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ASSESS TO PLAN: CONSERVATION ACTION PLANNING FOR THE SNAKES AND LIZARDS OF SRI LANKA

Report from the IUCN Red List Assessment, Key Biodiversity Areas and Assess to Plan workshop

14 – 19th September 2019, Simpson's Forest Hotel, Elkaduwa, Wattegama, Sri Lanka

EXECUTIVE SUMMARY

In September 2019, the IUCN/CI Biodiversity Assessment Unit held a workshop to complete IUCN Red List assessments for 169 species of snakes and lizards of the 230 currently (September 2019) described reptile species known from Sri Lanka, as part of the Global Reptile Assessment. Additionally, a preliminary Key Biodiversity Area (KBA) assessment was conducted and the IUCN SSC Conservation Planning Specialist Group facilitated the Assess to Plan (A2P) process to identify the next steps towards conservation action for all species assessed as threatened.

Of the 169 species assessed during the workshop, 102 (60%) were categorised as threatened (Critically Endangered, Endangered or Vulnerable), with 100 (98%) of these being endemic to Sri Lanka. Additionally, 17 species (10%) were assessed as Data Deficient, all of which are Sri Lankan endemics.

The main overarching threats to Sri Lankan snakes and lizards identified during the workshop were habitat loss, fragmentation, alteration and degradation. The principal underlying causes included forest clearance for plantation agriculture, tourism and urban development. Collection of animals for the international pet trade and persecution of snakes were also recognised as significant threats to certain species. Additionally, road traffic mortality, pollution, invasive species and predation from an increasing number of domestic animals including cats and poultry were identified as contributing to the threatened status of species. Droughts attributed to climate change and forest die-back (the cause of which remains poorly understood but has been linked to lead pollution (Ranasinghe *et al.*, 2009), were also considered current or potential threats to reptile species that are found in affected forest habitats.

During the workshop, 114 species were preliminary identified as Key Biodiversity Area trigger species, 101 of which were assessed as threatened. Additionally, three Near Threatened and three Data Deficient species also qualified as KBA trigger species because of their restricted ranges (<10,000 km^2). A total of 33 KBA sites were either adopted (from existing KBAs) or newly delineated for 102 of the trigger species. Adequate information was available for 96 of the threatened trigger species, which were included in one or more of the KBA sites.

The Asses to Plan (A2P) process carried out by participants during the workshop determined that site-based conservation action planning was considered necessary for all 102 threatened species. KBA sites identified during the workshop were used as the focal sites for multi-species conservation planning bundles and next steps were mapped out for 10 of the 33 KBA sites. Habitat-based conservation action planning was identified as a requirement for 41 species dependant on and/or restricted to a specific habitat type (the specific habitat type could occur at multiple sites). Key habitats for which conservation action planning was recommended included montane tropical / sub-tropical forest characterised by numerous mid height (up to 8m) canopy trees, lowland rainforest, dry evergreen forest, sand dunes and coastal scrubland and also specific areas that have quality, thick leaf litter and humus layer on which a number of threatened fossorial species depend. Threat-based conservation action planning was recommended for 26 species. Threat bundles included species impacted by collection for the international pet trade, persecution and predation. Intensive care conservation action planning was recommended as one of the planning priorities for two species, in conjunction with site and habitat planning. Details of the A2P conservation action planning sessions and next steps are presented in this report, along with multi-species conservation action planning summary tables.

1. INTRODUCTION

1.1 Reptile diversity of Sri Lanka

The island of Sri Lanka lies between 5˚ 55' and 9˚ 51' North latitude and 79˚ 41' and 81˚ 54' East longitude. It is a moderate-sized continental island (listed as the 25th largest island in the World), with an area of approximately 65,610 km^2 and a coastline of 1,620 km long (Calder, 2009).

Sri Lanka is ranked as one of the World's herpetological hotspots, with 233 reptile species currently recorded (62.6 % endemic). However, recent studies indicate that the diversity is vastly underestimated and that several new species of geckoes, skinks and snakes are remaining to be formally described. Thus, this diversity is exceptional for an island of its size.

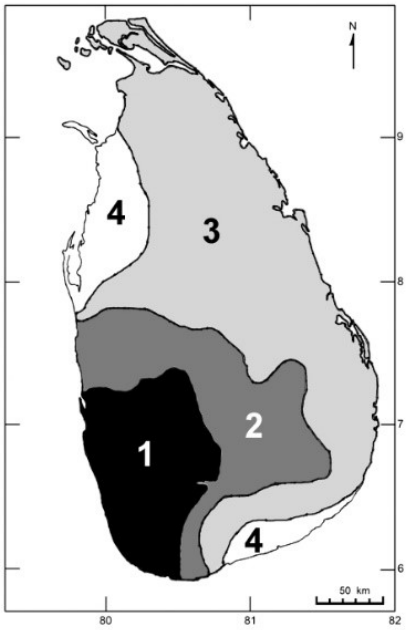
Sri Lanka's reptile diversity includes nine chelonian species in six families (five marine turtles, three freshwater terrapins and one land tortoise). Of these, one species (red ear slider, *Trachemys scripta*) has been introduced through the pet trade. Two species of crocodiles are also present in the country, of which the highest wild mugger (*Crocodylus palustris*) population in the world is found in Sri Lanka. One hundred and seventeen lizard species in 10 families (Agamidae, Chameleonidae, Gekkonidae, Lacertidae, Lygosomidae, Mabuyidae, Ristellidae, Scincidae, Sphenomorphidae and Varanidae) are found in the country. Of these, 94 species are endemic to Sri Lanka. Of the 21 agamid species, 19 are endemic to the island, genera *Ceratophora, Cophotis and Lyriocephalus*are are endemic to Sri Lanka and represent some of the most spectacular agamids in the world. Of the 58 gecko species, the genus *Cnemaspis* has increased from earlier known diversity of four to 36 species, all of which are endemic to the country. Thirty-three species of skinks in seven genera are known from Sri Lanka. They are classified in the families Lygosomidae, Mabuyidae, Ristellidae, Scincidae and Sphenomorphidae. Twenty-six species are restricted to the island, and the genera *Chalcidoseps*, *Lankascincus* and *Nessia* are endemic to Sri Lanka. Finally, Sri Lanka is home to 105 snake species in 11 families: Acrochordidae, Boidae, Colubridae, Cylindrophiidae, Elapidae, Gerrhopilidae, Homalopsidae, Pythonidae, Typhlopidae, Uropeltidae and Viperidae. Fifty-one species are endemic to the country, including the genus, *Aspidura*.

1.2 The climatic, altitudinal and ecological zones of Sri Lanka

Geological evidence suggests that Sri Lanka has been in existence for nearly three billion years and remained part of the Gondwana super-continent (Katupotha, 2013). The physiography of Sri Lanka consists of a central mass known as the Central Highlands. Three distinct peneplains, or erosion levels, are recognized according to elevation and slope features. The lowest, or first, peneplain (sea level to 270 m) is the largest and extends inland from the coast. The second peneplain, or the uplands, extends from 270 m to about 910 m, and occupies nearly three-tenths of the island. The highlands, or third peneplain, lie at elevations of 910–2,524 m.

Climatologically, Sri Lanka is a warm, tropical, humid country, which is under the influence of monsoon winds that blow during two distinct periods of the year and seasonally producing large quantities of rain. The south-western region of the island mainly receives rain from the south-western monsoon in June–September. From November-February, the whole island receives rain from the north-eastern monsoon. Most activities of reptiles in these areas are synchronized with rainfall, especially reproduction, when there is abundant food supply for the young.

Figure 1. Distribution of the four major ecological zones of Sri Lanka



1 = Wet zone

2 = Intermediate zone

3 = Dry zone

4 = Semi-arid zone

There are four major ecological zones based on rainfall in Sri Lanka: 1) wet zone, 2) intermediate zone, 3) dry zone and 4) the semi-arid zone (Figure 1). The semi-arid zone receives an annual rainfall of less than 1,250 mm per year, while the dry zone receives an annual rainfall of 1,250–1,900 mm. Together, the semi-arid and dry zones occupy nearly 60% of the island. About 19% of the island is covered by the wet zone, and it receives an annual rainfall of 2,500–5,000 mm per year. The humidity in the wet zone ranges between 75 and 85%. Sri Lanka's wet zone has a higher proportion of endemic reptiles than the other climatic zones of the island. The intermediate zone consists of intermediate climatic conditions between the dry and wet zones and covers approximately 22% of the island. The average annual precipitation of the intermediate zone ranges between 1,900 and 2,500 mm.

The vegetation and natural ecosystems of the island are influenced by its geography and climate. The natural ecosystems include forests, grassland, coral reefs, sand dunes, wetlands and mangroves. As a result of the distinct conditions in different ecological zones, different forest types are seen in each of the zones. For example, the lowland wet zone harbours lowland rainforests, while the highland wet zone comprises sub-montane and montane forests. The vast lowland dry zone is home to dry mixed evergreen forests, while the lowland intermediate zone has moist semi-evergreen forests and the semi-arid zone has thorn forests or scrubland. Much of the natural forests of Sri Lanka have been lost during the last 150 years due to human activities such as agriculture, urbanization, building dams and highway construction. This has resulted in the loss of natural habitat for many forest-dwelling species, making them more vulnerable to predators, though several reptiles have managed to carve out niches in some of these altered habitats.

