ORANGUTAN ACTION PLAN FOR SABAH

2020-2029

Sabah Wildlife Department
Ministry of Tourism, Culture and Environment

ORANGUTAN ACTION PLAN
FOR SABAH

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EXECUTIVE SUMMARY

This Orangutan State Action Plan (SAP) is covering a 10-year period, starting in 2020. It is the continuation of the first State Action Plan that was produced for this species in 2012. Today, Sabah is a major stronghold for the Bornean orangutan, and much has been achieved over the past few years. However, the species remains critically endangered. In the new Anthropocene era, co-existence between people and orangutan is the key to give a chance of long-term survival for this iconic species. Recent findings show that the species can adapt to habitat degradation and can even be found in agricultural landscape. But ensuring its viability requires a shift in our conservation strategies. It requires to incorporate the agriculture landscape and other non-protected areas in the overall orangutan conservation framework. This new thinking is reflected in the current Action Plan. In fact, it forms the backbone of this document.

A total of five non-site specific and a series of site-specific objectives were identified during the development of this Plan. They are presented in this document.

Objective 1. Halt habitat loss and restore orangutan habitat across the landscape

- No forest conversion to be permitted into key orangutan priority areas
- Identify where major forest corridors must be maintained or created to facilitate orangutan dispersal and gene flow across the State
- Ensure minimum forest degradation
- Implement large-scale forest restoration

Objective 2. Ensure better protection of orang-utans across their entire habitat

- Ensure more effective law enforcement to secure long-term viability of orangutan meta-population
- Increase awareness and education of all stakeholders to inform them about the protected and endangered status of the orangutan

Objective 3. Ensure that orangutan can survive in agricultural landscapes

- Increase and improve orangutan habitat inside oil palm plantations
- Ensure a zero-orangutan loss within plantations

Objective 4. Ensure the best ex-situ practices for orangutan management and conservation

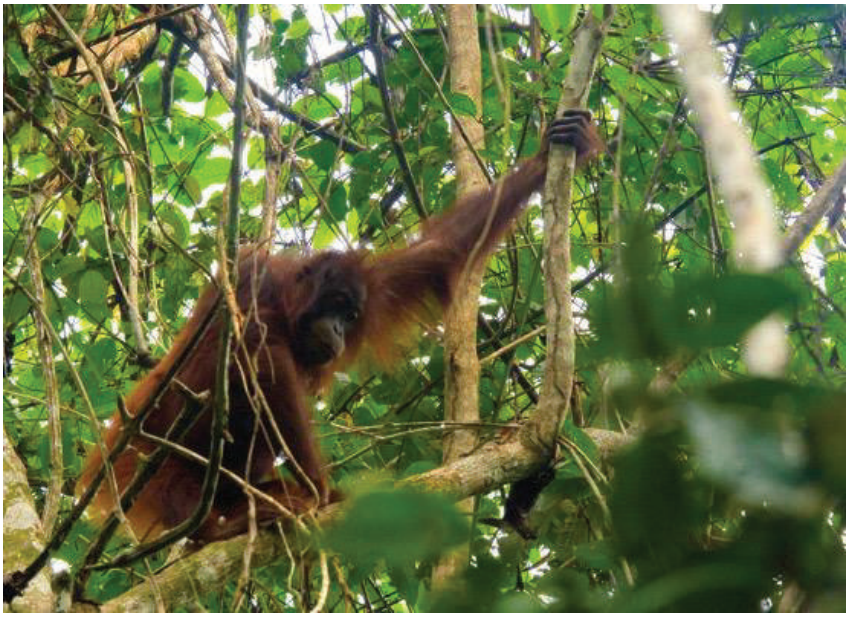
- Re-assess the function of capture and translocation as a possible conservation tool

Objective 5. Need to monitor and predict orangutan population trends.

- Ensure that this SAP is known from all State agencies in charge of initiating large development projects and land use changes
- Ensure a regular monitoring of the orangutan status in Sabah
- Set up an Endangered Species Conservation Unit (ESCU)

Objective 6: Site-specific priority actions

- Secure and maintain large orangutan populations in Sabah
- Support smaller orangutan populations in Sabah



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PREAMBLE

This Orangutan State Action Plan is covering a 10-year period, starting in 2020. It is the continuation of the first State Action Plan that was produced for this species in 2012.

The frame and contents of the first Action Plan were based on recommendations proposed by consensus during the "2003 International Workshop" and "2009 Orangutan Conservation Colloquium". The first State Action Plan combined a total of 19 priority actions and 74 activities. Seven actions were non-site specific, seven were site-specific and five were overarching priority actions (including ex-situ activities). The absence of clear and practical Key Performance Indicators attached to the first SAP hampered a thorough quantification of its delivery. A qualitative assessment of the Plan was conducted via consultation with local experts and practitioners (interviews) and the analysis of conservation activities undertaken in the State during the period of the Plan (newspaper articles, news, policies, scientific articles and etc.). Results of this assessment are briefly presented in Table 1.

Table 1: Results of the qualitative assessment of the first Orangutan State Action Plan delivery.

	Number	Not done	On-going	Done
Non-site Priority Actions	7	1	6	-
• Activities	30	5	15	10
Site-specific Priority Actions	7	2	2	3
• Activities	26	4	6	16
Overarching Priority Actions	5	2	2	1
• Activities	18	5	6	6

Some of the most notable achievements during the period of the first SAP include:

- *More protected areas for orangutans*: between 2006 and 2018, the State Government increased by 84% the area covered by Total Protected Areas (TPAs) in Sabah, from 15.8% of the total land mass in 2006 to 25.5% in 2018. In 2018, TPAs in Sabah represented a surface of 1,874,000 ha. These TPAs were home to about 80% of the total orangutan population found in Sabah (*vs* about 30% in 2006).
- *High Priority Areas for Orangutan Conservation are maintained within Commercial Forest Reserves:* overall, the total forest area covered by a Forest Management Plan represents 2.32 million ha (or 66% of the total forest estate in Sabah): 1.65 million ha is managed for timber and agroforestry (under a Forest Management Plan or FMP) while 0.67 million ha is managed for conservation purpose (under a Conservation Management Plan or CAMP).
- *Improved connectivity of highly fragmented orangutan populations living in Segama and Kinabatangan floodplains:* a combination of active land acquisition (mostly led by conservation NGOs) and active gazettement process of key state land parcels (mostly led by the SFD and State Government) is slowly improving connectivity at the landscape level.

- *Proposed highway and bridge project in Lower Kinabatangan stopped by the State Cabinet in 2017.*
- *First successful prosecutions against orangutan poachers.*

However, several priority actions (and activities) described in the Plan were not followed or achieved, for example:

- *The SAP was not tabled before the State Cabinet and therefore was never endorsed officially by the government*.
- *The Sabah Orangutan Conservation Alliance (SOCA) was not created*. SOCA was supposed to be officially in charge of implementing the SAP. As a result, the implementation and evaluation of the previous SAP has been done on an *ad hoc* basis and left to the various partners who took an interest in its implementation.
- *Degazettement and conversion of forest areas that were home to orangutans*: mangrove forest reserves (19% of the total mangroves in the state were degazetted); parts of Gunung Rara Class II CFR were reallocated to Benta Wawasan and other companies for conversion to plantations and other types of land uses; 40,000 ha of Bongayya Class II CFR forest were converted to other types of land uses (primarily oil palm plantations).
- *Most plantations do not respect the proposed 100 m wide wildlife corridors along major rivers.*
- *A clear process whereby inputs from orangutan experts would be incorporated in the development of official plans, policies and large land use changes (such as FMPs, Pan Borneo Highway) is still lacking.*

The current Orangutan State Action Plan was developed based on the results of the analysis of the previous SAP. It also received inputs generated during the International Orangutan PHVA held in Jakarta (May 2017) and several consultations with key stakeholders in Sabah.

1. INTRODUCTION

1.1. Taxonomy

Today, two species of orangutans are found in Sumatra (*Pongo abelii* and *Pongo tapanuliensis*), while another species *(Pongo pygmaeus)* is found in Borneo. The Bornean orangutan is further split into three subspecies:

P. p. pygmaeus: Northwest Bornean Orangutan:
- State of Sarawak (Malaysia)
- Province of West Kalimantan (Indonesia)

P. p. wurmbii: Southwest Bornean Orangutan:
- Province of West Kalimantan (Indonesia)
- Province of Central Kalimantan (Indonesia)

P. p. morio: Northeast Bornean Orangutan:
- State of Sabah (Malaysia)
- Province of North Kalimantan (Indonesia)
- Province of East Kalimantan (Indonesia)

1.2. Legal status and legislation

The orangutan is banned from international trade by being listed on Appendix 1 of CITES (Convention of International Trade in Endangered Species of Flora and Fauna). Bornean orangutans are now "Critically Endangered" under the IUCN (World Conservation Union) Red List (Ancrenaz *et al.,* 2016).

In Malaysia, the orangutan is a totally protected species since 1958. In Sabah, the species is totally protected under Schedule 1 of the Sabah Wildlife Conservation Enactment 1997, meaning that orangutans cannot be hunted or shot under any circumstance. Killing an orangutan or possessing orangutan products (skull, skin, bones, etc.) is an offence under section 25 of the WCE 1997. The penalty is a minimum fine of 50,000 MYR and maximum of 250,000 MYR, plus imprisonment for no less than six months and up to five years.

