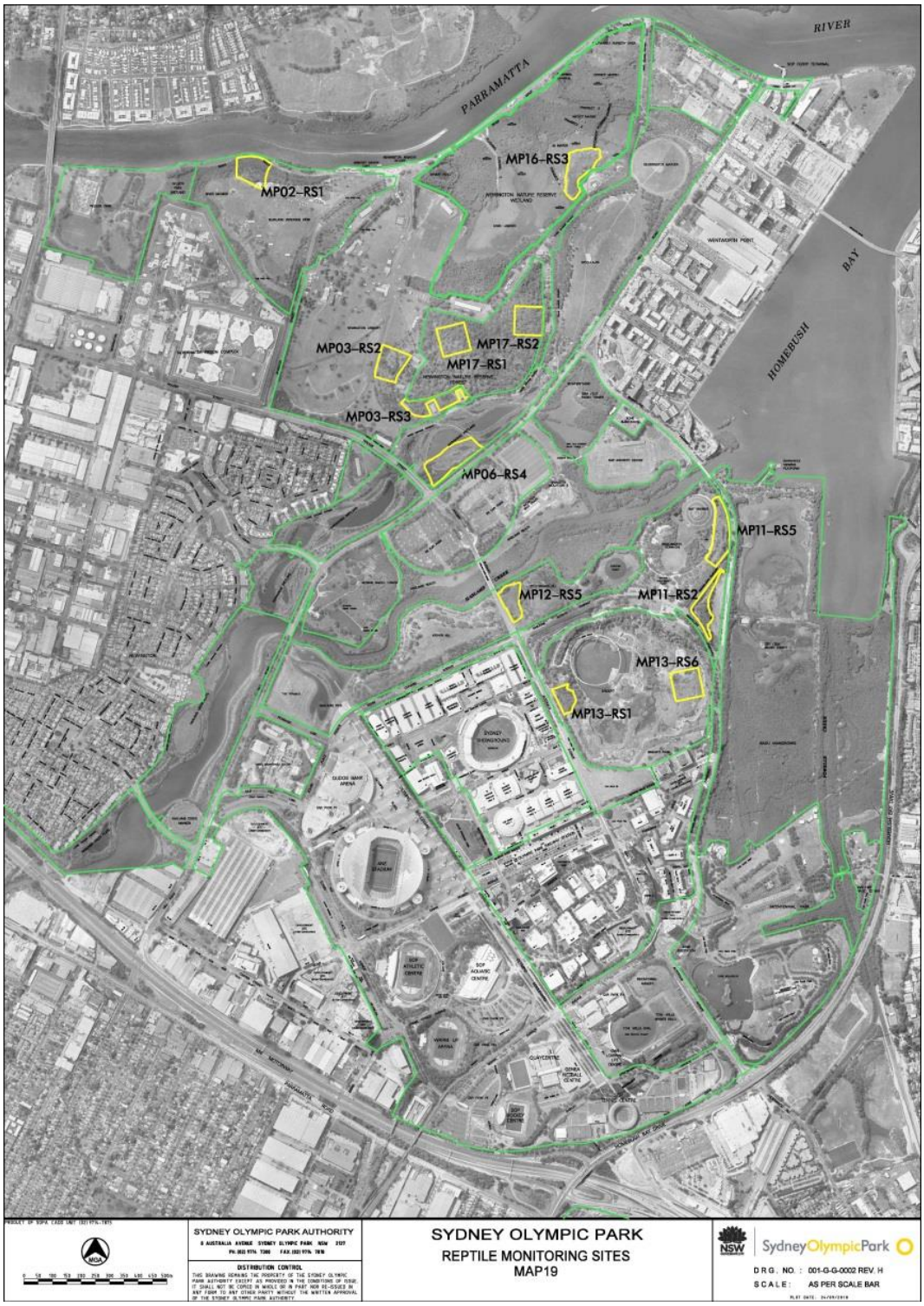

Figure 1. Reptile survey plots at Sydney Olympic Park (yellow). Green lines denote precinct boundaries of the Park.