1.3 Scope of the workshop

In September 2019, the IUCN-Conservation International Biodiversity Assessment Unit (IUCN-CI BAU) held an IUCN Red List Assessment, Key Biodiversity Areas (KBA) and Assess to Plan (A2P) workshop for Sri Lankan reptiles. The workshop was carried out as part of the Global Reptile Assessment (GRA), which is being led by the IUCN-CI BAU. Of the approximate 230 reptile species found in Sri Lanka, 169 (73%) species (described by September 2019) were assessed using the IUCN Red List Categories and Criteria, and subsequently considered for the Key Biodiversity Area, and Assess to Plan processes during the workshop. The focus of the workshop was for terrestrial snakes and lizard species endemic to Sri Lanka. It excluded all species of Chelonia, Crocodilia, 15 sea snakes, plus *Chamaeleo zeylanicus*, native to Sri Lanka and southern India. IUCN Red List assessments for these species are either being carried out or have already been assessed and published by their respective IUCN SSC taxonomic Specialist Groups. Additionally, freshwater snakes belonging to the family Homalopsidae were also not assessed during the workshop, as they were included within the sea snake assessment. Finally, 27 of the remaining species have a much wider distribution outside of Sri Lanka. Assessments for these

groups of species are being completed at one or more alternative GRA workshops, in range countries that include more significant proportions of their global populations. The 169 species assessed comprised 97 lizard species and 72 species of snakes. A list of the 169 species assessed during the workshop is presented in Appendix I.

2. WORKSHOP PROCESS

The workshop took place over a total of six days, involving 26 participants, four Red List and KBA facilitators and two Assess to Plan facilitators. A full list of workshop participants is provided in Appendix II.

2.1 IUCN Red List assessments

The first four days of the workshop were dedicated to assessing species for the IUCN Red List of Threatened Species™ (IUCN Red List).

The IUCN Red List is a critical indicator of the health of the world's biodiversity. It is widely recognised as the most comprehensive, scientifically based source of information on the global status of plant and animal species. IUCN Red List Categories and Criteria are applied to individual species assessments (which detail information about species' range, population size and trend, habitats and ecology, use and/or trade, threats, and conservation actions – in place and needed), to determine their relative risk of extinction. Threatened species are listed as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU). Classification of species into the threatened categories applies a set of five quantitative criteria based on biological factors related to extinction risk, including rate of population decline, population size, area of geographic distribution and degree of population and distribution fragmentation.

Taxa that are either close to meeting the threatened thresholds or would be threatened were it not for ongoing conservation programmes are classified as Near Threatened (NT). Taxa evaluated as having a low risk of extinction are classified as Least Concern (LC). Also highlighted within the IUCN Red List are taxa that cannot be evaluated due to inadequate information to make a direct or indirect assessment of risk of extinction based on distribution and/or population status and are therefore assessed as Data Deficient (DD). This category does not necessarily mean that a species is *not* threatened, only that the risk of extinction cannot be assessed with the information available (IUCN 2012).

During the workshop, the 169 reptile species to be assessed were arranged into taxonomic-based working sets (Table 1). Workshop participants divided into four working groups (each group with an IUCN Red List facilitator) based on their expertise, to complete draft global Red List assessments for every species. Experts contributed their data, information and knowledge on individual species and the Red List facilitator compiled the draft assessment documentation. All experts in a working group worked together and debated the information compiled on each species. They then reviewed the assessment documentation against the IUCN Red List Categories and Criteria and agreed the most appropriate category to apply, by group consensus. Experts were able to move between working groups if required for species being assessed in another group, for which they had specific expertise to contribute to the assessment. Post workshop, all draft assessments were reviewed by the IUCN-CI Biodiversity Assessment Unit team, with final pre-submission review carried out by the Red List

Authority Coordinator for snakes and lizards. Any outstanding queries were followed up with experts for resolution, prior to submission for publication on the IUCN Red List.

Table 1. Taxonomic working sets for Red Listing the snakes and lizards of Sri Lanka

Working set	Number of species
1. Agamidae	20
2. Colubridae	23
3. Gekkonidae	47
4. Natricidae	13
5. Scincidae	28
6. Tylophidae, Gerrhopilidae & Uropeltidae	24
7. Other groups (Boidae, Cylindrophiidae, Elapidae, Lacertidae and Viperidae)	14
Total number of species	**169**

2.2 Key Biodiversity Area (KBA) assessments

Over the last two days of the workshop, and after the provisional IUCN Red List assessment was completed, a preliminary identification of KBAs was conducted following the Guidelines for using the Global Standard for the Identification of Key Biodiversity Areas v 1.0 (KBA Standard and Appeals Committee 2019). All potential KBA trigger species (i.e. those meeting the KBA standards for threatened species (A1) and geographically restricted species (B1-2) (IUCN 2016), were identified during the Red List assessment process. The spatial distribution of trigger species was then overlaid with the layers of existing KBAs and existing Protected Areas (PAs) to see if they fall wholly within or overlap with their boundaries. Whenever trigger species fell wholly within or overlapped with existing KBAs, they were included within these KBAs, provided they met the corresponding KBA criteria, sub-criteria and thresholds. If trigger species fell wholly within or overlapped existing PAs that were not already identified as KBAs, the boundaries of these PAs were designated as new KBAs, provided the trigger species met the corresponding KBA criteria, sub-criteria and thresholds. Finally, if the trigger species distribution did not overlap with any existing KBA or PA, a new KBA site was delineated. In all cases, the experts attending the workshop were consulted to ascertain the presence of the trigger species within a site, provide information and data to support the compliance with the KBA criteria and meeting the relevant thresholds, and help with the delineation of practical KBA boundaries. During this process, all KBA sites were evaluated for their ecological significance and manageability, according to the Guidelines (for detailed information about the process, see KBA Standard and Appeals Committee 2019).

2.3 Assess to Plan (A2P) process

IUCN's Species Survival Commission adopted an 'Assess-Plan-Act cycle' and a goal that "every species that needs conservation attention is covered by an effective plan of action". However, with more than a quarter of all species on the IUCN Red List being assessed as threatened with extinction, there are too many species to address with single-species conservation planning.

As the planning arm of the IUCN SSC, the Conservation Planning Specialist Group (CPSG) is committed to enabling the rapid progression of threatened species from assessing, through conservation planning, and into effective action.

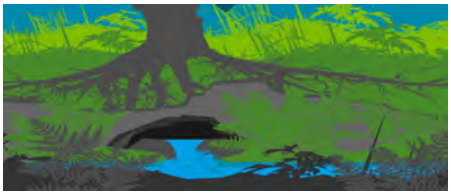
The Assess to Plan (A2P) process has been formulated as an intermediate step to link single-species status assessment through to stakeholder-inclusive multi-species conservation action planning. A2P is

designed to be integrated into an IUCN Red List workshop, where optimal use of the data collected during the assessment process can be made, and species can be propelled into action, through planning. The A2P process groups taxa that house species expected to respond positively to the same set of conservation actions *and* whose conservation can be addressed by the same constituency of conservation actors or agencies and then connecting those multi-species bundles to those willing and able to act.

The A2P process began during the four days of Red Listing, where workshop participants assigned all species assessed as threatened to one (or more) of five A2P "*buckets*" (site, habitat, threat, single species and intensive care), depending on their most critical conservation action planning needs.

The five A2P conservation planning buckets for threatened species and a summary description for each are presented in Table 2.

Table 2. Summary of the five A2P conservation planning buckets for threatened species.

A2P conservation planning bucket	Description
Site directed action planning 	• species inhabiting a defined area and subject to multiple localised threats linked to that area (e.g. species affected by disturbance, pollution and other impacts from specific development projects at a particular site).
Habitat directed action planning 	• species dependent on the same, specific habitat type which is subject to a common threat or set of threats (the specific habitat type could occur at multiple sites).
Threat directed action planning 	• groups of species targeted by a common threat that is not anchored to a site or sites, but which travels with the species (e.g. species targeted for traditional medicine or illegal international trade, species affected by a disease pandemic).
Single species recovery action planning 	• outlier species whose conservation needs do not overlap significantly with those of other species and need a unique combination of actions, across the multiple A2P buckets for their effective conservation.

A2P conservation planning bucket	Description
Intensive care action planning 	• species for which *in situ* conservation alone is considered unlikely to prevent extinction within the time available and planning for potential intensive species management of some form may also be required (could include actions such as small population management and translocation feasibility, gene banking, intensive management in the wild, *ex situ* management feasibility assessment etc).

Additionally, during the Red List assessment workshop participants also assigned species assessed as Data Deficient (DD) to "*DD A2P buckets*". The aim of this was to identify the core reasons we don't currently have enough information to assess these species beyond Data Deficient and group them according to these reasons, to inform co-ordinating and prioritising subsequent next steps to fill knowledge gaps and move these species out of the Data Deficient category. The seven Data Deficient A2P buckets are summarised in Table 3.