1.3. Ecology and behaviour

Bornean orangutans are the largest arboreal mammals in the world, although they walk significant distances on the ground (Ancrenaz *et al*., 2014). Bornean orangutans live a semi-solitary life and rarely aggregate in groups. Males are the dispersing sex: upon reaching sexual maturity (at around 15 years old), they leave the area where they were born to establish large territories covering several hundred hectares. Females' territories are smaller, with actual size depending on forest type and availability of food resources. Females reach maturity at 15 years old; they generally give birth to a single infant after a gestation period of approximately 250-260 days. Bornean orangutans are very slow breeders and produce on average, one offspring every 7.6 years (van Noordwijk *et al*., 2018), which explains their extreme sensitivity to hunting pressure.

Orangutans are generalist plant feeders and adapt their diet to natural resources available in the forest, explaining why they can cope to a certain extent with forest degradation following low and sustainable timber extraction (Ancrenaz *et al*., 2010): Text Box 1. They eat mostly fruits, and complement their diet with young leaves, flowers, tree bark, and insects.

Text Box 1: Orangutan adaptation to over-degraded and fragmented forests of Lower Kinabatangan

Orangutans are more adaptable than previously thought and are thriving in the highly degraded forests of the Lower Kinabatangan Wildlife Sanctuary (Oram, 2018). There, they find sufficient food because of the abundance of pioneer plant species (especially vines and climbers), that contribute more than one third of their food. They breed well and raise their young to maturity successfully (van Noordwijk *et al.,* 2018), cope with habitat structure (Davies *et al.,* 2017), and can disperse on the ground to reach forest fragments if necessary (Ancrenaz *et al.,* 2014).

Increasingly over the years in Kinabatangan, we have witnessed more occurrences of wild orangutans using the palm oil landscape when they disperse or look for supplemental food (Ancrenaz *et al.*, 2015). Animals are venturing into the plantations (sometimes at night), to feed on palm fronds, fruits and occasionally build their nests in palm trees, although they seem to favor non-palm oil trees when available for nesting.

Since orangutans require broad floristic diversity to satisfy their nutritional needs (Russon *et al.,* 2009), pure stands of oil palms or industrial tree monoculture alone cannot sustain viable orangutan populations. However, it is urgent to acknowledge that wild orangutans are using increasingly these production landscapes on a regular basis. Therefore, these agricultural areas must also be considered as being part of the overall orangutan range, provided that natural forests required to supply the necessary plant diversity to support this large bodied great ape are retained within the overall landscape: Text Box 2.

The preservation of genetic diversity is critical to maintain the orangutan meta-populations (Goossens *et al.*, 2006a), but today it is still unknown if these non-protected forest "islands" located within the oil palm landscape will be sufficient enough to sustain viable groups of animals in the long-term. Therefore, we need to better understand the dynamic of orangutans in agricultural landscapes to make these commercial areas more resilient for the species.

Text Box 2: What is an orangutan habitat?

When speaking of orangutan, habitat and forest seem to be interchangeable terms. However, habitat is species-specific: it describes where a given species lives. Habitat is also a dynamic notion, especially for adaptable species such as the orangutan that can cope to a certain extent with major changes in its environment. Traditionally, the prime orangutan habitat was associated to primary forest, especially forests located in floodplains. Over the past 20 years however, scientists have learnt that orangutans could survive in forests exploited for timber, and today this production landscape is recognized as an integral part of the orangutan habitat. In fact, the majority of wild populations in Borneo are currently found in degraded forests and in forests that are still exploited for timber.

The development of commercial agricultural monoculture requires large-scale forest clearing: forest loss results in a net habitat loss for the orangutan. When the forest is destroyed, some of the animals will take refuge in the forest patches retained in the overall landscape. However, with time, orangutans surviving in these forest patches will increase their range by using the mature oil palm dominated landscapes that used to be part of their former range. Indeed, recent research shows that orangutans are found in acacia or oil palm plantations (HUTAN, unp. data), and a fraction of these agricultural landscapes is increasingly becoming a part of the orangutan habitat.

1.4. Current distribution and population trends

The primary habitat of Bornean orangutans is the lowland old-growth and mosaic forests below 500m above sea level. Bornean orangutans were most abundant along large watercourses in inundated and semi-inundated areas, where movement between different habitat types could buffer them against shortages in food availability in a specific habitat type. Orangutans can also be found as high as 1,500 m *asl*, but at lower densities than in lowland areas. Large rivers are natural barriers and limit dispersal (Goossens *et al.,* 2005). Orangutans are also found in selectively logged forests (Ancrenaz *et al*., 2010), sustainable production forests i.e. Deramakot (Mannan *et al*., 2003) and even in monoculture acacia plantations (Meijaard *et al*., 2010).

Climatic change and human pressure have resulted in significant reductions in the range and numbers of Bornean orangutans during the recent historic past (Goossens *et al*., 2006a; Meijaard *et al*., 2010b). Today, we estimate that more than half of the current orangutan range in Borneo has been or is slated for agricultural development and other types of land uses, such as timber extraction or mining (Wich *et al*., 2012). A recent analysis indicated that between 20,000 and 25,000 orangutans were likely to occur in small forest patches within agricultural landscapes across the island (Voigt *et al.,* 2018).

In 2016, the IUCN Red List classified the Bornean orangutan (*Pongo pygmaeus*) as "Critically Endangered" (Ancrenaz *et al*., 2016) as a result of the drastic decline of their population size in the wild.

1.5. Major threats

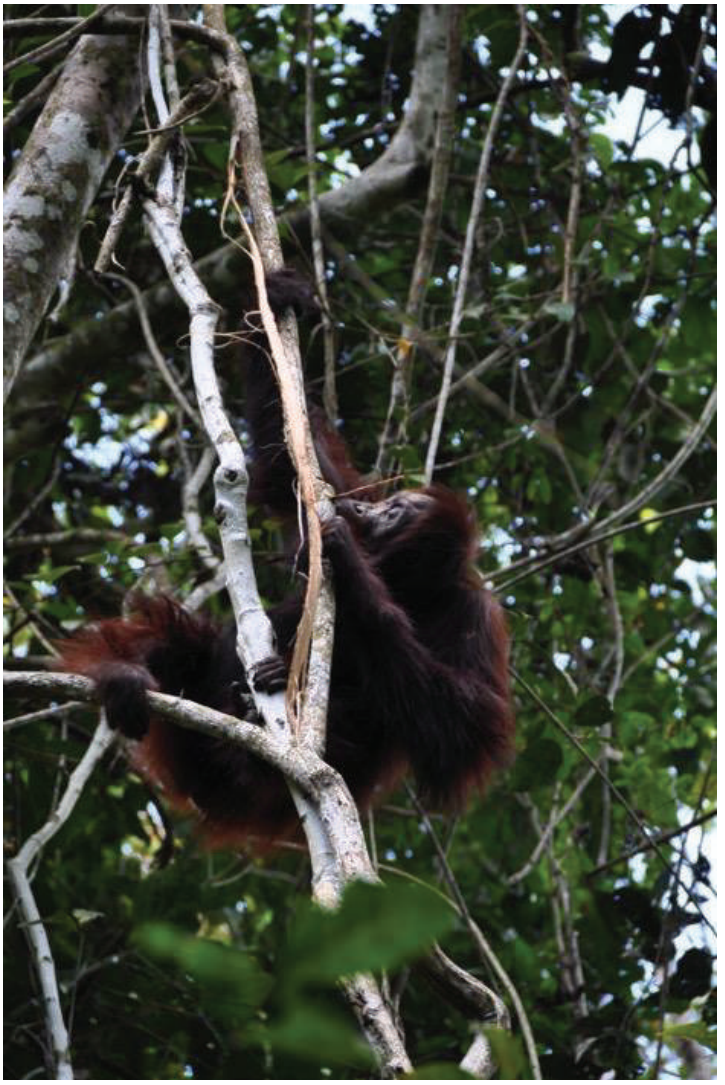
The drastic decline of orangutans in Borneo is a result of (1) forest loss and fragmentation due to the conversion of their forest habitat to other types of land uses (primarily agriculture and mining); and 2) hunting due to conflicts and for bushmeat (Davis *et al*., 2013).

Lowland forests are the preferred orangutan habitat and are also the prime target areas for agricultural development, explaining the rate of orangutan habitat loss. Satellite data showed that in Borneo, 40% of key orangutan habitat was destroyed between 1973 and 2010 (Gaveau *et al.,* 2014). In Sabah, palm oil accounted for 57-60% of all conversion of species-rich rainforests between 1973 and 2015 (Gaveau *et al*., 2016). In these newly created man-made landscapes, orangutans often seek refuge in whatever forest patches are left. In these circumstances, animals can be displaced, and they move into forests that are already inhabited by other wild orangutans. This influx of newcomers from nearby home ranges (which is called the 'compaction' effect) has unknown long-term social impacts on the resident populations. Habitat fragmentation is an ever-increasing threat across the species' range. Linear infrastructures (roads, bridges, dams and railways) split populations into smaller subpopulations and give access to poachers, settlers and other human encroachment, putting new pressures on remote populations. In addition, more fragmentation results in a higher proportion of the orangutan habitat being bordered by non-forest, which carries new survival risks, such as potentially dangerous encounters with people or dogs, infrastructures (e.g. electrical lines) and exposure to diseases from humans and domestic animals. The latter particularly needs specific attention because of the almost total lack of knowledge about disease risk management.

