Release of rescued Malayan sun bears *Helarctos malayanus* in the Southern Cardamom Mountains, Cambodia

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មូលន័យសង្ខេប

កម្មវិធីដោះលែងសត្វព្រៃឲ្យត្រឡប់ចូលព្រៃវិញគឺជាការចាំបាច់ ព្រោះចំនួនសត្វព្រៃដែលរឹបអូសបានពីការជួញដូរ និងការចិញ្ចឹមដោយខុសច្បាប់កាន់តែមានចំនួនច្រើនឡើង។ ដើម្បីគាំទ្រដល់កម្មវិធីនេះ យើងបានបរិយាយពីបទពិសោធន៍ដែលទទួលបានពីការដោះលែងសត្វខ្លាឃ្មុំតូច (*Helarctos malayanus*) នៅតំបន់ជួរភ្នំក្រវាញ ភាគខាងត្បូងនៃប្រទេសកម្ពុជា។ បន្ទាប់ពីការស្តារនីតិសម្បទា និងការបន្សុំ សត្វខ្លាឃ្មុំតូចចំនួន៣ក្បាលត្រូវបានដោះលែងនៅក្នុងឱកាស២ផ្សេងៗគ្នា។ មុនពេលដោះលែង ខ្លាឃ្មុំទាំងនោះត្រូវបានគេចិញ្ចឹមតាំងពីវានៅតូច។ ការតាមដានដោយឧបករណ៍ GPS ដែលបំពាក់នៅនឹងក បានបង្ហាញថា ខ្លាឃ្មុំទាំង៣មានសមត្ថភាពរស់ដោយខ្លួនឯងបាន និងចេះគេចពីមនុស្ស បន្ទាប់ពីលែងឲ្យចូលទៅក្នុងព្រៃវិញ។ ទោះជាយ៉ាងណា ខ្លាឃ្មុំទាំង៣បានជួបនឹងបញ្ហាគឺ ២ក្បាលត្រូវបានជាប់អន្ទាក់ម្តងទៀត និង១ក្បាលទៀតត្រូវបានសម្លាប់ដោយសត្វព្រៃ។ លទ្ធផលរបស់យើងបង្ហាញថា ខ្លាឃ្មុំតូចអាចទទួលបានជំនាញសម្រាប់ការរស់នៅ ហើយការចិញ្ចឹមក្នុងទ្រុងមិនមែនជាឧបសគ្គដល់ភាពជោគជ័យនៃការដោះលែងឲ្យចូលព្រៃវិញទេ ប្រសិនបើសត្វទាំងនោះត្រូវបានគេបន្សុំនៅក្នុងព្រៃដែលមានទំហំធំ ដែលជំរុញឲ្យវាកើតមានអាកប្បកិរិយាធម្មជាតិ និងការកាត់បន្ថយការឃើញមនុស្ស មុននឹងធ្វើការដោះលែងឲ្យវាចូលព្រៃវិញទេ។ តាមបទពិសោធន៍ ការអភិវឌ្ឍកម្មវិធីដោះលែង យើងគួរពិចារណាទៅលើកត្តាបរបាញ់ និងវត្តមានប្រភេទខ្លាឃ្មុំតូចដែលមាននៅក្នុងទីតាំងដោះលែង។

Abstract

Well-conceived programmes for releasing wildlife are essential due to the growing numbers of animals confiscated from the illegal wildlife and pet trade. To support the development of such programmes, we describe experiences gained from the release of Malayan sun bears *Helarctos malayanus* in the Southern Cardamom Mountains of southwest Cambodia. Following rehabilitation and acclimatisation, three sun bears were released on two different occasions. Prior to their release, the bears had been in captivity since infancy. Post-release monitoring with GPS collars showed that all three bears were capable of sustaining themselves unassisted and avoided human interactions after their release. However, all three encountered problems which later resulted in their recapture or death: two were caught in snares and one was killed by a wild resident. Our results demonstrate that sun bears can acquire the skills necessary for survival and that captivity need not be a barrier to successful release if the animals are provided with large forested enclosures that encourage 'natural' behaviours and human contact is minimised prior to release. Our experiences also emphasize the importance of considering hunting pressure and presence of conspecifics at release sites when developing release programmes.