Table 3. Summary of the seven A2P conservation planning buckets for Data Deficient species. Buckets '1' and '2' have sub-categories within their overarching explanation for a DD Red List category.

Data Deficient A2P buckets	
1. Hard to survey for	a. Difficult habitats to access, e.g. arboreal / fossorial
	b. Remote location – logistically difficult to get to
2. Very recently described	a. Only very recently discovered
	b. Newly described from old specimens
	c. Taxonomic re-classification
3. Hard to identify	
4. Known only from historic specimen(s)	
5. Area hasn't been re-surveyed / needs targeted surveys	
6. Area(s) surveyed extensively, but species not found	
7. Poor museum curation (specimens in bad condition)	

Once the Red List assessment component of the workshop had been completed and all threatened and DD species had been provisionally allocated to A2P buckets, "*species bundles"* were then identified within the buckets.

Species bundles group species that share conservation actions needed that can be addressed by the same conservation agencies. For example, 25 species could be allocated to the A2P 'site' bucket. Within that, 17 of the 25 species occur at 'Site A' and eight occur at 'Site B'. Conservation planning for multi-species can be co-ordinated at this site level, however conservation planning actions and relevant stakeholders are likely to differ *between* sites A and B. Hence in this example, there are two species bundles within the A2P 'site' bucket. Similarly, 12 species could be allocated to the A2P 'threat' bucket. Five of these species could require conservation planning around international trade as the major threat, whereas seven of these species could require conservation planning around a specific

disease as the major threat. Therefore, there are also two species bundles within this A2P 'threat' bucket (Figure 2).

Figure 2. Example of species bundles housed within A2P threatened species buckets. Species bundles house species expected to respond positively to the same set of conservation actions *and* whose conservation can be addressed by the same constituency of conservation actors or agencies.

A2P conservation planning sessions were held for each of the threatened species bundles identified during the workshop. Discussions were held with species experts to identify the required planning conservation actions and the potential key collaborators and stakeholders involved in taking the next steps for each bundle. The A2P process is significantly more subjective than the Red List process, which is objective and governed by universal standards. Through attaching A2P to the Red List assessment process, A2P can utilise the best, science-based information available on the status of species (collated through the completion of Red List assessments) to then, with the species assessors, move in to more creative discussion, focusing on people (i.e. the potential stakeholders and collaborators for moving the identified conservation planning needs and actions forward), and what is realistically possible given the political, economic and social contexts of each situation.

The aim of A2P discussions was that, by the end of the workshop, all species considered during the A2P process would be assigned to at least one multi-species bundle, with each bundle having recommended conservation planning actions and a workshop participant who would lead on taking these actions forward, post workshop.

3. WORKSHOP RESULTS

3.1. IUCN Red List assessment provisional results

The Red List workshop resulted in 102 of the 169 species assessed being provisionally categorised as threatened (CR, EN VU). These comprised 67 out of 97 (69%) lizard species and 36 out of 72 (50%) snake species. Seventeen species (7 lizards and 10 snake species) were assessed as Data Deficient. Provisional Red List categories assigned to species during the workshop are provided in the table in Appendix I. It should be noted that all assessments are subject to review post-workshop and the IUCN Red List website should always be consulted for the final species assessment category and documentation, once assessments have been accepted and published.

3.2 Summary of major threats to Sri Lankan reptiles

During the assessment process, experts identified the main overarching threats to Sri Lanka's lizards and snakes to be habitat loss, fragmentation, alteration and degradation attributed to multiple human activities. Major drivers include forest clearance for agriculture (particularly tea, coffee and rubber plantations), tourism development and expansion of facilities (particularly related to pilgrimages), encroachment of settlements, dam construction, granite mining gem mining and logging (with these extraction activities often being illegal). Processes associated to these drivers create another tier of threats to species, including the impact of agrochemicals, increased amounts of domestic waste and

pollution, expanding distribution of invasive / predatory species, road construction (and an increase in road traffic mortality), soil erosion and landslides.

Forest dieback was identified as a potential threat to some forest species. This has been ongoing since at least the 1990s, although forests dying are known as far back as the 1940's (de Rasayro, 1946), particularly in the Horton Plains National Park (Perera, 1978). The causes of forest dieback currently remain poorly understood (Ranasinghe *et al.,* 2009). There are no signs of natural forest recovery in affected areas, where invasive shrubs such as *Eupatorium riparium*, *Eupatorium inulifolium* and *Cestrum aurantiacum*) now often replace natural vegetation. In many parts of Horton Plains National Park, a bamboo (*Sinarundinaria*) species and a cuscuta species have been observed (during long-term research investigations) to be spreading in the understory as well as in open gaps in the forest and in some places, is thick and impenetrable. Climate change was also identified as a significant actual or potential threat to high elevation species, through the increased intensity and duration of drought. Other threats included collection of species for the international pet trade and persecution, particularly of snakes.

Species were most often assessed as threatened due to the cumulative effect of numerous factors impacting their populations and/or fragmenting or reducing their distributional range.

3.3 Key Biodiversity Areas

During the workshop, 114 species were preliminary identified as Key Biodiversity Area (KBA) trigger species. Of these, 101 species had been assessed as threatened during the Red List assessment process and 13 were range-restricted species (geographic ranges ≤ 10,000 km^2). Thirty-three KBAs were identified, (21 of which were newly delineated and 12 were existing KBAs) for the proposed addition of 102 of the 114 trigger species, including 96 of the 101 threatened species (for which adequate information was available, as required by the KBA process), plus three Near Threatened and three Data Deficient species. The table in Appendix III provides information on the 33 KBA sites identified during the workshop and the reptile species occurring within each of them.

Fifty-six of the 96 threatened species occur within just one of the 33 KBA sites. Nineteen species occur within 2 KBA sites; 12 species occur within three sites, two species occur within four sites; two species occur within five sites; three species occur at six sites; one species occurs at eight sites and one species occurs within 11 out of the 33 KBA sites identified.

3.4 Assessing to Plan

3.4.1 Allocation of threatened species to A2P conservation planning buckets

During the Red List assessment process, experts allocated all species provisionally assessed as threatened (Critically Endangered, Endangered or Vulnerable) to one or more of the five A2P conservation planning buckets (refer to Table 2, section 2.3 above, for the five A2P bucket definitions), according to the conservation planning direction(s) considered most needed for each of these species.

Table 4 below provides a summary of the number of species allocated to each of the five A2P conservation planning buckets for threatened species and the table in Appendix IV provides full details on which of the five A2P buckets each of the 102 threatened species were allocated to.

Table 4. Number of threatened species allocated to each of the A2P conservation planning buckets (*n*=102).

	Site-based conservation planning	Habitat-based conservation planning	Specific threat-based conservation planning	Intensive care conservation planning	Single species recovery planning
No. of species	102 species	41 species	26 species	2 species	0 species

Site-based conservation planning was recommended for all 102 species provisionally assessed as threatened. Additionally, habitat-based conservation planning was recommended for 41 species; conservation planning around specific threats was recommended for 26 species; and two species were identified as needing conservation planning to investigate the feasibility for intensive care. No species were identified as needing single species recovery planning.

Eight of the 102 threatened species were allocated to three A2P conservation planning buckets. Of these, seven species were identified as needing site, habitat and specific threat-based conservation planning and one species was identified as needing planning for potential intensive care, alongside site and habitat-based conservation planning. Fifty-three of the 102 threatened species were allocated to two of the five A2P conservation planning buckets. Of these, 33 species were identified as needing site and habitat -based conservation planning; site and specific-threat based planning was recommended for 19 species and and one species was identified as needing planning for potential intensive care, alongside site-based conservation planning. Forty-one of the 102 threatened species were allocated to just one of the five A2P conservation planning buckets; all of which were identified as needing site-based conservation planning.

3.4.2 Allocation of Data Deficient species to A2P conservation planning buckets

Of the 169 species assessed, a total of 17 species across five families were categorised as Data Deficient (Appendix I). During the Red List assessment process, experts allocated all species provisionally assessed as Data Deficient to one or more of the A2P conservation planning buckets (refer to Table 3, section 2.3 above, for the A2P bucket definitions for Data Deficient species), according to the underlying reasons that describe why we are unable to gather adequate information on species to assess their conservation status.

Table 5 below shows how the 17 Data Deficient species were allocated to the A2P buckets and provides a summary explanation. Three of the 17 species were allocated to two A2P DD buckets (highlighted in the table with 'i.' and 'ii.' adjacent to the species name).

Due to time limitations during the workshop, no further A2P conservation planning actions were carried out for Data Deficient species. However, the categorisation of species into the A2P DD buckets may be useful in planning and/or prioritising future work and/or research on these species.

Table 5. Allocation of Data Deficient species to each of the A2P DD conservation planning buckets (*n*=17).