Results of recent modelling exercises indicated that in Sabah, several thousands of orangutans may have died since the late 2000's as a result of habitat fragmentation and conflicts with people (Santika *et al*., 2017; Voigt *et al*., 2018). The models showed that most of these animals were found in small patches of forest located outside of the Permanent Forest Estate (PFE) of the State or in suboptimal habitat, such as mangrove areas. Since these small populations had never been surveyed before, their number was never accounted for when the most comprehensive State population estimate baseline was produced in the early 2000's (Ancrenaz *et al*., 2005). New findings show that maintaining small groups of animals outside of the major orangutan populations is paramount to sustain the orangutan meta-population in the long-term; it is thus urgent to better document the status of these small populations to mitigate the negative impacts of fragmentation.

People have traditionally hunted orangutans to mitigate conflicts or for meat consumption (Wich *et al.,* 2012; Davis *et al*., 2013). Across Borneo, interview surveys revealed that between 2,000 and 3,000 individuals were killed annually on average (Meijaard *et al*., 2011). Given their exceptionally slow reproductive rate (van Noordvijk *et al*., 2018), the mortality rate due to hunting can easily exceed the natural breeding rate and drive populations to extinction, even before these losses can be documented (Marshall *et al*., 2006). Inadequate knowledge about the orangutan protection status, weak enforcement of existing laws and poor prosecution of people responsible for lethal conflict mitigation, illegal trade, and poaching for bushmeat of orangutans are major obstacles to improving the situation on the ground.

Figure 1: Bornean orang-utans (*Pongo pygmaeus morio*) eat primarily fruits but rely on bark, leaves, flowers and insects to complement their diet during periods of fruit scarcity.



2. DISTRIBUTION IN SABAH AND SITE DESCRIPTION

The first orangutan comprehensive surveys in Sabah were conducted by Payne in the late 1980's. These surveys showed that all major populations were concentrated in the eastern side of Sabah. However, two substantial populations were also found in western Sabah, in the Crocker Range and Kinabalu National Parks. The baseline data collected by HUTAN and SWD in the early 2000's recognized 16 Major Orangutan Populations (SAP, 2011) and confirmed that most orangutan populations were located in the eastern side of the State. These surveys also revealed that orangutans used to occur in the western and northern parts of the State, but that many populations had been driven to extinction because of hunting for meat or for traditional medicine (SWD, unp. data).

Today, the largest orangutan populations in Sabah are either found in Totally Protected Areas (TPAs) or in Commercial Forest Reserves (CFRs) exploited for timber, following sustainable forestry practices. Recent aerial nest surveys conducted in 2014-2017 by WWF in eight of the 16 major orangutan populations recognized in the early 2000's (Table 2), as well as the regular long-term monitoring of the Kinabatangan population suggested that (Simon *et al*., 2019):

- Over the past 15 years, the major populations found in the interior forests of Sabah (either totally protected or sustainably exploited) have maintained their size. This encouraging result is primarily due to the decrease of forest conversion rate (legal or illegal) within the PFE of Sabah, and to the relatively low hunting pressure in the Central Forests of the State. ***Protecting the Central Forests of Sabah that are home to the largest orangutan population in Malaysia is a necessary and efficient conservation strategy for the species.***

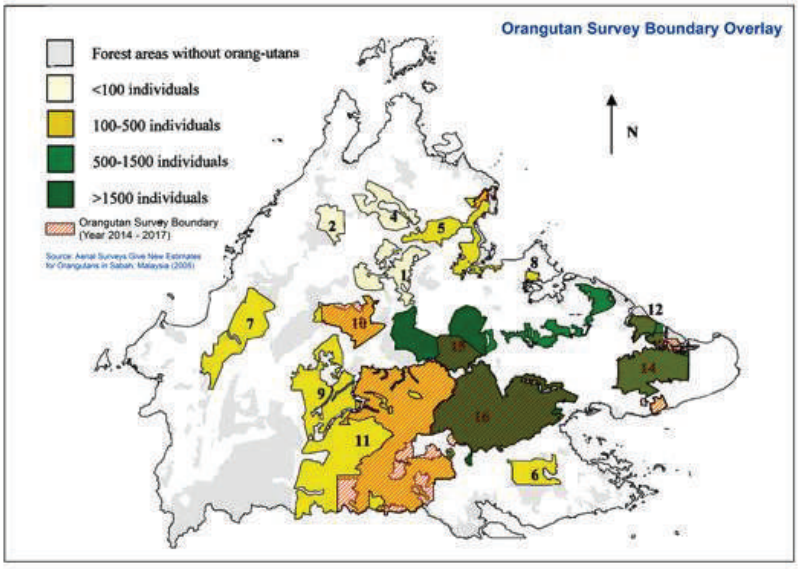
- Over the past 15 years, the worst decline occurred in highly fragmented populations, such as the Lower Kinabatangan. The major losses affected small subpopulations that were located in forest patches isolated within agricultural landscapes or that had taken refuge in suboptimal habitat, such as mangrove forests. Since the vast majority of these small groups had never been surveyed in the past, an unknown number of animals have disappeared over the past 15 years. However, existence of these "ghost" orangutans was detected by recent ground surveys, and by using generalized linear modeling and a hierarchical Bayesian approach (Santika *et al*., 2017; Voigt *et al*., 2018; HUTAN, 2018). Although the larger orangutan populations seem to stabilize in the interior forests of Sabah, these models show that orangutan numbers are still declining in the State overall. ***It is a priority to detect all small sub-populations living outside of protected areas. It is also a priority to identify adequate management options to maintain or restore the critical connectivity necessary to sustain a healthy genetic diversity and the long-term viability of the overall meta-population of the State***.

Table 2: Table showing population size trend over a 15-year period (Note that some of the survey areas between Imbak-Kalabakan and Kuamut does not overlap: see Figure 2).

			Habitat (km^2)		Estimated orangutan population size	
No.	**Population**	**Status**	**2002**	**2017**	**2002**	**2017**
1	Ulu Tungud	NP	720	na	29 (9-99)	na
2	Mount Kinabalu	P	200	200	50 (25-75)	na
3	Silabukan	P	100	105	58 (21-159)	51 (34-76)
4	Lingkabau****	NP	300	na	100 (75-150)	na
5	Bongayya	NP	600	85	111(38-324)	118 (79-175)
6	Ulu Kalumpang	P	480	480	144 (54-408)	na
7	Crocker Range	P	900	900	181 (62-528)	na
8	Sepilok	P	40	40	200 (100-300)	na
9	Pinangah	NP	1,000	na	223 (77-644)	na
10	Trus Madi	P	80	128	37(13-102)	46 (31-70)
		NP	600	676	245(88-682)	272 (181-410)
11	Kuamut*	NP	4,600		262 (80-160)	
		P	860		51 (17-166)	
	Imbak Kalabakan*	P		2,175		694 (458-1,051)
		NP		2,630		
12	Kulamba	P	170	387	500 (182-1,369)	361 (223-488)
13	Kinabatangan	P	410	410	1125 (690-1,800)	785 (414-1467)***
14	Tabin	P	1110	1110	1401 (517-3,796)	1207 (813-1,794)
15	Upper Kinabatangan					
	Tawai	P	210		15 (5-49)	na
	Tangkulap	NP	350		217 (79-594)	na
	Deramakot	NP	530	551	792 (292-2,148)	887 (597-1,318)
	Lokan	NP	580	580	692 (225-1,874)	na
16	Segama					
	Not Protected	NP	3150	204	4584 (2,064-11.064)	271 (182-402)
	Protected	P	480	3488	498 (183-1,050)	4,775 (3,216-7,089)

NP=Not Protected; P=Protected; na=non available; *Maliau Basin not surveyed in 2017, explaining the difference of area size; **Only populations for which we have precise densities per LOT; ***data from KOCP regular monitoring; **** estimate from Payne (1987)

Figure 2. Map showing the survey areas in 2005 and 2017.



3. NON SITE SPECIFIC PRIORITY ACTIONS

OBJECTIVE 1

HALT HABITAT LOSS AND RESTORE ORANGUTAN HABITAT ACROSS THE LANDSCAPE

Activity 1.1. No forest conversion to be permitted into key orangutan priority areas

Rationale: The future of orangutans in Sabah will very much depend on the long-term security of large, strictly protected forests where illegal logging and hunting will be efficiently controlled and where orangutan populations remain large enough to cope with catastrophic events such as fires, climate change and disease outbreaks.

Measures to be taken:

Action 1.1.1. Enforce environmental protection laws

- Strict compliance with EIA's recommendations and Malaysian laws about full protection of riparian forest reserves (see for example the *Sabah DID Guidelines 2000-Procedure on Riparian Buffer Zone*) and forests on slopes greater than 25% throughout the entire commercial area. These areas should be identified on maps and also posted on the ground;
- In the case of forest conversion to agriculture, consultation with the SWD and relevant stakeholders is compulsory, in accordance with section 38 of the WCE, 1997, to identify (1) which specific areas may contain significant orangutan numbers; (2) which areas are needed to be excised from future conversion scheme to allow animals' movement between forest blocks; (3) what conflict mitigation measures would be appropriate to reduce potential conflicts and not jeopardize the future of these animals.