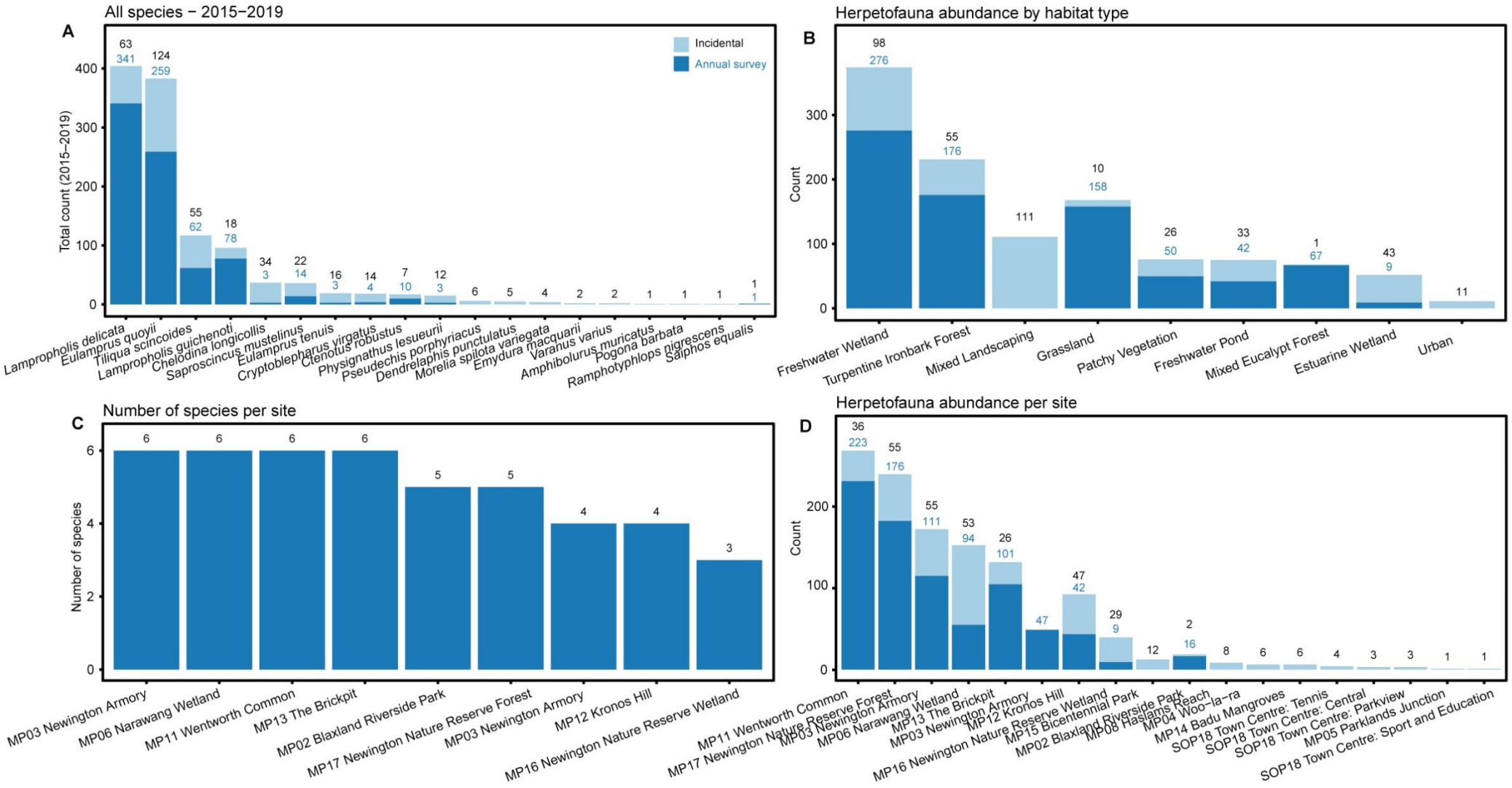

Figure 2. Reptile community structure in the survey period 2015–2019. A) Number of individuals observed for each species across the survey period. B) Number of individuals observed in different habitat type. C) Number of species and D) Number of individuals observed at each assigned survey site. Dark blue bar charts represent counts or observations within the annual survey, and light blue bar charts represent incidental findings.