Keywords Acclimatisation, conspecifics, monitoring, rehabilitation, snare, soft-release, sun bear.

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Introduction

The rehabilitation and release of captive animals into their historical ranges has long been considered a conservation strategy for zoos to repopulate 'silent' forests or bolster wild populations of scarce species (Kleiman, 1989; Wilson & Stanley Price, 1991; Beck *et al*., 1994; IUCN/SCC, 2013). For a release to have a conservation and animal welfare benefit, proper protocols must be conducted, including site selection, health checks, behavioural assessment and selection of appropriate candidates, rehabilitation and acclimatization at the release site, and supplementary feeding and monitoring post-release for as long as necessary (IUCN/SCC, 2013). Release programmes therefore require long-term management and financial commitment and must never be conducted as a means of discarding animals considered surplus to requirements, which will compromise good husbandry practises and risk undermining the conservation goal of supporting wild populations (Kleiman, 1989; Huber, 2010). Documentation of the outcomes of reintroduction programmes is also crucial to develop species-specific reintroduction guidelines, particularly for species with a long history of failed release attempts (Wilson & Stanley Price, 1991; van Manen & Pelton, 1997; Clark *et al*., 2002; Clark, 2009; Crudge *et al*., 2019).

Species in the Ursidae present a challenge for release efforts due to their extensive home ranges, ability to adapt to captivity and humans, and the volume of survival skills cubs learn from their mothers during their early development (Fredriksson, 2005; van Dijk, 2005). Bears that have been hand-reared or spent prolonged periods in captivity are more likely to be unafraid of humans, lack necessary survival skills and become nuisance animals once released (Alt & Beecham, 1984; Stiver *et al*., 1997; Fredriksson, 2005; Clark, 2009; Huber, 2010). Conservation translocations of North American and European bear species have been extensively reported, with reintroductions in Europe occurring as early as the 1930s (*Ursus americanus*: Alt & Beecham, 1984; Stiver *et al*., 1997; Eastridge & Clark, 2001; Clark, 2009; *U. arctos*: Buchalczyk, 1977; Jonkel *et al*., 1980; Clark *et al*., 2002; Preatoni *et al*., 2005; Huber, 2010). Thus far however, reports on the outcomes of Malayan sun bear *Helarctos malayanus* releases have been limited (Fredriksson, 2005; Abidin *et al*., 2018).

Malayan sun bears are the smallest member of the Ursidae, weighing between 30 to 65 kg. The species is predominantly terrestrial, but climbs well and is arrhythmic: active both day and night (Augeri, 2005). It is also omnivorous, foraging for a wide range of different foods including fruit, roots, insects and other forms of animal protein. Reportedly the least studied of the bear species (Servheen, 1999), sun bears have been recorded in lowland tropical primary and secondary dipterocarp forests throughout Southeast Asia (Wong *et al*., 2004; Nazeri *et al*., 2014; Abidin *et al*., 2018), although population estimates are lacking throughout their range. The species is considered Vulnerable (Scotson *et al*., 2017) due to declining numbers as a result of habitat loss and hunting for use in the pet trade, food delicacies and traditional medicines (Mills & Servheen, 1994; Scotson *et al*., 2017).

In Cambodia, snares are the most common hunting method. Made from easily sourced and affordable materials, snares are indiscriminate and extremely damaging to terrestrial wildlife, including sun bears (O'Kelly *et al*., 2018; Heinrich *et al*., 2020). Sun bears are also targeted due to their value on the black market, because hunters can sell a single animal to wildlife traders for 2,500 USD (Wildlife Alliance, unpublished data, Chi Phat Commune, Koh Kong Province). Although national legislation exists to protect wildlife in Cambodia from such exploitation, these laws are poorly enforced in most areas (Gray *et al*., 2017).

The Wildlife Rapid Rescue Team (WRRT) was established in 2001 to combat the illegal wildlife trade in Cambodia. The WRRT is an official government task force which comprises seven Military Police and four Forestry Administration officials and is supported technically and financially by the non-governmental organisation Wildlife Alliance (Gray *et al*., 2017). Between 2001 and 2019, the WRRT confiscated 111 sun bears from illegal trafficking or pet trade (WRRT, unpublished data) and transferred these to the Phnom Tamao Wildlife Rescue Centre (PTWRC) in Takeo Province, Cambodia. Approximately 140 rescued Malayan sun bears and Asiatic black bears *Ursus thibetanus* are managed at PTWRC by an Australian charity, Free the Bears. Because demand for bears and their parts in the illegal wildlife trade continues, housing a growing number of confiscated sun bears that will require lifetime care at such centres is neither practical nor a conservation goal. As such, well-conceived and planned release programmes using confiscated animals are essential and will become even more critical in the future (Griffith *et al*., 1989).