Action 1.1.2. Advocate for full protection status to be given to major orangutan habitat

- Produce a very clear and precise map based on satellite imagery at wider scales and ground surveys at local level showing the location of all forest patches that are being potentially used by orangutans;
- Prepare documentation including recommendations to improve the protected status of key fragments (HCV, HCS, OECMs – Other Effective Conservation Measures- IUCN, 2018);
- Ensure that all private land owners are aware of orangutan presence in their land parcels and are also cognizant of their responsibility to uphold existing laws stipulating the full protection of this critically endangered species;
- Liaise with the SFD and other government agencies to include key orangutan areas in the network of protected forests that is to be finalized by 2025.

Action 1.1.3. Assess the precise orangutan distribution outside of the current network of protected areas

- Finalize the state-wide analysis of orangutan distribution using occupational models (Maxent and similar tools);
- Survey all non-protected forest areas, including HCVF and riparian reserves in plantation and mangrove forests to assess orangutan presence.

Activity 1.2. Identify where major forest corridors must be maintained or created to facilitate orangutan dispersal and gene flow across the State

Rationale: Today, fragmentation of habitat and orangutan populations is a serious threat for the long-term viability of the species in Sabah. Many orangutan populations have lost or are losing their connection with other populations. The priority is to identify all remaining scattered sub-populations, including dispersed individuals that have found refuges in small forest patches across the agricultural landscape. Indeed, small forest patches or suboptimal habitat such as mangrove forests may still retain a significant number of individuals. These small populations provide a much-needed additional reservoir of important genetic diversity, and maintain a proper gene flow across the fragmented landscape that is necessary to sustain the overall meta-population. In the larger landscape, scientifically-based, regional land use planning is needed to delineate zones of interaction around protected forests and their surroundings, encompassing hydrological, ecological and socio-economic interactions. Ideally, the core protected areas will remain connected to other areas of forest that could be used sustainably for (commercial) timber extraction. The design of such living landscapes must be approached across the whole landscape as well as at the site level.

Measures to be taken:

Action 1.2.1. Limit forest fragmentation and support orangutan meta-population by improving connectivity across the entire landscape

- Identify and map isolated orangutan subpopulations, and identify ways to reconnect these subpopulations by creating, restoring or maintaining natural forest corridors (contiguous or stepping-stones);
- Develop and disseminate an Overarching Plan that will identify how orangutan meta-populations are to be reconnected at the state-wide level, that will also consider linkages with North Kalimantan, Indonesia;
- Ensure that corridors are designed to link orangutan populations currently living in the lowland forests of Sabah with highland forests. These highlands could serve as possible refuges with projected global climate change.

Action 1.2.2: Limit further fragmentation of orangutan habitat

- Landscape level: Ensure that any new development project, especially involving linear infrastructures (roads: "Pan Borneo Highway"; electricity lines and other), considers orangutan distribution at its early stage of conception;
- Forest Management Unit (FMU) / estate level: Areas and compartments that ensure the connectivity of already assigned HCVF and other orangutan conservation compartments/areas as mentioned in FMPs and Oil Palm Management Plans need to be designated on maps and on the ground.

Activity 1.3. Ensure minimum forest degradation

Rationale: Although orangutans appear to be more resilient and adaptable than previously thought, forests harbouring orangutans need to be retained and protected from ongoing degradation.

Measures to be taken:

Action 1.3.1. Reinforce the capacity to respond to any forest fire event

- Conduct training and capacity building with all FMU holders for early detection of any fire event;

- Set up an early intervention strategy to better fight and limit widespread fire outbreaks.

Action 1.3.2. Revise current silviculture practices

- New silviculture practices should consider retaining sufficient vines and climbers, since these plants contribute up to one third of the orangutan diet in Sabah (Kanamori *et al.,* 2010; Oram, 2018);
- Produce a list of key climber and liana species that cannot be cut down during silviculture treatments.

Action 1.3.3. Implement forest management practices compatible with orangutan survival

Today, about 20% of the current orangutan populations in Sabah are found in CFR exploited for timber. Sufficient ecological resources are needed in these exploited forests to maintain healthy orangutan populations.

- Keep all "High Priority Areas for Orangutan Conservation in CFR" under Natural Forest Management;
- Expand and implement Reduced Impact Logging (under FSC or MTCC certification) to all CFRs in the State;
- Incorporate a biodiversity (including wildlife) management strategy within every FMP developed for the Forest Reserves of Sabah;
- Ensure that every FMU holder has the in-house capacity to monitor, manage and protect wildlife (including orangutans) properly.

Activity 1.4. Implement large-scale forest restoration

Rationale: Most protected and unprotected forests in Sabah have been extensively logged and exploited until recently. Currently, most of these forests are highly degraded and appear to be in various stages of regeneration. In many highly-degraded areas, natural regeneration is jeopardized by invasive species, seed bank depletion and predation, soil compaction and other ecological factors. Large-scale reforestation and habitat restoration initiatives will accelerate forest regeneration processes and improve forest condition, which is necessary to sustain wildlife.

Action 1.4.1. Enhance orangutan food productivity in severely degraded habitat

- Develop a state-wide programme to guide reforestation exercises, with a special emphasis given to sustain orangutan long-term survival;
- Incorporate wild fruit tree and climber species that are important food for orangutans in all replanting exercises;
- Retain native species climbers and lianas that are part of the orangutan diet during silviculture treatment (see above).

Priority and timeline (objective 1):

- Identification and protection of all orangutan sub-populations (5 years).
- Revise or develop all necessary plans (5 years).
- Forest restoration in key orangutan habitats (10 years).

Lead Agencies: SWD, SFD, SF, SP, EPD.

Partners: FMU holders, Oil Palm Estates, Hutan, Pongo Alliance, WWF, NGOs, UMS.

Success measure/indicator:

- Production of orangutan map outside of PAs.

- Percentage of orangutan range covered by a management plan (within and outside PAs).
- Number, size and location of orangutan corridors.
- Orangutans are using forest corridors and restored habitats.
- Orangutans move freely across agriculture landscapes.

OBJECTIVE 2

ENSURE BETTER PROTECTION OF ORANGUTANS ACROSS THEIR ENTIRE HABITAT

Activity 2.1. Ensure more effective law enforcement to secure long-term viability of orangutan meta-population

Rationale: Being extremely slow breeders, an orangutan population cannot sustain a killing rate of more than 1% of adult females per year. It is thus essential to ensure that no orangutan is killed in protected and non-protected habitats. Data collected in SORC since 1964 shows that both the existence of the Forest Conservation Ordinance 1964 and the WCE 1997 resulted in the influx of orphans to SORC, indicating that strong laws act as a deterrent to orangutan killing. In Sabah, many organizations are involved in anti-poaching activities, but the lack of an overall strategy to address this threat is an impediment to combat wildlife trade.

Measures to be taken:

Action 2.1.1. For the Sabah State Cabinet to endorse all the recommendations described in this SAP (Cabinet Paper)

Action 2.1.2. Revise the WCE, 1997 to reinforce its scope and outcomes and to minimize the current pressure on orangutan and other species

Action 2.1.3. Design adequate strategies to tackle orangutan killing in agricultural and non-agricultural landscapes

- Develop an overall strategy that will map all actors involved in anti-poaching activities and design ways to synergize their efforts in the field;
- Conduct well-organized crime investigation to fight the “cyber crime” that is increasing in Malaysia;
- Assess and evaluate orangutan killing in Sabah by (1) compiling all orangutan poaching records and related information from all Districts of Sabah into a central database; (2) conducting well-structured, scientifically rigorous but culturally appropriate interview surveys in hot spot areas where orangutans may still be killed to access true threat levels.

Action 2.1.4. Reinforce prosecution measures to provide a strong deterrent against killing orangutans and/or acquiring babies for the pet trade and equally for all other fully protected species in Sabah

- Pursue capacity building of the Environmental Court to prosecute poachers more efficiently;
- Encourage prosecution not only of hunters but also pet traders, and buyers of wildlife and wildlife products.

Action 2.1.5. Make anti-poaching efforts more impactful

- Improve the efficiency of the Honorary Wildlife Warden (HWW) network through better communication between the different groups, joint patrolling between HWWs and enforcement agency staff and strategic planning;
- Establish and promote a standardized enforcement platform, i.e. PROTECT;
- Ensure that all enforcement groups are using the same reporting methodology (Spatial Monitoring and Reporting Tool: SMART Conservation software);
- Ensure that systematic control is conducted at each estate gate and increase security at each access point to forests and private plantations (like preventing frauds about duplicating licenses for example);
- Adopt and enforce a zero-snaring policy in Sabah, since orangutans are also victims of these illegal practices;
- Initiate a mobile enforcement unit to faster actions on the ground.

Activity 2.2. Increase awareness and education of all stakeholders to inform them about the protected and endangered status of the orangutan

Rationale: The orangutan is widely accepted as the symbol of Sabah's unique fauna and national treasure, and the species attracts increasing levels of interest, both nationally and internationally. This should be capitalized on as a vehicle for comprehensive education and awareness campaigns aimed at all levels of Malaysian society to instil pride in Sabahan people who share their "home" with a unique Great Ape. Education and awareness campaigns should also inform citizens and tourists about the current threats faced by the species and what needs to be done to protect the orangutan and its forest habitat. Better tourism practices will also contribute to improved favourable international recognition about how the State is managing its unique natural resources.