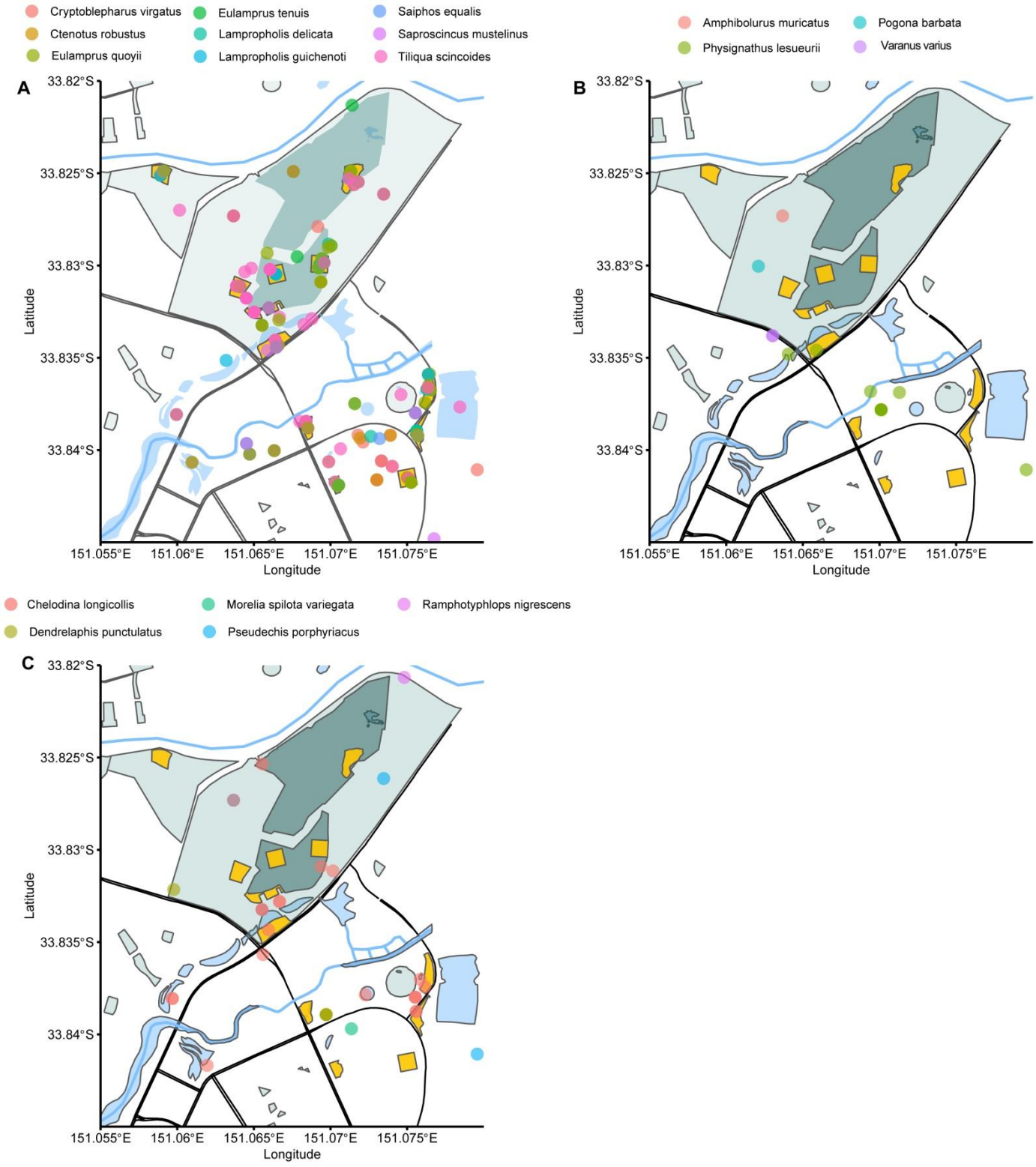

Figure 3. Reptile distribution in Sydney Olympic Park separated by A) skinks, B) agamid and varanid, and C) snakes and turtles

Figure 4. A Blackish Blind Snake from Macquarie Park, Sydney

The two most observed species are the (Dark-flecked) Garden Sunskink (*Lampropholis delicata*) and the Eastern Water Skink (*Eulamprus quoyii*); in fact, they are so common that they are almost certainly under-reported. Both species can tolerate considerable urban development, and many people are familiar with them. As indicated by its English name, the Eastern Water Skink is often (but not always) living in the vicinity of aquatic bodies of some sort, and is usually quite conspicuous where it occurs. It is a fairly large sized active brownish lizard with two more or less distinctive golden-coloured stripes on the back, and darker flanks with many small light spots (Figure 5a). The Garden Sunskink on the other hand is a small brown, more uniformly coloured and perhaps less conspicuous skink, which is abundant throughout the Park.