Data Deficient A2P buckets		Family	Species name	Notes
Hard to survey for	Difficult habitats to access, e.g. arboreal / fossorial	-	-	-
	Remote location – difficult to get to	-	-	-
Very recently described	Only recently discovered	GEKKONIDAE	*i. Cnemaspis kandambyi*	This species has not been recorded since its original description in 2017, although targeted surveys have been conducted
	Newly described from old specimens	-	-	-
	Taxonomic re-classification	-	-	-
Hard to identify		UROPELTIDAE	*i. Rhinophis melanogaster*	
			Rhinophis oxyrhynchus	
		SCINCIDAE	*Eutropis floweri*	Difficult to distinguish morphologically no genetic work done
			Eutropis austini	Difficult to distinguish morphologically, no genetic work done
			Eutropis greeri	Difficult to distinguish morphologically, no genetic work done
Known only from historic specimen(s)		UROPELTIDAE	*Rhinophis punctatus*	Known only from the description. Type lost. Type locality incorrect.
			Rhinophis zigzag	Known only from single type specimen (2011). No locality data.
		SCINCIDAE	*Lygosoma singha*	Known only from the type described in 1950s. Found in the north area, which has opened in the last 10yrs, following the conflict, but this species hasn't been seen.
			Nessia deraniyagalai	Known only from type specimen (1950). Not

Data Deficient A2P buckets	Family	Species name	Notes
			located in subsequent searches, species could be invalid.
	COLUBRIDAE	*Dendrelaphis oliveri*	Recorded in 1950. May not even be from Sri Lanka
		Lycodon gracilis	The only confirmed record from Sri Lanka is a specimen collected in 1888 in Haly, Jaffna.
	GEKKONIDAE	*i. Cnemaspis amith*	Described in 2007 from museum specimens collected prior to 1852.
Area hasn't been re-surveyed / needs more extensive surveying	UROPELTIDAE	*Rhinophis lineatus*	
		ii. Rhinophis melanogaster	
Surveyed extensively, but not found	TYPHLOPIDAE	*Indotyphlops tenebrarum*	
		Indotyphlops veddae	
		Indotyphlops violaceus	
	GEKKONIDAE	*ii. Cnemaspis amith*	Type locality unknown (description provided: 'Ceylon'). Extensive surveys have been carried out across Sri Lanka for *Cnemaspis* species, but this species has not been found.
		ii. Cnemaspis kandambyi	This species has not been recorded since its original description in 2017, although targeted surveys have been conducted
Poor museum curation (bad specimens)	-	-	-

3.4.3 Identifying multi-species bundles within the A2P threatened species buckets.

The table in Appendix V provides summary details of the A2P conservation planning buckets and multi-species bundles for all 102 threatened species of Sri Lankan snakes and lizards.

SITE-BASED CONSERVATION PLANNING

Site-based conservation planning was recommended for all 102 species provisionally assessed as threatened (Appendix IV). Ninety-six of the 102 threatened species were included within one or more of the 33 Key Biodiversity Areas identified during the KBA process (Appendix III). These KBA sites were used as the focus for creating multi-species bundles, within the 'Site bucket'. During the workshop, conservation planning and 'next steps for action' were discussed in A2P sessions for 10 of these 33 KBA sites, covering a total of 68 of the 102 threatened species (Appendix V). Multi-species bundle sizes across these 10 KBAs ranged from 3-24 species. Detailed outcomes of the multi-species conservation planning for these 10 KBA sites are presented in Section 4 of this report.

Fifty-eight of the 102 threatened species occurred within the 23 KBA sites, for which A2P conservation planning discussions were not held. Multi-species bundle sizes across these 23 sites range from 1-13 species (Appendix III and Appendix V). Of these 58 species, 30 species also occurred in one of the 10 KBA sites for which A2P sessions were held to identify the next conservation planning actions for these sites. Twenty-eight species only occurred in one or more of the 23 non-A2P KBA sites. Six of the 28 species in non-A2P KBA sites were not in any other A2P conservation planning buckets. These species are *Cnemaspis hitihamii*, *Cnemaspis rajakarunai*, *Cnemaspis kumarasinghei, Cyrtodactylus ramboda*, *Nessia didactyla* and *Nessia monodactyla*. Additionally, a further six threatened species were allocated to the A2P Site-based planning bucket but were not trigger species for any of the KBAs. These species are *Hemidactylus scabriceps*, *Sitana devakai, Cnemaspis latha*, *Cnemaspis menikay Cyrtodactylus yakhuna* and *Dasia haliana.* Three of these species (*Sitana devakai*, *Cyrtodactylus yakhuna* and *Dasia haliana*) were also allocated to other A2P conservation planning buckets (Appendix V).

HABITAT-BASED CONSERVATION PLANNING

Habitat-based conservation planning was recommended for 41 of the species provisionally assessed as threatened (Appendix IV and V). These 41 species are all dependent on specific habitat types, or requirements and either do not survive in, or are not known from, other habitat types. Nine specific habitat types were identified across the 41 species requiring specific habitat-based conservation planning. Table 6 below provides information on these nine multi-species habitat bundles and the numbers and names of species allocated to them. Due to time restraints during the workshop, A2P sessions were not held for these multi-species habitat bundles. However, site-based conservation planning was also recommended for these 41 species, therefore it is recommended that their specific habitat requirements are considered during site-based conservation planning for the relevant KBA sites in which these species occur (Appendix V).

Table 6. Habitat based multi-species planning bundles.

Habitat type	No. of species	Species names	Rationale
Sub-tropical / tropical moist montane forest	2	*Ceratophora erdeleni, Ceratophora karu*	These species seem to be tropical moist montane forest obligates and are not, or rarely found outside of this forest type.
Semi-fossorial species in sub-tropical / tropical moist montane forest	4	*Aspidura deraniyagalae, Aspidura ravanai, Aspidura desilvai, Calliophis haematoetron*	Semi-fossorial species that require deep humus layer /dense leaf litter within moist, montane forests. These species are not found outside of this habitat type, where the specific combination of soil microhabitat conditions that are critical to the survival of these species.
Sub-tropical / tropical moist lowland forest	6	*Ceratophora aspera, Dendrelaphis sinharajensis, Lycodon carinatus, Oligodon calamarius, Hemidactylus pieresii, Lankascincus greeri*	These species seem to be tropical moist lowland forest obligates and are not, or rarely found outside of this forest type.
Fossorial species in sub-tropical / tropical moist lowland forest	2	*Indotyphlops leucomelas, Rhinophis tricoloratus*	Fossorial lowland forest obligate species. These species are not found outside of this habitat type, where the specific combination of soil microhabitat conditions that are critical to the survival of these species.
Coastal habitats	2	*Sitana devakai, Sitana bahiri*	These species specifically require coastal habitats such as dry coastal shrublands and sand dunes. They do not occur in heavily modified habitats, where sandy substrates and vegetation do not remain, and they will not persist in developed areas.
Fossorial species - dry forest habitat	3	*Nessia hickanala* *Rhinophis porrectus* *Rhinophis dorsimaculatus*	Sandy soils of sub-tropical / tropical dry forests, at depths of 10-30cm. Sub-tropical / tropical dry forests with sandy substrates / sand dunes Lowland dry areas, particularly dry zone evergreen forest

Habitat type	No. of species	Species names	Rationale
Large mature trees	6	*Cophotis dumbara, Cnemaspis phillipsi, Cnemaspis scalpensis, Cnemaspis molligodai, Cnemaspis podihuna, Dasia haliana*	These arboreal species are only associated with mature forest habitats, with large trees and associated high canopy cover.
Granite caves / rocky outcrops	15	*Cnemaspis butewai, Cnemaspis gotaimbarai, Cnemaspis ingerorum, Cnemaspis kohukumburai, Cnemaspis kivulegedarai, Cnemaspis nandimithrai, Cnemaspis nilgala, Cnemaspis rammalensis, Cnemaspis samanalensis, Cnemaspis tropidogaster, Cnemaspis alwisi, Cnemaspis punctata, Hemidactylus hunae, Calodactylodes illingworthorum, Cnemaspis upendrai*	Usually undisturbed areas in specific forest habitats (e.g. tropical lowland rainforest, wet evergreen tropical forest and moist dry semi-evergreen forest). The rock cave / rock conditions and their specific microhabitats are important to these species. Cool, shady, moist and often mossy conditions are required.
Streams and wetlands	1	*Rhabdophis ceylonensis*	Typically associated with streams in rainforests within the wet zone of Sri Lanka

THREAT-BASED CONSERVATION PLANNING

Threat-based conservation planning with regards to a specific threat was recommended for a total of 26 species provisionally assessed as threatened (Appendix IV and V). Multi-species bundles were created, based on five specific threats identified during the Red List assessment process. Table 7 below provides information on these five multi-species threat bundles and the numbers and names of species allocated to each of them.

During the workshop, conservation planning and 'next steps for action' were discussed in A2P sessions for two of these multi-species bundles: 'snake persecution' and 'pet trade'. Detailed outcomes of the multi-species conservation planning around these two threats are presented in Section 5. Due to time restraints during the workshop, A2P sessions were not held for remaining multi-species bundles on predation or lizard persecution. It is recommended that these specific threats to species are considered during the site-based conservation planning, for the KBA sites applicable to these species.

Table 7. Threat based multi-species planning bundles.