Measures to be taken:

Action 2.2.1. Ensure that all plantation owners, managers and developers are aware of the current legislation and the fully protected status of the species

- Produce and disseminate user-friendly brochures listing all wildlife laws pertaining to the protection and the sustainable management of orangutans and their forest home;
- Design and disseminate ways for crop owners (small holders and industrial scale) to better address conflict situations and damages to crops;
- Give special emphasis to reach out to communities within established oil palm estates, and rural communities where people and orangutans are most likely to meet, and therefore need to actively establish ways to co-exist.

Action 2.2.2. Develop guidelines for sustainable orangutan tourism

- Develop and enforce simple guidelines for responsible tourism in key visitation sites to deter inappropriate behaviours when watching wildlife. In many places, orangutan health and social behaviour can be jeopardized because of close human proximity, such as SORC, Gomantong caves, Tabin Wildlife Reserve, etc. These brochures should be disseminated freely to the visiting tourists;
- Develop a curriculum about wildlife watching and integrate it in the national tourist guide curriculum;
- Train professional guides about basic orangutan ecology so they become a reliable source of information for visiting tourists.

Action 2.2.3. Develop state-wide awareness campaigns about orangutans and their habitat

- Conduct education outreach programmes to inform residents, immigrant workers in oil palm plantations or logging camps, and tourists, of Sabah's wildlife protection laws via public posting, banners (restaurants, airports, newspapers, etc.), and on social media;
- Develop an official syllabus about wildlife conservation (including orangutan) to be included in the national education curriculum;
- Make the international "World Orangutan Day" celebrated on 19th August every year, a major state-wide event;
- Innovate and establish Environmental and Education Centres at "Sepilok Orangutan Rehabilitation Centre" and at "Lok Kawi Zoo", since both centres welcome more than 120,000 visitors every year (both local and international);
- Similar education materials should also be displayed at all information centres within SWD, SFD and SP premises.

Priority and timeline (objective 2):

- PROTECT, DaMai and HWW teams operational and using SMART (2 years).
- Tourism guidelines available (2 years).
- Education curriculum developed and used across the State (3 years).

Lead Agencies: MOCAT, SWD (Enforcement team and Intelligence Unit), SFD (PROTECT), SF (DaMai), Education Department, SLSD.

Partners: FMU holders, Oil Palm Estates, Tour operators, KiTA, HWW, Hutan, DGFC, WWF, NGOs, SEEN.

Success measure/indicator:

- No orangutan killed across the State.
- Number and type of persecutions in case of orangutan being killed or molested, or orangutan habitat being encroached.
- Tourism guidelines developed, endorsed and used by the industry.
- Development of education curriculum about orangutan conservation and delivery (long-goal: assess behavioural changes).

OBJECTIVE 3

ENSURE THAT ORANGUTAN CAN SURVIVE IN AGRICULTURAL LANDSCAPES

Oil palm plantations are covering more than 25% of the State landmass; they are preferentially found in the lowland areas of the Eastern side of Sabah. These lowland areas used to also be the best-suited orangutan habitat. Pure stands of large oil palm plantations cannot sustain viable populations of orangutans and cannot be considered as suitable for the orangutan per se. However, it is urgent to acknowledge that agricultural landscapes are increasingly becoming part of the overall orangutan habitat. Therefore, patches and corridors of natural forests need to be retained within these landscapes, and opportunistic killing and hunting must be prevented at all cost.

The long-term vision for orangutan conservation in Sabah is to design better landscapes that will incorporate existing plantations and other rural livelihood development, such that they will also accommodate wild orangutans.

Activity 3.1. Increase and improve orangutan habitat inside oil palm plantations

Rationale: Wild orangutan survival is compatible with oil palm plantations if sufficient areas are still covered with natural forest: Text Box 3. Allowing industry to completely clear-cut forest patches makes the overall agricultural landscape less and less suitable for totally protected species such as the orangutan and others. If even small islands of forest are completely removed, the sum total of the animals' ecological needs cannot be met. This destruction leads to catastrophic levels of fragmentation of the overall population and drives local extinctions. It is thus a priority to retain, restore and recreate sufficient patches of natural forests as stepping-stones or corridors to maintain healthy wild orangutan populations in this altered landscape. Female orangutans are highly philopatric and spend their entire life in their ancestral home range (Goossens *et al.,* 2006b; Arora *et al.,* 2012). They are highly intolerant of non-related adult females (Knott *et al.,* 2010; van Noordwijk *et al.,* 2012; Marzec *et al.,* 2014). **As a result, the survival of adult resident females is best assured if they remain where they are found.** Also, given the likely catastrophic loss of females during the most intensive land conversion period in Sabah during the 1980s and 1990s, every remaining female in isolated forest patches represents a critical unit to maintain the overall population genetic diversity.

Measures to be taken:

Action 3.1.1. Create a mosaic landscape that will support orangutan dispersal in agricultural landscapes to reconnect isolated populations

- Identify the presence of resident adult females living in oil palm plantations;
- Identify and map all existing forest patches - even very small (~1 ha forest patches, including single key large fruit tree species, such as *Ficus* spp., *Dracontomelon* spp. and others) - within oil palm plantations used by orangutans;
- Collaborate with the SWD and other orangutan "expert" organizations to identify all HCVs located within the estates that need to be retained for orangutan long-term conservation. These set asides will include:
    - All HCV areas identified by law and by palm oil certification bodies (MSPO, RSPO), such as riparian areas, ravines and steep areas;
    - All areas that are essential to sustain orangutans and that will be used as "connectors" between isolated groups of animals;
- Conduct an orangutan HCV assessment before any new planting to identify what areas could be set aside to act as connectors between isolated sub-populations of orangutans. This orangutan assessment should be ideally conducted or reviewed by orangutan experts.

Action 3.1.2. Improve food availability within agricultural landscapes to sustain resident breeding females

- Enhance food productivity within agricultural landscapes by planting fruit trees (such as *Ficus sp.*), climbers and lianas that will enrich highly degraded forests where they remain;
- Reduce and/or ban the use of pesticides and fertilizers that can potentially harm wildlife living at the edge and within plantations.

Activity 3.2. Ensure a zero-orangutan loss within plantations

Rationale: Orangutan is an extremely slow reproducing species that cannot tolerate a hunting rate of adult female >1%/year (Bruford *et al.*, 2010). The close proximity between orangutans and people in agricultural landscapes may increase the risk of killing due to conflict and non-conflict situations. Orangutan meta-populations will not be sustainable unless orangutans can use the oil palm landscape and do not suffer any losses in this human-transformed landscape.

Measures to be taken:

Action 3.2.1. Ensure a minimum and acceptable rate of conflicts in plantations

- Identify and quantify actual crop damages and other damages to the agricultural landscape, and assess the extent of true financial losses that result from these damages;
- Develop standard methodologies and SOPs to reduce conflicts between orangutans and growers and address agricultural damage effectively.

Action 3.2.2. Ensure a zero-orangutan loss within plantations

- Ensure that all companies have developed and are enforcing a "No-Kill Tolerance" policy;
- Reinforce awareness efforts in plantations used by orangutans, with a special emphasis given to smallholders who do not have access to the same resources than larger plantations. These campaigns should ideally target all staff working in the estates bordering orangutan habitat, including palm oil workers and their families. A specific education curriculum needs to be developed and shared with the palm oil industry (see action 2.2.3).

Priority and timeline (Objective 3):

- Identify and locate all resident females within oil palm landscapes (10 years).
- Develop necessary BMP and SOP to ensure orangutan survival within oil palm plantations (3 years).
- Understand orangutan ecological needs within agricultural landscapes (10 years).

Lead Agencies: SWD, SFD (PROTECT), MAFI, MPOC.

Partners: Oil Palm Estates, HWW, Hutan, DGFC, Pongo Alliance, WWF, NGOs, SEEN.

Success measure/indicator

- Orangutans can move freely and safely across agricultural landscape: number of estates and size of the area used by orangutans within the agricultural landscape of Sabah.
- Orangutan ecological needs to survive in plantations are better understood.

Figure 3. Well managed agricultural landscape could become part of the orang-utan habitat and contribute to sustain viable meta-populations on the long-term.

Text Box 3: Are orangutans able to live in oil palm plantations?

New scientific insights show that the orangutan habitat is encompassing both intact and degraded forests, as well as non-forest habitat, as long as some mosaic forests are retained within these degraded landscapes. This of course has a very important impact on our perception of the dynamic of orangutan meta-population and population, and their viability. Orangutans are increasingly using mature oil palm plantations for dispersal (they walk on the ground or move from frond to frond between palms), as food sources (they feed on young leaves or ripe fruits) or for resting (they build their nests in the central part of the palm) (Ancrenaz *et al*., 2015).