Another skink that superficially looks very similar to the Eastern Water Skink is the Bar-sided Skink (*Concinnia tenuis*; Figure 5b); in fact, until fairly recently it shared its genus name with the former species. This is essentially a tree-dwelling species, often seen when it pokes its head from a hole in a tree trunk or when basking nearby, and we have observed them elsewhere in the Sydney area, active after sunset, hunting for insects under house lights. Because of its arboreal habitat it is probably easily overlooked; in fact, Cogger (2005) states that at that time there was only a single record from the Park from 1994 or so. The systematic monitoring has shown that it actually occurs in several localities in the Park, and this illustrates the scientific value of such regular surveys.

a)

b)

Figure 5. Eastern Water Skink (a) and Bar-sided Skink (b) in Sydney Olympic Park

Also common are the iconic and distinctive Eastern Blue-tongued Lizard (*Tiliqua scincoides*) and the far less conspicuous Grass Sun-Skink or Pale-flecked Garden Sunskink (*Lampropholis guichenoti*). The latter species can look quite similar to its dark-flecked relative, in particular when it dashes off and disappears in the undergrowth, but usually has a more or less conspicuous dark vertebral stripe and may look more greyish. The Eastern Blue-tongued Lizard

is a well-known large-sized and slow-moving skink with a large triangular head, often with beautiful patterns on the back (Figure 6). For one reason or another, they tend to lose many of their toes when they grow older, but that is admittedly somewhat harder to see without closer inspection.

Figure 6. One of many Eastern Blue-tongued Lizards in Sydney Olympic Park

Another species that is almost certainly under-reported during the surveys is the Robust Ctenotus (*Ctenotus robustus*), a species that also looks somewhat similar to the Eastern Water Skink with which it may sometimes share similar habitats (Figure 7). A closer look (if possible) will reveal that they have a delicate pattern of several longitudinal stripes on the back, including a mid-dorsal black line which is enclosed by two very narrow golden stripes. These moderate-sized diurnal skinks are extremely fast and agile when they have reached their preferred body temperatures and tend to be quite shy, so they are easier to find during the earlier hours of the day when they may still be hiding under rocks and various other debris on the surface. They appear particularly common in the relatively open areas in the Brickpit, but we have also observed them in other grassy areas in the Park. There exist also some older records of the related Copper-tailed Skinks (*Ctenotus taeniolatus*), but this species was not observed during the years 2015–2019. As indicated by its name, this active diurnal lizard has a conspicuous reddish tail.

Figure 7. A Robust Ctenotus found in the Brickpit

Fence Skinks or Striped Snake-eyed Skinks (*Cryptoblepharus virgatus*) are small, active and diurnal lizards, that are usually seen basking or moving on rocks or trees or even house walls, and they occur even in some of the urban habitats in inner Sydney. Because of their small size and arboreal habits, they are easily overlooked. Its common name originates in the structure of its eyelids, with a transparent scale covering the eyes, which cannot close as is the case with snakes. They have a conspicuous pair of longitudinal dorsolateral silvery-grey stripes along their backs, and so they may look vaguely similar to juvenile Eastern Water Skinks until one has a proper look. Most of the observations so far occurred in the Brickpit and the Newington Nature Reserve area.

The Weasel Skink (*Saproscincus mustelinus*) is another species added to the fauna list of Sydney Olympic Park because of the more systematic monitoring for the presence of reptiles, with a single record from 2001 and more frequently encountered in the last decennium in several localities in the Park. During daytime they are usually found hiding under debris, because they appear to prefer moister areas, becoming active in the evening or at

night in particular on warmer nights. They are brown to russet brown above with many scattered pale flecks; the tail is sometimes distinctively reddish brown, and they have a small distinctive white spot behind the eyes (Figure 8a).