Threat type	No. of species	Species names
Pet trade	11	*Ceratophora aspera, Ceratophora karu, Ceratophora stoddartii, Cophotis dumbara, Cnemaspis rammalensis, Calotes liocephalus, Calotes pethiyagodai, Ceratophora tennentii, Cophotis ceylanica, Lyriocephalus scutatus, Cyrtodactylus yakhuna*

Threat type		No. of species	Species names
Snake persecution		6	*Hypnale nepa, Boiga barnesii, Dendrelaphis caudolineolatus, Dendrelaphis schokari, Oligodon sublineatus, Cylindrophis maculatus*
Predation	by domestic / feral cats and dogs	5	*Cnemaspis scalpensis, Ceratophora stoddartii, Lyriocephalus scutatus, Cyrtodactylus soba, Dasia haliana*
	by native species - jungle crow	4	*Cnemaspis scalpensis, Calotes nigrilabris, Ceratophora stoddartii, Cophotis ceylanica*
	by poultry	4	*Gerrhopilus mirus, Cyrtodactylus fraenatus, Gerrhopilus ceylonicus, Rhinophis homolepis*
Lizard Persecution		2	*Lyriocephalus scutatus, Calodactylodes illingworthorum*

INTENSIVE CARE CONSERVATION PLANNING

Two species (*Aspidura ravanai* and *Nessia layardi*) were allocated to the intensive care A2P conservation planning bucket, as it was recommended that the feasibility of an *ex-situ* management component should be considered as part of the effective conservation of these species. Detailed outcomes of the multi-species conservation planning around intensive care conservation planning for these two species are presented in Section 6.

Site-based and habitat-based conservation planning was also recommended for *Aspidura ravanai.* This species is one of the 23 species that occurs in the Peak Wilderness Sanctuary Complex, which was one of the 10 KBA sites discussed during A2P conservation planning sessions (presented in section 4 of this report, below). *Aspidura ravanai* is a semi-fossorial species (which can be found up to 30cm below ground level). It appears to be a forest obligate species associated with montane cloud forests. Habitat requirements specifically for this species should be taken into consideration during conservation planning activities for the Peak Wilderness Sanctuary complex.

Site-based conservation planning was also recommended for *Nessia layardi*. This species was one of two trigger species for the newly delineated KBA site 'Horagolla National Park'. Due to time limitations, A2P conservation planning discussions were not carried out for this site, however it is recommended that this site is considered during comprehensive conservation planning for this species.

APPENDIX I

The 169 species of snakes and lizards assessed during the Sri Lankan IUCN Red List workshop.

The 102 species provisionally assessed as threatened are shaded (CR = red, EN = gold, VU = pale yellow). The 17 species assessed as Data Deficient are shaded in grey. The IUCN Red List website should be consulted for the final species assessment category and documentation, once assessments have been accepted and published.

Family	Species	IUCN RL category
AGAMIDAE	*Ceratophora erdeleni*	CR
	Ceratophora karu	CR
	Cophotis dumbara	CR
	Calotes desilvai	CR
	Ceratophora aspera	EN
	Sitana bahiri	EN
	Ceratophora tennentii	EN
	Calotes manamendrai	EN
	Calotes pethiyagodai	EN
	Calotes nigrilabris	EN
	Ceratophora stoddartii	EN
	Cophotis ceylanica	EN
	Calotes liocephalus	EN
	Lyriocephalus scutatus	VU
	Sitana devakai	VU
	Otocryptis nigristigma	LC
	Otocryptis wiegmanni	LC
	Calotes liolepis	LC
	Calotes ceylonensis	LC
	Calotes calotes	LC
BOIDAE	*Eryx conicus*	NT
COLUBRIDAE	*Oligodon calamarius*	EN
	Dendrelaphis sinharajensis	EN
	Lycodon carinatus	EN
	Oligodon sublineatus	VU
	Boiga barnesii	VU
	Dendrelaphis schokari	VU
	Dendrelaphis caudolineolatus	VU
	Sibynophis subpunctatus	LC
	Lycodon anamallensis	LC
	Lycodon nympha	LC
	Dendrelaphis tristis	LC
	Liopeltis calamaria	LC

Family	Species	IUCN RL category
	Boiga forsteni	LC
	Boiga beddomei	LC
	Chrysopelea taprobanica	LC
	Lycodon aulicus	LC
	Dendrelaphis bifrenalis	LC
	Argyrogena fasciolata	LC
	Boiga ceylonensis	LC
	Coelognathus helena	LC
	Ahaetulla pulverulenta	LC
	Dendrelaphis oliveri	DD
	Lycodon gracilis	DD
CYLINDROPHIIDAE	*Cylindrophis maculatus*	VU
ELAPIDAE	*Calliophis haematoetron*	EN
	Bungarus ceylonicus	NT
	Naja naja	LC
	Bungarus caeruleus	LC
	Calliophis melanurus	LC
GEKKONIDAE	*Cnemaspis godagedarai*	CR
	Cnemaspis kohukumburai	CR
	Cnemaspis rammalensis	CR
	Cnemaspis hitihamii	CR
	Cnemaspis latha	CR
	Cnemaspis menikay	CR
	Cnemaspis ingerorum	CR
	Cnemaspis phillipsi	CR
	Cnemaspis butewai	CR
	Cnemaspis samanalensis	CR
	Cnemaspis retigalensis	CR
	Cnemaspis scalpensis	CR
	Cnemaspis nilgala	CR
	Cyrtodactylus ramboda	CR
	Cnemaspis tropidogaster	CR
	Cnemaspis gotaimbarai	CR
	Cnemaspis nandimithrai	CR
	Cnemaspis rajakarunai	CR
	Cnemaspis kivulegedarai	EN
	Hemidactylus scabriceps	EN
	Cnemaspis alwisi	EN
	Cnemaspis kallima	EN
	Cnemaspis kumarasinghei	EN
	Cnemaspis molligodai	EN
	Cnemaspis punctata	EN
	Cnemaspis pulchra	EN
	Hemidactylus pieresii	EN

Family	Species	IUCN RL category
	Cyrtodactylus fraenatus	EN
	Cyrtodactylus edwardtaylori	EN
	Cyrtodactylus subsolanus	EN
	Cnemaspis kandiana	EN
	Hemidactylus hunae	EN
	Cyrtodactylus yakhuna	VU
	Calodactylodes illingworthorum	VU
	Cnemaspis gemunu	VU
	Cnemaspis upendrai	VU
	Cyrtodactylus soba	VU
	Cnemaspis anslemi	VU
	Cnemaspis podihuna	VU
	Cnemaspis pava	NT
	Cyrtodactylus cracens	NT
	Cyrtodactylus triedrus	NT
	Cnemaspis silvula	LC
	Hemidactylus depresus	LC
	Hemidactylus leschenaultii	LC
	Cnemaspis kandambyi	DD
	Cnemaspis amith	DD
GERRHOPILIDAE	*Gerrhopilus mirus*	CR
	Gerrhopilus ceylonicus	EN
LACERTIDAE	*Ophisops minor*	LC
	Ophisops leschenaultii	LC
NATRICIDAE	*Aspidura desilvai*	CR
	Aspidura deraniyagalae	CR
	Aspidura ravanai	CR
	Rhabdophis ceylonensis	EN
	Aspidura trachyprocta	EN
	Aspidura drummondhayi	EN
	Aspidura copei	EN
	Aspidura ceylonensis	VU
	Aspidura guentheri	VU
	Aspidura brachyorrhos	VU
	Rhabdophis plumbicolor	LC
	Atretium schistosum	LC
	Xenochrophis asperrimus	LC
SCINCIDAE	*Nessia layardi*	CR
	Lankascincus deignani	CR
	Nessia monodactyla	EN
	Nessia hickanala	EN
	Nessia didactyla	EN
	Nessia bipes	EN
	Lankascincus sripadensis	EN

Family	Species	IUCN RL category
	Lankascincus greeri	EN
	Chalcidoseps thwaitesi	EN
	Lankascincus taprobanensis	EN
	Lankascincus taylori	VU
	Nessia sarasinorum	VU
	Dasia haliana	VU
	Eutropis bibronii	NT
	Nessia burtonii	NT
	Nessia gansi	NT
	Lankascincus gansi	LC
	Lankascincus fallax	LC
	Eutropis tammanna	LC
	Lankascincus megalops	LC
	Lankascincus dorsicatenatus	LC
	Eutropis madaraszi	LC
	Eutropis beddomei	LC
	Eutropis greeri	DD
	Lygosoma singha	DD
	Nessia deraniyagalai	DD
	Eutropis austini	DD
	Eutropis floweri	DD
TYPHLOPIDAE	*Indotyphlops leucomelas*	CR
	Indotyphlops lankaensis	CR
	Indotyphlops malcolmi	EN
	Indotyphlops violaceus	DD
	Indotyphlops veddae	DD
	Indotyphlops tenebrarum	DD
UROPELTIDAE	*Rhinophis erangaviraji*	CR
	Rhinophis phillipsi	CR
	Rhinophis roshanpererai	CR
	Rhinophis porrectus	EN
	Rhinophis melanogaster	EN
	Rhinophis tricoloratus	EN
	Rhinophis dorsimaculatus	EN
	Rhinophis philippinus	EN
	Rhinophis homolepis	EN
	Rhinophis blythii	EN
	Rhinophis drummondhayi	EN
	Rhinophis saffragamus	VU
	Rhinophis punctatus	DD
	Rhinophis oxyrhynchus	DD
	Rhinophis lineatus	DD
	Rhinophis zigzag	DD
VIPERIDAE	*Hypnale nepa*	EN

Family	Species	IUCN RL category
	Hypnale zara	NT
	Trimeresurus trigonocephalus	LC
	Daboia russelii	LC
	Hypnale hypnale	LC

APPENDIX II

Participants of the IUCN Red List Assessment, Key Biodiversity Areas and Assess to Plan workshop, 14 – 19 September 2019

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APPENDIX III

Summary of the 33 Key Biodiversity Areas (KBAs) proposed for the inclusion of 105 reptile species.