Current research conducted by HUTAN-KOCP indicates a differential use of the palms depending on the age/class of the orangutans:

- *Resident adult females, immature offspring and occasional adult males that are primarily living in larger forest patches adjacent to oil palm plantations*: these individuals can enlarge their home range by penetrating the plantations and by using some of the resources found there. Being very shy and cryptic, they are often not detected by people. These incursions are generally short (from half an hour to a couple of hours), and the animals spend most of their time feeding on palm fruits or leaves, or resting in the middle part of a palm tree. They rarely nest in a palm since they tend to prefer going back to the nearby forest for nesting.
- *Resident orangutan females that are surviving in small forest patches retained within the oil palm landscape*. Orangutan adult females are territorial, and they usually reside close to where they were born in an area between 0.5 and 2 km^2, depending on habitat quality and availability of food resources. In Kinabatangan, we have identified several females living in small degraded forest patches located within the palm oil matrix. These females may have survived the wave of forest conversion that happened in the late 90's in Kinabatangan. Today, they seem to resume their ranging patterns within their former territory even if most of it is now covered with palms or other types of agricultural production. Of course, sufficient food resources are needed for these females to survive in these fractured landscapes: chances of survival are increased with the number and size of set asides, by improving habitat quality, by enrichment planting of key food species, by improving the overall forest connectivity within the agricultural landscape and by making sure that awareness of their protected status is sufficient, and hunting bans are properly enforced. What will happen to these females when the plantation will chop their trees around the patch?
- *Large territorial adult flanged males:* these males move over vast territories that can be larger than 10 km^2. However, these large territories are highly overlapping with other flanged males. They are defended but direct conflict is usually avoided by use of long call vocalizations that act as a spacing mechanism. In Kinabatangan, flanged males have been detected walking in oil palm plantations more than 5 km away from the nearest forest. They are penetrating deep inside the plantations that likely were once a contiguous part of their territory, or to move between forest patches to look for breeding opportunities with resident females who may survive in this landscape.
- *Smaller less-territorial unflanged adult males:* this type of adult male does not actively defend a territory but may habitually use certain areas where favorable conditions exist. They usually leave the area they were born around 15 years of age. Unflanged males then roam widely in search of females or places where food is plentiful and widely dispersed. When conditions become unfavorable these small males readily move on to another area. During these dispersal periods, these males often travel extensively in the plantations to look for new forest areas and mating opportunities.

OBJECTIVE 4

ENSURE THE BEST EX-SITU PRACTICES FOR ORANGUTAN MANAGEMENT AND CONSERVATION

Activity 4.1: Re-assess the function of capture and translocation as a possible conservation tool

Rationale: Orangutan translocation was initiated in Sabah in the early 1990's under the management of the SWD. Several hundreds of animals were removed from conversion areas and released in Tabin WR, Deramakot FR, Gomantong FR and other areas. Capturing an orangutan is a costly endeavour in terms of human and financial resources. It is also a difficult task and can endanger the animal's life. Although translocation is perceived as a potential conservation tool, the limits and constraints of this approach need to be acknowledged: challenges to identify suitable release sites, lack of resources for adequate post release monitoring, uncertainty about survival rate, and the failure of this management approach to foster co-existence with wildlife where they are found (see Text Box 4).

Measures to be taken:

Action 4.1.1. Develop criteria and guidelines, including SOPs, for translocating orangutans

- These guidelines should allow for the SWD and partners involved in translocation/rescue to assess a situation and to decide when and where animals should be "rescued" and translocated, bearing in mind that translocation should be the last option to consider, when other approaches have not been successful. These guidelines should be practical and should consider all elements pertaining to the decision to translocate or not (health status of the orangutan, location, possibility to retain the animals on site, presence and location of a release site, etc.).

Action 4.1.2. Build capacity within the SWD and WRU to address and resolve conflict situations rather than just displacing the animal from its home (Text Box 4)

- A special attention must be given about the normal behaviour and life history of wild orangutans locally.

Activity 4.2. Re-assess the roles of rehabilitation and release as an orangutan conservation tool

Rationale:

Rehabilitation is a lengthy and difficult process during which young orangutans who have been separated from their mothers are treated for any physical and medical disabilities, are given the opportunity to acquire natural and social skills until they are weaned from human contact, and able to survive independently. Sepilok Orangutan Rehabilitation Centre (SORC) was the first rehabilitation centre for orangutans in the world and has been in existence for the last 55 years. It is fully run by a Goverment agency. The orangutan being a totally protected species, SWD has an obligation to care for orphans confiscated from the pet trade or rescued following forest conversion. SWD also cares for adults injured in conflict situation or as a result of other trauma. SORC provides a free-living semi supported environment for those animals. SORC also acts as an education and awareness raising facility as a main eco-tourist

destination for both Malaysian and foreign visitors alike. Experience gained at SORC and other rehabilitation centres show that wild rehabilitants may never possess the full range of competence that is necessary to survive on their own in the forest, and that should have been acquired from their wild mothers. Indeed, orangutans have the longest association between a single offspring and its mother of any animal. In the wild, infants are not fully weaned or range independently of their mothers until around seven years of age. From eight to 14 years of age, both sexes still stay nearby their mother, in their natal range.

Measures to be taken:

Action 4.2.1. Need to revise care protocols used at SORC

SORC has collected a wealth of data over the past 55 years about orangutan care and rehabilitation. It is now necessary to undertake a thorough compilation and analysis of all this data to identify variables and underlying factors that lead to successful rehabilitation of individuals and establishment of viable populations of ex-captive animals. This analysis will be used to develop or update guidelines for ex-situ management of rehabilitants, including:

- Husbandry and care of orangutans (enrichment, facilities, etc.) to promote arboreal locomotion and other natural activities;
- Clinical and quarantine procedures;
- Protective strategies and Personal Protective Equipment for staff and staff medical requirements;
- Diet and feeding regime (particular attention must be given to include more natural food in their current diet);
- Record keeping to document individual survival competencies;
- Guidelines about husbandry, care and management of unreleasable individuals, following international standards.

Action 4.2.2. Need to reinforce capacities of SORC staff to implement best practices for ex-situ management of rehabilitant orangutans

- Familiarize the SORC staff with the natural orangutan behaviour to better equip the orphans with necessary skills to survive in the wild:
  - Better integration of results of research conducted with wild populations (Danum, Kinabatangan, Segama, others) in the management of captive orangutans;
  - Exchange programmes between SORC staff and other orangutan research projects across Sabah;
  - Pursue the on-going engagement with the Orangutan Veterinary Advisory Group;
  - Increase human resources in charge of caring for orangutans.
- Improve existing facilities and follow existing international husbandry standards;
- Develop research protocols that will inform and optimize the chances of successful reintroduction, including behavioural assessment, diet requirement and etc.

Action 4.2.3. Need for stronger regulations about tourism activities in SORC

SORC is a major tourism product in Sabah and is attracting an ever-increasing number of people to the rehabilitation centre and release platforms. Several tour companies are also operating in the fringes of this FR, and film crews are also adding to the human pressure. This situation results in close proximity and increased contacts between people and orangutans, which causes sanitary risks, conflicts and increased

dependence to human beings, all factors jeopardizing successful rehabilitation:

- Analyse the impacts of tourism activities on orangutan well-being and rehabilitation process;
- Based on the results of this analysis, propose necessary measures (including Sustainable Tourism Guidelines) to remediate to any short-coming related to tourism activities at SORC.

Action 4.2.4. Need to assess and revisit the role of the SORC Volunteer program

The Sepilok's Volunteer Program has been in existence for more than 15 years. It is urgent to assess the consequences and impacts of this program to update the current practices. This program is for example increasingly perceived as a form of orangutan exploitation and undermines the SWD efforts to conduct rehabilitation in a professional way.

- Establish clear MoUs with any organization bringing volunteers or doing fundraising in SORC to prevent any miscommunication, abuse or misunderstanding of orangutan management by the SWD;
- Analyse the impacts of volunteer's presence and activities on the behaviour and health of orangutan and on the long-term consequences of the entire rehabilitation process;
- Determine if the volunteer program needs to be stopped or continued. In case the program continues, produce adequate guidelines, including number, duties and responsibilities of volunteers, selection process of volunteers, repackaging the program toward better welfare of the animals and conservation.

Action 4.2.5. Assess the potential of Sepilok-Kabili FR for further orangutan release

- See specific recommendations developed for Sepilok-Kabili FR (next section).

Action 4.2.6. Identify new release sites for orangutans

- Based on the current situation encountered at SORC, it is urgent to identify new release sites for orangutans. The selection process should strictly follow the IUCN Guidelines for Great Ape Reintroduction. Among others, the new release site should be devoid of resident orangutan population to maximize the chances of survival of released females (see above).

Action 4.2.7. Design and implement a thorough Post-Release Monitoring (PRM) protocol

- Experience gained from past post release monitoring that was implemented at Tabin Wildlife Reserve needs to be analysed to identify lessons learnt and to guide further releases;
- Develop best practices guidelines to detail the post release monitoring methodology to be used in Sabah to ensure maximum welfare and survival of released individuals.

Priority and timeline (Objective 4):

- BMPs for translocation are developed and implemented (2 years).
- SORC Care protocols are revised (5 years).

Lead Agencies: SWD.

Partners: SFD, Hutan, NGOs (UK Appeal).

Success measure/indicator

- SORC rehabilitation guidelines are updated.

Figure 4. What future for orang-utan?

Text Box 4: What is the role of orangutan translocation as a conservation tool?