The Three-toed Skink (*Saiphos equalis*) was unknown in the Park until 2017 when an incidental sighting occurred in the Brickpit. One specimen was then found during the 2018 surveys in Newington Armory but managed to escape before photographic evidence could be obtained. The species is known to be present in two disjunct precincts and could be rare in the Park. This is a burrowing species that is usually found under rocks or logs. It is a moderately sized brown elongate skink with short limbs with three digits each, and a distinctive yellow to orange belly (Figure 8b). A few species of dragon (family *Agamidae*) also occur in the Park, but they don't appear to be common. Jacky Lizards (*Amphibolurus muricatus*) appear to be also a more recent addition to the fauna list of Sydney Olympic Park, with the first records in the database appearing in 2010. So far, the species has only been recorded from a few localities, and a specimen basking on a fallen tree was observed during one of our 2016 surveys.

Although common in the Sydney basin, the familiar Eastern Water Dragon (*Intellagama lesueurii*) is notoriously absent from the AHS surveys. There are fewer than 20 incidental records in the SOPA database from various locations in the Park, although these large and active dragons are usually very conspicuous when present. These lizards are usually associated with creeks and larger streams, and so one would expect that colonisation would occur via the Parramatta River.

a)

b)

Figure 8. Weasel Skink (a) and Three-toed Skink (b)

Another dragon that is known to occur in Sydney Olympic Park is the Bearded Dragon (*Pogona barbata*). There is however only one record in the SOPA database in the last few years, and this is an incidental observation from October 2018, with previous records from 2013 and 2010. Although this is also a rather large dragon, it is much more cryptic than the previous species, usually seen on fence post or tree trunks. Perhaps a more systematic search that is focused on this species would be useful, although it is secure in NSW. In any case, these dragons appear to be rare in the Park.

Although one would expect Lace Monitors (*Varanus varius*) to naturally occur in the Park, there are only two records in the SOPA database, both dating from 2019, where the same individual was observed on two different days in October 2019. Lace Monitors are

common in the Sydney basin, often associated with picnic sites in national parks, where some individuals can become very bold and a bit of a nuisance, scavenging on leftovers abandoned by careless individuals of our own primate species.

Eastern Long-necked Turtles (*Chelodina longicollis*) are quite common in the wetlands of Sydney Olympic Park. Basking individuals are frequently observed also during the AHS surveys in the larger water bodies. Turtles occur in the big water body in the Brickpit where they can be observed from above from the Brickpit Ring Walk, but also in other ponds in the Park, for instance at Wentworth Common. Occasionally one can encounter more intrepid individuals on land when they are migrating from one pond to another one, as has happened on one of the recent AHS surveys.

Two turtle species have thus far eluded the annual surveys. The Murray River Turtle (*Emydura macquarii)* has been observed incidentally by an AHS member sunning in two separate ponds in the Narawang Wetland in 2014. This species has also been seen in the Eastern Pond and may be more widely spread than currently known. The Red-eared Slider (*Trachemys scripta elegans),* a highly-invasive introduced species, is also present on site in unknown numbers, with one individual recently captured and removed by SOPA staff. AHS members assisted with identification and transfer of the turtle to the Department of Primary Industries.

Other reptile species documented from within the boundaries of the Park include perhaps the Wood Gecko (*Diplodactylus vittatus*) and the Common Scaly-Foot (*Pygopus lepidopodus*) but these observations remain unconfirmed (Cogger, 2005). Given that these two species are mainly nocturnal, we cannot expect to encounter them easily anyway during our daytime surveys.

Some habitat types in Sydney Olympic Park are not currently covered by the AHS surveys. For instance, none of the current quadrats overlaps with mangroves. The latter are usually considered to be more reptile-unfriendly, although some species such as Bar-Sided Skinks and Eastern Water Dragons can be found in these habitats.

In summary, there is arguably much more work that can be done to obtain a more complete picture of the abundance and short and long-term spatiotemporal distribution of the various reptile populations within the boundaries of the Park, although some of the larger frogs are remarkably sedentary (Figure 9). Continued collaboration between AHS and SOPA will contribute to a better understanding of reptile fauna in the Park, and how to manage habitat to conserve them.

Figure 9. One of several inclusive and friendly AHS reptile survey teams (2016) with Wentworth Common's sedentary frog.

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