No.	KBA name	Newly delineated or existing KBA	No. of species included	Species names	RL cat
1	Bambarabotuwa and Massienna	New	1	*Cnemaspis butewai*	CR
2	Beralihela	New	1	*Cnemaspis ingerorum*	CR
3	Dolukanda Conservation Forest	Existing	5	*Calliophis haematoetron*	EN
				Cnemaspis alwisi	EN
				Nessia bipes	EN
				Lankascincus taylori	VU
				Lyriocephalus scutatus	VU
4	Enasalwatta	New	9	*Calotes desilvai*	CR
				Ceratophora erdeleni	CR
				Ceratophora karu	CR
				Cnemaspis godagedarai	CR
				Rhinophis erangaviraji	CR
				Cnemaspis pulchra	EN
				Cyrtodactylus subsolanus	EN
				Lyriocephalus scutatus	VU
				Aspidura guentheri	VU
5	Gammaduwa	New	4	*Rhinophis phillipsi*	CR
				Cnemaspis kallima	EN
				Cnemaspis phillipsi	EN
				Cnemaspis punctata	EN
6	Gannoruua Forest Reserve	Existing	10	*Cnemaspis scalpensis*	CR
				Lankascincus deignani	CR
				Cyrtodactylus fraenatus	EN
				Gerrhopilus ceylonicus	EN
				Hemidactylus pieresii	EN
				Aspidura brachyorrhos	VU
				Aspidura ceylonensis	VU
				Boiga barnesii	VU
				Lankascincus taylori	VU
7	Garendi Ella	New	1	*Cyrtodactylus ramboda*	EN
8	Gilimale-Eratna	Existing	13	*Ceratophora aspera*	EN
				Lycodon carinatus	EN
				Nessia didactyla	EN
				Oligodon calamarius	EN
				Rhinophis homolepis	EN
				Aspidura brachyorrhos	VU
				Aspidura ceylonensis	VU

No.	KBA name	Newly delineated or existing KBA	No. of species included	Species names	RL cat
				Aspidura guentheri	VU
				Boiga barnesii	VU
				Cylindrophis maculatus	VU
				Dendrelaphis caudolineolatus	VU
				Lyriocephalus scutatus	VU
				Oligodon sublineatus	VU
9	Horagolla National Park	New	2	*Nessia layardi*	CR
				Nessia burtonii	NT
10	Ihala Kalugala	New	1	*Cnemaspis menikay*	CR
11	Kadugannawa	New	1	*Cnemaspis kohukumburai*	CR
12	Kalupahana	Existing	7	*Rhinophis roshanpererai*	CR
				Aspidura trachyprocta	EN
				Calotes nigrilabris	EN
				Ceratophora stoddartii	EN
				Cyrtodactylus edwardtaylori	EN
				Lankascincus taprobanensis	EN
				Rhinophis drummondhayi	EN
13	Kandapola Sita Eliya Forest Reserve	New	4	*Aspidura trachyprocta*	EN
				Ceratophora stoddartii	EN
				Cophotis ceylanica	EN
				Cnemaspis gemunu	VU
14	Kanneliya-Dediyagala-Nakiyadeniya Complex	Existing	9	*Indotyphlops leucomelas*	CR
				Dendrelaphis sinharajensis	EN
				Lycodon carinatus	EN
				Oligodon calamarius	EN
				Rhabdophis ceylonensis	EN
				Rhinophis tricoloratus	EN
				Dendrelaphis schokari	VU
				Lyriocephalus scutatus	VU
				Oligodon sublineatus	VU
15	Kegalle Sanctuary	New	5	*Nessia didactyla*	EN
				Aspidura brachyorrhos	VU
				Aspidura guentheri	VU
				Dendrelaphis caudolineolatus	VU
16	Knuckles Range extension	Existing	20	*Aspidura desilvai*	CR
				Cophotis dumbara	CR
				Ceratophora tennentii	EN
				Calotes pethiyagodai	EN
				Calotes manamendrai	EN
				Calliophis haematoetron	EN
				Nessia bipes	EN
				Hypnale nepa	EN
				Cnemaspis phillipsi	EN
				Cnemaspis punctata	EN
				Chalcidoseps thwaitesi	EN

No.	KBA name	Newly delineated or existing KBA	No. of species included	Species names	RL cat
				Aspidura ceylonensis	VU
				Aspidura brachyorrhos	VU
				Nessia sarasinorum	VU
				Lankascincus taylori	VU
				Dendrelaphis schokari	VU
				Cyrtodactylus soba	VU
				Dendrelaphis caudolineolatus	VU
				Lyriocephalus scutatus	VU
				Cnemaspis kallima	NT
17	Kokagala Reserve Forest	Existing	3	*Cnemaspis gotaimbarai*	CR
				Calodactylodes illingworthorum	VU
				Rhinophis saffragamus	VU
18	Kumana-Kudumbigala	New	5	*Cnemaspis nandimithrai*	CR
				Hemidactylus hunae	EN
				Sitana bahiri	EN
				Calodactylodes illingworthorum	VU
19	Lenagala Reserved Forest expanded	New	2	*Cnemaspis rajakarunai*	CR
				Rhabdophis ceylonensis	EN
20	Maragala	New	7	*Cnemaspis hitihamii*	CR
				Cnemaspis kumarasinghei	EN
				Hemidactylus hunae	EN
				Cnemaspis podihuna	VU
				Cylindrophis maculatus	VU
				Aspidura brachyorrhos	VU
				Calodactylodes illingworthorum	VU
21	Morningside and Handapan Ella Plains	Existing	24	*Calotes desilvai*	CR
				Ceratophora erdeleni	CR
				Ceratophora karu	CR
				Cylindrophis maculatus	CR
				Aspidura drummondhayi	EN
				Ceratophora aspera	EN
				Cnemaspis molligodai	EN
				Dendrelaphis sinharajensis	EN
				Hemidactylus pieresii	EN
				Lankascincus greeri	EN
				Lycodon carinatus	EN
				Oligodon calamarius	EN
				Rhabdophis ceylonensis	EN
				Rhinophis tricoloratus	EN
				Aspidura brachyorrhos	VU
				Aspidura guentheri	VU
				Boiga barnesii	VU
				Dendrelaphis caudolineolatus	VU
				Dendrelaphis schokari	VU
				Lankascincus taylori	VU

No.	KBA name	Newly delineated or existing KBA	No. of species included	Species names	RL cat
				Oligodon sublineatus	VU
				Lyriocephalus scutatus	VU
				Cyrtodactylus cracens	NT
				Nessia gansi	NT
22	Namanukula	New	5	*Aspidura deraniyagalae*	CR
				Gerrhopilus mirus	CR
				Cnemaspis kumarasinghei	EN
				Cyrtodactylus edwardtaylori	EN
				Lankascincus taylori	VU
23	Nilaveli	New	5	*Indotyphlops lankaensis*	CR
				Indotyphlops malcolmi	EN
				Indotyphlops tenebrarum	DD
				Indotyphlops veddae	DD
				Indotyphlops violaceus	DD
24	Nilgala	New	4	*Cnemaspis nilgala*	CR
				Hemidactylus hunae	EN
				Nessia sarasinorum	VU
				Aspidura brachyorrhos	VU
25	Pilikuttuwa and Maligatenna	New	1	*Cnemaspis tropidogaster*	CR
26	Peak Wilderness Sanctuary	Existing	23	*Aspidura ravanai*	CR
				Cnemaspis samanalensis	CR
				Aspidura copei	EN
				Aspidura trachyprocta	EN
				Calotes liocephalus	EN
				Calotes nigrilabris	EN
				Ceratophora aspera	EN
				Ceratophora stoddartii	EN
				Cophotis ceylanica	EN
				Hypnale nepa	EN
				Lankascincus sripadensis	EN
				Lankascincus taprobanensis	EN
				Rhabdophis ceylonensis	EN
				Rhinophis blythii	EN
				Lyriocephalus scutatus	EN
				Aspidura brachyorrhos	VU
				Aspidura ceylonensis	VU
				Aspidura guentheri	VU
				Cnemaspis anslemi	VU
				Cylindrophis maculatus	VU
				Dendrelaphis caudolineolatus	VU
				Dendrelaphis schokari	VU
				Nessia burtonii	NT
27	Rammalekanda Forest Reserve	Existing	3	*Indotyphlops leucomelas*	CR
				Cnemaspis rammalensis	CR
				Aspidura guentheri	VU