In many cases, individuals found in oil palm plantations or close to human settlements are considered doomed by relevant authorities, NGOs, villagers and companies. Therefore, they are often captured and translocated to (not always nearby) forest areas. This approach raises three major questions:

- **Are translocated orangutans able to survive?** The survival rate of released orangutans after translocation has not been documented. We cannot simply assume that all animals will adjust and survive in places they do not know, especially where a resident wild population is already established. Indeed, although mostly a solitary foraging species, the diffuse fission fusion social network within sub-population is key to the survival of resident and related females (van Schaik, 1999; van Noordwijk *et al.,* 2012).
- **What is the impact of removing individuals perceived as isolated and doomed on the meta-population?** Removing potential resident orangutans (especially resident females) from forest patches results in a net harvest within the meta-population found in the mix mosaic agricultural landscape. Furthermore, routinely translocating dispersing males can likewise negatively impact local genetic fitness. Therefore, translocation in itself jeopardizes the long-term survival of the meta-population by further fragmenting the smaller populations that have adapted to survive drastic habitat transformation and conversion to agriculture.
- **What becomes of the forest patches after the removal of the orangutans?** Often, following capture and translocation of the orangutans from a forest patch, these patches are then cleared because they no longer contain "high conservation value" species. This destruction results in the loss of all species that were still living in these forest patches and thereby intensifies fragmentation and habitat loss and accelerates local extinction of all species, including totally protected species.

Allowing clear-cutting forest patches makes the overall agricultural landscape less and less suitable for orangutans and other wildlife. Recent research in Sabah shows that where hunting is not an issue, orangutans can use the remaining mixed forest/oil palm matrix, but to do so they need forest corridors and patches of natural forests. If these small islands of forests are removed, the animals cannot use the landscape anymore, the population becomes catastrophically fragmented and not viable in the long-term. The long-term option would be to promote peaceful co-existence with viable wild orangutan populations in order to allow for orangutans to survive in agricultural landscapes.

OBJECTIVE 5

NEED TO MONITOR AND PREDICT ORANGUTAN POPULATION TRENDS

Activity 5.1. Ensure that this SAP is known from all State agencies in charge of initiating large development projects and land use changes

Rationale: Sabah is developing fast. New agriculture development or other land-use changes may create serious threats on the viability of orangutan populations. Some of them, such as the "Pan Borneo Highway" will create bottlenecks that will further fragment the orangutan meta-population. By engaging early in the discussion with relevant agencies and bodies, most of these shortcomings can be mitigated.

Measures to be taken:

Action 5.1.1. Ensure that this SAP is known from all development agencies in Sabah
Action 5.1.2. Identify major development projects in the State and propose mitigation strategies early in the process

Activity 5.2. Ensure a regular monitoring of the orangutan status in Sabah

Rationale: Only a thorough monitoring system will inform about the effectiveness and efficiency of management and conservation activities undertaken by the State agencies and their partners. Orangutan surveys are difficult and consume significant resources, but new analytic tools allow for designing models that can be used to predict orangutan density and trend.

Measures to be taken:

Action 5.2.1. Use the latest technology to spatially and temporally model the orangutan density and distribution trends in Sabah

- Engage with scientists with the necessary knowledge to develop such modelling;
- Train Malaysian students (UMS and other local universities) to master these new approaches.

Action 5.2.2. Undertake a Regular monitoring of orangutan populations in Sabah, every 5 or 10 years, depending on threat level

Activity 5.3. Set up an Endangered Species Conservation Unit (ESCU)

Rationale: Implementing the various SAP recently developed for several fully protected species and enforcing wildlife laws in Sabah requires concerted efforts between all relevant partners. A new ESCU will provide human resources and expertise to monitor the implementation of these Plans, meet with the different stakeholders and prepare the documents needed to monitor the delivery of these Plans. ESCU will be in charge of evaluating, assessing and implementing all action/conservation plans that are already available for several totally protected species in Sabah (elephant, banteng, proboscis monkey, Sunda clouded leopard, Malayan sun bear); and developing policies and plans for other threatened species that

are of interest to the State.

Measures to be taken:
Action 5.3.1. The ESCU is set up and operational

Priority and timeline (Objective 5):

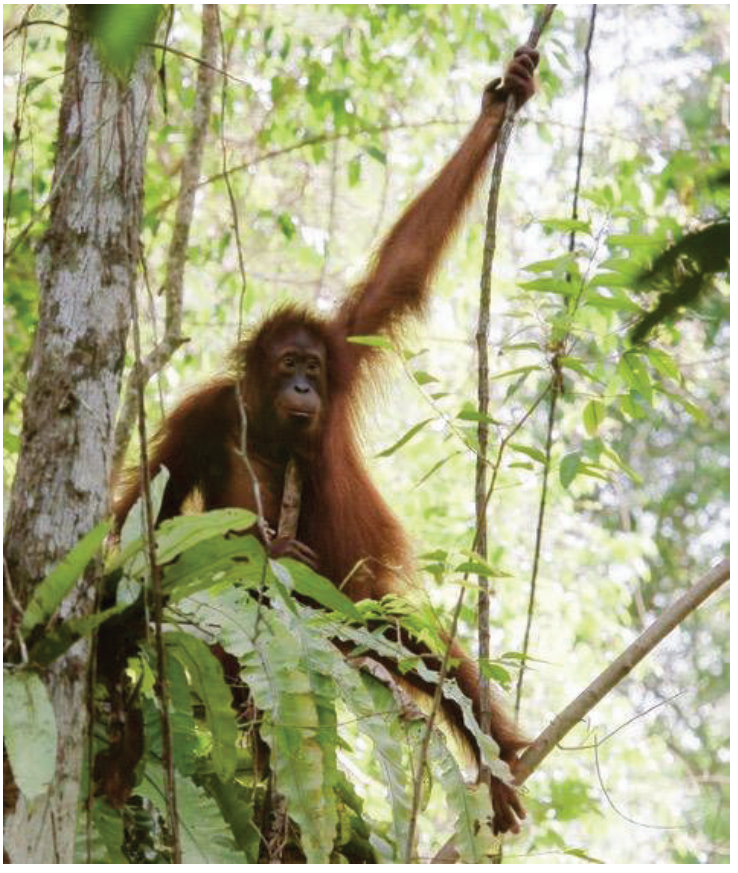
- Creation of ESCU (2 years)
- Regular population monitoring (10 years)

Lead Agencies: SWD

Partners: NGOs and all players concerned with orangutan presence within their management areas.

Success measure/indicator

- Population trends are known.
- Mid-term review of the SAP after five years is available.



4. SITE-SPECIFIC PRIORITY ACTIONS

A total of 16 major populations were identified during the early 2000's surveys. Although it is essential to maintain all orangutan populations present in the State, the list below is distinguishing between populations holding more than 250 individuals (perceived as being viable on the long-term according to a recent PHVA, 2017), and populations that are at higher risk of extinction because of their smaller population size.

OBJECTIVE 1

SECURE AND MAINTAIN LARGE ORANGUTAN POPULATIONS IN SABAH

Population 16. Bukit Piton-Segama

- Regular monitoring of the largest orangutan population in Malaysia;
- Assess the impacts of forest restoration on orangutan population trend and viability;
- Ensure better connectivity across the landscape;
- Implement FMPs with a special emphasis to orangutan management and monitoring;
- Conduct forest restoration in the most degraded areas;
- Liaise with all oil palm estates within and surrounding Bukit Piton-Segama forests to inform them about orangutan presence and guide them in a proper management of this species;
- Ensure a no poaching pressure in these forests by regular patrol, educational outreach and prosecution of offences.

Population 15. Upper Kinabatangan

- Implement FMPs with a special emphasis to orangutan management and monitoring;
- Ensure that FMU holders adhere to the SFM practices (NFM, RIL, HCV protection) and control poaching activities;
- Forest restoration of the compartments that are the most degraded.

Population 14. Tabin

- Finalize a new Management Plan for Tabin, with a special emphasis on orangutan conservation and monitoring;
- Ensure connectivity between Tabin and Silabukan;
- Ensure connectivity between Tabin and Kulamba;
- Identify all HCVF outside of the protected forests of Tabin that could act as

stepping-stones to facilitate orangutan movement across the larger landscape, and give them adequate protection;
- Ensure a no poaching pressure in Tabin by regular patrol, educational outreach and prosecution of offences;
- Liaise with all oil palm estates surrounding Tabin to inform them about orangutan presence and guide them in a proper management of this species.

Population 13. Kinabatangan

- Identify all HCVF and forest patches located outside of the protected forests of Kinabatangan that currently support orangutans and that could act as stepping-stones to facilitate orangutan movement across the larger landscape, and give them adequate protection;
- Maintain and recreate connectivity between the Lower Kinabatangan Wildlife Sanctuary and the Lower Kinabatangan-Segama Wetlands Ramsar Site;
- Avoid any further fragmentation of this already highly fragmented landscape and any further development (such as road or bridge in particular) that could increase fragmentation;
- Restore and recreate habitat that can support orangutans within the oil palm landscape, with particular emphasis on riversides, swamps and steep slopes;
- Enforce certification guidelines before any new rotation planting cycles are conducted in local oil palm estates;
- Takes steps to promote the establishment of 100 m buffer zones within oil palm plantations where the plantations border with protected forests, through requirements and recommendations in environmental impact assessments done prior of replanting of old palms;
- Investigate the feasibility of reconnecting upper and lower Kinabatangan at the Batu Puteh bridge;
- Implement the Resolution endorsed by all participants during the "2003 International Orangutan Workshop held in Kota Kinabalu".

Population 12. Kulamba

- Connect the Kulamba population with adjacent orangutan populations in Tabin WR and LKWS;
- Identify all HCVF outside of Kulamba WR that could act as stepping-stones to facilitate orangutan movement across the larger landscape and give them adequate protection.