No.	KBA name	Newly delineated or existing KBA	No. of species included	Species names	RL cat
28	Ramboda	New	2	*Cyrtodactylus ramboda*	EN
				Cnemaspis upendrai	VU
29	Rattota	Existing	5	*Rhinophis philippinus*	EN
				Calliophis haematoetron	EN
				Ceratophora tennentii	EN
				Aspidura brachyorrhos	VU
				Dendrelaphis caudolineolatus	VU
30	Ritigala	New	6	*Cnemaspis retigalensis*	CR
				Nessia bipes	EN
				Aspidura brachyorrhos	VU
				Cylindrophis maculatus	VU
				Nessia sarasinorum	VU
				Oligodon sublineatus	VU
31	Udawattakele Wildlife Sanctuary	Existing	3	*Gerrhopilus ceylonicus*	EN
				Nessia monodactyla	EN
				Aspidura brachyorrhos	VU
32	Victoria Randenigala Rantambe extension	New	1	*Cnemaspis kivulegedarai*	EN
33	Wilpattu Complex	New	4	*Nessia hickanala*	EN
				Rhinophis dorsimaculatus	EN
				Rhinophis porrectus	EN
				Cylindrophis maculatus	VU

APPENDIX IV

Summary of A2P species buckets for threatened Sri Lankan snakes and lizards (*n*=102).

THREAT		SITE		HABITAT		INTENSIVE CARE		SINGLE SPECIES
		Aspidura ravanai	CR	*Aspidura ravanai*	CR	Aspidura ravanai	CR	
Ceratophora karu	CR	*Ceratophora karu*	CR	*Ceratophora karu*	CR			
Cophotis dumbara	CR	*Cophotis dumbara*	CR	*Cophotis dumbara*	CR			
Cnemaspis rammalensis	CR	*Cnemaspis rammalensis*	CR	*Cnemaspis rammalensis*	CR			
Cnemaspis scalpensis	CR	*Cnemaspis scalpensis*	CR	*Cnemaspis scalpensis*	CR			
Ceratophora aspera	EN	*Ceratophora aspera*	EN	*Ceratophora aspera*	EN			
Calodactylodes illingworthorum	VU	*Calodactylodes illingworthorum*	VU	*Calodactylodes illingworthorum*	VU			
Dasia haliana	VU	*Dasia haliana*	VU	*Dasia haliana*	VU			
		Nessia layardi	CR			Nessia layardi	CR	
Gerrhopilus mirus	CR	*Gerrhopilus mirus*	CR					
Calotes nigrilabris	EN	*Calotes nigrilabris*	EN					
Ceratophora tennentii	EN	*Ceratophora tennentii*	EN					
Calotes liocephalus	EN	*Calotes liocephalus*	EN					
Calotes pethiyagodai	EN	*Calotes pethiyagodai*	EN					
Ceratophora stoddartii	EN	*Ceratophora stoddartii*	EN					
Cophotis ceylanica	EN	*Cophotis ceylanica*	EN					
Cyrtodactylus fraenatus	EN	*Cyrtodactylus fraenatus*	EN					
Gerrhopilus ceylonicus	EN	*Gerrhopilus ceylonicus*	EN					
Hypnale nepa	EN	*Hypnale nepa*	EN					
Rhinophis homolepis	EN	*Rhinophis homolepis*	EN					
Lyriocephalus scutatus	VU	*Lyriocephalus scutatus*	VU					
Oligodon sublineatus	VU	*Oligodon sublineatus*	VU					
Boiga barnesii	VU	*Boiga barnesii*	VU					
Dendrelaphis schokari	VU	*Dendrelaphis schokari*	VU					
Dendrelaphis caudolineolatus	VU	*Dendrelaphis caudolineolatus*	VU					
Cylindrophis maculatus	VU	*Cylindrophis maculatus*	VU					
Cyrtodactylus soba	VU	*Cyrtodactylus soba*	VU					
Cyrtodactylus yakhuna	VU	*Cyrtodactylus yakhuna*	VU					
		Ceratophora erdeleni	CR	*Ceratophora erdeleni*	CR			
		Cnemaspis kohukumburai	CR	*Cnemaspis kohukumburai*	CR			
		Cnemaspis ingerorum	CR	*Cnemaspis ingerorum*	CR			
		Cnemaspis phillipsi	CR	*Cnemaspis phillipsi*	CR			
		Cnemaspis butewai	CR	*Cnemaspis butewai*	CR			
		Cnemaspis samanalensis	CR	*Cnemaspis samanalensis*	CR			
		Cnemaspis nilgala	CR	*Cnemaspis nilgala*	CR			
		Cnemaspis tropidogaster	CR	*Cnemaspis tropidogaster*	CR			
		Cnemaspis gotaimbarai	CR	*Cnemaspis gotaimbarai*	CR			
		Cnemaspis nandimithrai	CR	*Cnemaspis nandimithrai*	CR			
		Aspidura desilvai	CR	*Aspidura desilvai*	CR			
		Aspidura deraniyagalae	CR	*Aspidura deraniyagalae*	CR			

THREAT	SITE		HABITAT		INTENSIVE CARE	SINGLE SPECIES
	Indotyphlops leucomelas	CR	*Indotyphlops leucomelas*	CR		
	Calliophis haematoetron	EN	*Calliophis haematoetron*	EN		
	Cnemaspis alwisi	EN	*Cnemaspis alwisi*	EN		
	Cnemaspis kivulegedarai	EN	*Cnemaspis kivulegedarai*	EN		
	Cnemaspis molligodai	EN	*Cnemaspis molligodai*	EN		
	Cnemaspis punctata	EN	*Cnemaspis punctata*	EN		
	Dendrelaphis sinharajensis	EN	*Dendrelaphis sinharajensis*	EN		
	Hemidactylus hunae	EN	*Hemidactylus hunae*	EN		
	Hemidactylus pieresii	EN	*Hemidactylus pieresii*	EN		
	Lankascincus greeri	EN	*Lankascincus greeri*	EN		
	Lycodon carinatus	EN	*Lycodon carinatus*	EN		
	Nessia hickanala	EN	*Nessia hickanala*	EN		
	Oligodon calamarius	EN	*Oligodon calamarius*	EN		
	Rhabdophis ceylonensis	EN	*Rhabdophis ceylonensis*	EN		
	Rhinophis dorsimaculatus	EN	*Rhinophis dorsimaculatus*	EN		
	Rhinophis porrectus	EN	*Rhinophis porrectus*	EN		
	Rhinophis tricoloratus	EN	*Rhinophis tricoloratus*	EN		
	Sitana bahiri	EN	*Sitana bahiri*	EN		
	Cnemaspis podihuna	VU	*Cnemaspis podihuna*	VU		
	Cnemaspis upendrai	VU	*Cnemaspis upendrai*	VU		
	Sitana devakai	VU	*Sitana devakai*	VU		
	Calotes desilvai	CR				
	Cnemaspis godagedarai	CR				
	Cnemaspis hitihamii	CR				
	Cnemaspis latha	CR				
	Cnemaspis menikay	CR				
	Cnemaspis rajakarunai	CR				
	Cnemaspis retigalensis	CR				
	Indotyphlops lankaensis	CR				
	Lankascincus deignani	CR				
	Rhinophis erangaviraji	CR				
	Rhinophis phillipsi	CR				
	Rhinophis roshanpererai	CR				
	Aspidura copei	EN				
	Aspidura drummondhayi	EN				
	Aspidura trachyprocta	EN				
	Calotes manamendrai	EN				
	Chalcidoseps thwaitesi	EN				
	Cnemaspis kallima	EN				
	Cnemaspis kumarasinghei	EN				
	Cnemaspis pulchra	EN				
	Cyrtodactylus edwardtaylori	EN				
	Cyrtodactylus ramboda	EN				
	Cyrtodactylus subsolanus	EN				
	Hemidactylus scabriceps	EN				
	Indotyphlops malcolmi	EN				

THREAT	SITE		HABITAT	INTENSIVE CARE	SINGLE SPECIES
	Lankascincus sripadensis	EN			
	Lankascincus taprobanensis	EN			
	Nessia bipes	EN			
	Nessia didactyla	EN			
	Nessia monodactyla	EN			
	Rhinophis blythii	EN			
	Rhinophis drummondhayi	EN			
	Rhinophis philippinus	EN			
	Aspidura brachyorrhos	VU			
	Aspidura ceylonensis	VU			
	Aspidura guentheri	VU			
	Cnemaspis anslemi	VU			
	Cnemaspis gemunu	VU			
	Lankascincus taylori	VU			
	Nessia sarasinorum	VU			
	Rhinophis saffragamus	VU			
26 species	102 species		41 species	2 species	0 species

APPENDIX V

A2P conservation planning buckets and multi-species bundles for the 102 threatened species of Sri Lankan snakes and lizards

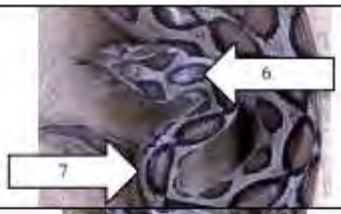
Family	Species	Draft IUCN RL cat.	Site											Habitat	Threat			Intensive care	Single species
			Wilpattu	Ritigala	Knuckles	Gannoruwa FR	Nilgala	Peak WS	Kalupahana	Morningside & HE Plains	Enasalwatta	Ramalkanda	Non A2P KBA		Snake persecution	Pet trade	Other non A2P threat		
AGAMIDAE	***Calotes desilvai***	CR								**X**	**X**								
	Ceratophora erdeleni	CR								**X**	**X**			X					
	Ceratophora karu	CR								**X**	**X**			X		**X**			
	Cophotis dumbara	CR			**X**									X		**X**			
GEKKONIDAE	*Cnemaspis butewai*	CR											X	X					
	Cnemaspis godagedarai	CR									**X**								
	Cnemaspis gotaimbarai	CR											X	X					
	Cnemaspis hitihamii	CR											X						
	Cnemaspis ingerorum	CR											X	X					
	Cnemaspis kohukumburai	CR											X	X					
	Cnemaspis latha	CR																	
	Cnemaspis menikay	CR																	
	Cnemaspis nandimithrai	CR											X	X					
	Cnemaspis nilgala	CR					**X**							X					
	Cnemaspis phillipsi	CR			**X**								X	X					
	Cnemaspis rajakarunai	CR											X						
	Cnemaspis retigalensis	CR		**X**															
	Cnemaspis rammalensis	CR										**X**		X		**X**			
	Cnemaspis samanalensis	CR						**X**						X					
	Cnemaspis scalpensis	CR				**X**								X			X		
	Cnemaspis tropidogaster	CR											X	X					
GERRHOPILIDAE	***Gerrhopilus mirus***	CR											X				X		
NATRICIDAE	***Aspidura desilvai***	CR			**X**									X					
	Aspidura deraniyagalae	CR											X	X					
	Aspidura ravanai	CR						**X**						X				**X**	
SCINCIDAE	***Lankascincus deignani***	CR				**X**													
	Nessia layardi	CR											X					**X**	
TYPHLOPIDAE	***Indotyphlops leucomelas***	CR										**X**	X	X					
	Indotyphlops lankaensis	CR											X						
UROPELTIDAE	***Rhinophis erangaviraji***	CR									**X**								
	Rhinophis phillipsi	CR											X						
	Rhinophis roshanpererai	CR							**X**										
AGAMIDAE	***Calotes liocephalus***	EN						**X**								**X**			
	Calotes manamendrai	EN			**X**														
	Calotes nigrilabris	EN						**X**	**X**								X		
	Calotes pethiyagodai	EN			**X**											**X**			
	Ceratophora aspera	EN						**X**		**X**			X	X		**X**			
	Ceratophora stoddartii	EN						**X**	**X**				X			**X**	X		

Family	Species	Draft IUCN RL cat.	Site										Habitat	Threat			Intensive care	Single species
			Wilpattu	Ritigala	Knuckles	Gannoruwa FR	Nilgala	Peak WS	Kalupahana	Morningside & HE Plains	Enasalwatta	Ramalkanda	Non A2P KBA		Snake persecution	Pet trade	Other non A2P threat		
	Ceratophora tennentii	EN			**X**								X			**X**			
	Cophotis ceylanica	EN						**X**					X			**X**	X		
	Sitana bahiri	EN											X	X					
COLUBRIDAE	***Dendrelaphis sinharajensis***	EN								**X**			X	X					
	Lycodon carinatus	EN								**X**			X	X					
COLUBRIDAE	***Oligodon calamarius***	EN								**X**			X	X					
ELAPIDAE	***Calliophis haematoetron***	EN			**X**								X	X					
GEKKONIDAE	*Cnemaspis alwisi*	EN											X	X					
	Cnemaspis kallima	EN			**X**								X						
	Cnemaspis kivulegedarai	EN											X	X					
	Cnemaspis kumarasinghei	EN											X						
	Cnemaspis molligodai	EN								**X**				X					
	Cnemaspis pulchra	EN									**X**								
	Cnemaspis punctata	EN			**X**								X	X					
	Cyrtodactylus edwardtaylori	EN							**X**				X						
	Cyrtodactylus fraenatus	EN				**X**											X		
	Cyrtodactylus ramboda	EN											X						
	Cyrtodactylus subsolanus	EN									**X**								
	Hemidactylus hunae	EN					**X**						X	X					
	Hemidactylus pieresii	EN				**X**				**X**				X					
	Hemidactylus scabriceps	EN																	
GERRHOPILIDAE	***Gerrhopilus ceylonicus***	EN				**X**							X				X		
NATRICIDAE	***Aspidura copei***	EN						**X**											
	Aspidura drummondhayi	EN								**X**									
	Aspidura trachyprocta	EN						**X**	**X**				X						
	Rhabdophis ceylonensis	EN						**X**		**X**			X	X					
SCINCIDAE	***Chalcidoseps thwaitesi***	EN			**X**								X						
	Lankascincus greeri	EN								**X**				X					
	Lankascincus sripadensis	EN						**X**											
	Lankascincus taprobanensis	EN						**X**	**X**										
	Nessia bipes	EN		**X**	**X**								X						
	Nessia didactyla	EN											X						
	Nessia hickanala	EN	**X**											X					
	Nessia monodactyla	EN											X						
TYPHLOPIDAE	*Indotyphlops malcolmi*	EN											X						
UROPELTIDAE	***Rhinophis blythii***	EN						**X**											
	Rhinophis dorsimaculatus	EN	**X**											X					
	Rhinophis drummondhayi	EN							**X**										
	Rhinophis homolepis	EN											X				X		
	Rhinophis philippinus	EN											X						
	Rhinophis porrectus	EN	**X**											X					
	Rhinophis tricoloratus	EN								**X**			X	X					
VIPERIDAE	***Hypnale nepa***	EN			**X**			**X**							**X**				

Family	Species	Draft IUCN RL cat.	Site											Habitat	Threat			Intensive care	Single species
			Wilpattu	Ritigala	Knuckles	Gannoruwa FR	Nilgala	Peak WS	Kalupahana	Morningside & HE Plains	Enasalwatta	Ramalkanda	Non A2P KBA		Snake persecution	Pet trade	Other non A2P threat		
AGAMIDAE	***Lyriocephalus scutatus***	VU			X	X		X		X	X		X			X	X		
	Sitana devakai	VU												X					
COLUBRIDAE	***Boiga barnesii***	VU				X				X			X		X				
	Dendrelaphis caudolineolatus	VU			X			X		X			X		X				
	Dendrelaphis schokari	VU			X			X		X			X		X				
COLUBRIDAE	***Oligodon sublineatus***	VU		X						X			X		X				
CYLINDROPHIIDAE	***Cylindrophis maculatus***	VU	X	X				X		X			X		X				
GEKKONIDAE	*Calodactylodes illingworthorum*	VU											X	X			X		
	Cnemaspis anslemi	VU						X											
	Cnemaspis gemunu	VU											X						
	Cnemaspis podihuna	VU											X	X					
	Cyrtodactylus soba	VU			X												X		
	Cnemaspis upendrai	VU											X	X					
	Cyrtodactylus yakhuna	VU														X			
NATRICIDAE	***Aspidura brachyorrhos***	VU		X	X	X	X	X		X			X						
	Aspidura ceylonensis	VU			X	X		X					X						
	Aspidura guentheri	VU						X		X	X	X	X						
SCINCIDAE	*Dasia haliana*	VU												X			X		
	Lankascincus taylori	VU			X	X				X			X						
	Nessia sarasinorum	VU		X	X		X												
UROPELTIDAE	*Rhinophis saffragamus*	VU											X						
Total number of threatened species in A2P bundle			**4**	**6**	**20**	**10**	**4**	**22**	**7**	**22**	**9**	**3**	**N/A**	**N/A**	**6**	**11**	**12**	**N/A**	**N/A**
Total number of species in A2P bucket									**102**				**58**	**41**		**26**		**2**	**0**

APPENDIX VI

Medically important snakes of Sri Lanka in a nutshell - snake Identification guide sheet by Anslem de Silva

Black snake with paired or single white bands (Fig.1) (in adults these are not distinct). Vertebrals or central row of dorsal scales much larger than costals (Fig.2).		Kraits, highly venomous
Flat rudder shape tail (Fig.3) – from sea or lagoon		Highly venomous
Distinct hood with two black spots on the ventral aspect (Fig.4). Dorsal side with spectacle or other marking (Fig.5)		Cobra – highly venomous. In a dead specimen, the hood could be spread out to see the markings
Triangular shape head with a white V shape mark (Fig.6). three chains of large spots, central large and distinct (Fig.7)		Russell's viper – highly venomous
Brownish snake with distinct cross like mark on the head (Fig.8)		Saw scale viper – venomous
Flat triangular head With large scales (Fig. 9). A pit between eye and nostril (Fig. 10). Snout raised.		Hump nosed viper – venomous
Green snake, large triangular head with a pit between eye and nostril (Fig.11)		Green pit viper – venomous