Population 11. Complex Gunung Rara-Imbak-Kalabakan

- Monitor the impact of land-use changes on orangutan distribution and survival;
- Provide contiguous and safe habitat for orangutans, i.e. stop further encroachment by local community in Sungai Tiagau FR, ensure that FMU

holders adhere to the SFM practices (NFM, RIL, HCV protection) and control poaching activities;
- Recreate and maintain wildlife corridors across the entire landscape;
- Habitat restoration to be conducted in the most degraded forests of the complex (i.e Sungai Tiagau FR, Northern Gunung Rara);
- Improve cross-boundaries connectivity between south of Sabah (FMU 25) and North Kalimantan.

OBJECTIVE 2

SUPPORT SMALLER ORANGUTAN POPULATIONS IN SABAH

Population 10. Trus Madi

- Ensure FMP implementation, with a special emphasis toward anti-poaching activities, respect of the RIL practices, protection and restoration of all HCVF that ensure connectivity for orangutans;
- Regular liaison between the State authorities, the "FMU Holder" and the "NGO Council" to monitor on-the ground activities and orangutan status.

Population 9. Pinangah

- Assess orangutan distribution with aerial and ground surveys within and without protected forests;
- Assess orangutan conservation status and threats (hunting) via interview surveys;
- Develop a Management strategy to re-establish connectivity across this highly fragmented landscape for this population based on the results of the survey.

Population 8. Sepilok-Kabili

- Establish a "Joint Committee" to optimize the management of Sepilok-Kabili FR, including all stakeholders active within and around the forest;
- Assess the potential of Sepilok-Kabili FR for further orangutan release: the Kabili Sepilok FR covers an area of 4,294 ha and is totally isolated from other forests. No recent survey of orangutan has been done, and the population status in this FR is currently unknown. Recent infrastructure development within and in the vicinity of this FR (boardwalks, tourist facilities, etc.) or other human activities may have reduced the size of the habitat available to orangutans. The following activities must be undertaken:
    - Undertake a thorough survey (ground and aerial) to determine

orangutan population distribution and size within and around SORC;
    - Assess habitat productivity and availability within SORC;
    - Establish and conduct a regular monitoring of the size of Sepilok-Kabili orangutan population;
    - Assess structure composition of the orangutan population (especially close to the release sites) to support a more effective social management of released individuals (presence of resident females should preclude the release of any new females for example).
- Develop and implement a thorough Management Plan for SORC and Sepilok-Kabili FR.

Population 7. Crocker Range National Park

- Assess orangutan distribution with aerial and ground surveys within and outside protected forests;
- Develop a management strategy for this population based on the results of the survey;
- Assess orangutan conservation status and threats (hunting) via targeted interview surveys;
- Develop educational and awareness outreach activities to increase local awareness about protected species, wildlife laws and forest fire.

Population 6. Ulu Kalumpang

- Assess orangutan distribution with aerial and ground surveys within and outside protected forests, including the wildlife corridor linking Ulu Kalumpang and Segama;
- Develop a management strategy for this population and for the larger landscape based on the results of the survey;
- Reduce further encroachment in the fringes of this forest;
- Map, reclaim and restore all areas that were encroached by oil palm development;
- Collaborate with Sabah Softwoods Berhad, to maintain a functional corridor for elephants, orangutans and other species;
- Identify areas to reconnect Ulu Kalumpang with Madai VJR by conducting enrichment planting in Yu Wang elephant corridor.

Population 5. Bongayya

- Assess orangutan distribution with aerial and ground surveys in protected forests and recently developed plantations;
- Identify all forest patches with signs of orangutan presence (steep ravines, riparian areas) and set them aside as HCVF due to orangutan presence;
- Develop an overall Management Plan for the landscape, including:
    - Strategy to ensure connectivity between Bongayya, Trusan Sugut FR

and other major forests in the area and across the agricultural landscape;
    - Location and extent of forest restoration activities in the degraded Trusan Sugut landscape;
- Raise awareness with local communities and FMU workers about orangutan and the need to protect its habitat i.e no killing, no fire.

Population 4. Lingkabau

- Map orangutan habitat and determine population size and distribution of this poorly known population;
- Incorporate the results of recent aerial nest surveys in the revision of the Lingkabau FMP;
- Implement FMPs with a special emphasis to orangutan management and monitoring;
- Assess orangutan conservation status and threats (hunting) via targeted interview surveys;
- Develop educational and awareness outreach activities to increase local awareness about protected species, wildlife laws and forest fire;
- Ensure that the FMU holders adhere to the best SFM practices i.e NFM, RIL, HCV protection.

Population 3. Silabukan

- Develop in collaboration with surrounding oil palm plantations company an overall management Plan that will intend to re-establish connectivity between Silabukan FR and Tabin WR;
- Develop an enrichment planting strategy targeting orangutan food sources interspersed within OPP to support orangutan dispersal between Tabin WR and Silabukan;
- Strengthen habitat protection through regular aerial and ground patrolling.

Population 2. Kinabalu National Park

- Assess orangutan distribution with aerial and ground surveys within and outside protected forests;
- Assess orangutan conservation status and threats (hunting) via targeted interview surveys;
- Develop educational and awareness outreach activities to increase local awareness about protected species, wildlife laws and forest fire.

Population 1. Ulu Tungud

- Assess orangutan distribution using aerial and ground nest surveys;

- Based on the results of the survey, develop a management strategy for this population;
- Assess orangutan conservation status and threats (hunting) via targeted interview surveys;
- Develop educational and awareness outreach activities to increase local awareness about protected species, wildlife laws and forest fire;
- Ensure that the FMU holders adhere to the best SFM practices i.e NFM, RIL, HCV protection.

5. IMPLEMENTATION, MONITORING, EVALUATION AND BUDGET

This SAP is covering a period of 10 years. The ultimate goal is to enable wild orangutan meta-population viability in Sabah and expand population numbers and overall extent of its range within the state. This will be achieved by a combination of:

- Full protection of the forests sustaining orangutans in the state
- Securing a landscape where orangutans can safely disperse and find sufficient food resources outside of protected forests
- Ensure zero-hunting pressure

All the recommendations described in this SAP should be evaluated by SWD and endorsed by the Sabah State Cabinet.

Although the implementation of this SAP remains the responsibility of the SWD, assistance of all relevant government departments and other partners (including the private sector, NGOs and civil society) is required to achieve this goal.

It is proposed that a **Species Action Plan Committee** is created, under the Ministry of Tourism, Culture and Environment. The members of this Committee will include relevant state agencies (DID, EPD, SaBC, SF, SFD, SLSD, SP, SWD, MAFI, MOCAT), NGOs (HUTAN, Pongo Alliance, WWF), and research institutions (DGFC, SEARRP, UMS). This Committee will assist and assess the implementation of all the SAPs developed in Sabah.

The Committee will produce a yearly overview and analysis of progress of the Orangutan SAP and disseminate the results to all stakeholders. A mid-term review will also be produced after five years (2024) by SWD with the assistance of the major stakeholders and the Endangered Species Conservation Unit (see page 31).

A broad budget necessary to deliver on this SAP include:

Surveys (10 years) (habitat and orangutan distribution, population trends)	RM	5,000,000
Habitat restoration (10 years)	RM	10,000,000
Endangered Species Conservation Unit (10 years)	RM	10,000,000
Enforcement/Education activities (10 years)	RM	20,000,000

6. LIST OF ACRONYMS

Asl	Above sea level
CAMP	Conservation Management Plan
CFR	Commercial Forest Reserve
CITES	Convention of International Trade in Endangered Species of Flora and Fauna
DGFC	Danau Girang Field Centre
DID	Department of Irrigation and Drainage
EPD	Environment Protection Department
ESCU	Endangered Species Conservation Unit
FR	Forest Reserve
FSC	Forest Stewardship Council
HCVF	High Commercial Value Forest
HWW	Honorary Wildlife Warden
IUCN	International Union for Conservation of Nature
FMP	Forest Management Plan
FMU	Forest Management Unit
KOCP	Kinabatangan Orangutan Conservation Programme
LKWS	Lower Kinabatangan Wildlife Sanctuary
MAFI	Ministry of Agriculture and Food Industry
MOCAT	Ministry of Tourism, Art and Culture
MPOC	Malaysian Palm Oil Council
MoU	Memorandum of Understanding
MSPO	Malaysian Sustainable Palm Oil
MTCC	Malaysian Timber Certification Council
NGOs	Non-Governmental Organisations
PFE	Permanent Forest Estate
PHVA	Population Habitat Viability Analysis
RIL	Reduced Impact Logging
RSPO	Round Table on Sustainable Palm Oil
SaBC	Sabah Biodiversity Centre
SAP	State Action Plan
SEARRP	South East Asia Rainforest Research Partnership
SEEN	Sabah Environmental Education Network
SF	Sabah Foundation
SFD	Sabah Forestry Department
SFM	Sustainable Forest Management
SLSD	Sabah Lands and Survey Department
SOPs	Standard Operating Procedures
SORC	Sepilok Orangutan Rehabilitation Centre
SP	Sabah Parks
SWD	Sabah Wildlife Department
TPAs	Totally Protected Areas
UMS	University Malaysia Sabah
VJR	Virgin Jungle Reserve
WCE	Wildlife Conservation Enactment
WR	Wildlife Reserve
WWF	World Wildlife Fund

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