The purpose of the present paper is to support the development of such programmes. To this end, we describe experiences gained from the release of three Malayan sun bears in accordance with the IUCN Reintroduction Guidelines (IUCN/SCC, 2013), including the soft-release protocols employed, challenges faced, lessons learned, and actions undertaken to mitigate possible issues in future releases.

Methods

We undertook the release of three sun bears in south-west Cambodia on two separate occasions, releasing two female bears in 2012 and a single male in 2019. All three bears were rescued from the illegal wildlife trade as cubs and spent at least four years in captivity prior to their release, including time in the acclimatization enclosure at the release site.

Wildlife release station

Our wildlife release station (11°22′12.2″N, 103°30′26.3″E) is situated on the edge of the Southern Cardamom Mountains, in Tatai Wildlife Sanctuary (ca. 1,443 km^2), Koh Kong Province. This location was chosen as it balanced the need for remoteness with the need for accessibility to provide supplies for the camp and animals and was established in 2019 as a permanent site for releasing native species rescued from the illegal wildlife trade or born in captivity at PTWRC. The station is situated in an area of predominately evergreen forest and is surrounded by hills less than 100 m in elevation. The nearest human settlement to the release station is Chi Phat village (Chi Pat Commune), approximately 8 km to the southeast, whereas the nearest military patrol station, Stung Proat, is located 7 km to the south.

Preliminary field surveys in 2008 indicated that the area contained sufficient resources for sun bears and limited competition from conspecifics, because local wildlife populations had been severely reduced by rampant illegal logging and hunting. This conclusion was based on villager reports, direct observations and checklists of species that were obtained through camera-trapping at the site (Reimer & Walter, 2013). In response, a community-based eco-tourism project was initiated in Chi Phat Commune in 2007 to provide alternative livelihoods for hunters and illegal loggers. The activities of this project and patrols undertaken by seven military police stations reduced wildlife hunting in the area considerably and as a result of these changes, the site was regarded as suitable for our first release of bears in 2012.

Hunting pressure in the forests surrounding the release station was further reduced by the creation of a community-based anti-poaching unit in 2013. The unit comprised 11 local community members who were tasked with patrolling the forest, removing snares, interrupting illegal activities and recording wildlife movements. This undoubtedly improved the safety of the area for wildlife, which was also suggested by subsequent camera trap records of previously unrecorded species including clouded leopard *Neofelis nebulosa* and dhole *Cuon alpinus*. As a result of these developments and because sun bears were not encountered in the area, it was deemed appropriate for our second release in 2019.

Study animals

The sun bears selected for our first release were two females, named Sloat and Sopheap. These were confiscated as cubs (approximately four months old) by the WRRT in December 2008 from Kampong Speu Province and brought to PTWRC for care and rehabilitation. Tests conducted for tuberculosis were negative, and the results of blood chemistry tests were normal for the species. The two females were cared for at PTWRC for approximately four years and were housed in a large, natural, open-topped enclosure. Handling and human interactions were kept to a minimum during feeding and cleaning, and were otherwise restricted to health checks. We transported the two females to the release station in May 2011 and moved the pair from their travel cages into a 'bear house' which comprised two dens (each measuring 3 m x 3 m x 3 m) to acclimatise for two weeks before then giving them access to an open-topped forest enclosure.

The candidate for our second release was a male sun bear, named Tela. Tela was rescued as a cub (approximately four months old) by the WRRT in 2014 from a petrol station in Mondulkiri Province. Veterinary staff present during the confiscation decided to bring the cub immediately to the wildlife release station, because he was deemed healthy and exhibited fear and aggression towards people, indicating he would be suitable for future release. To gradually introduce Tela to Sopheap and provide him with access to the outside while keeping the two bears separate, we fenced off a small portion of the enclosure outside the bear house with chain-link fencing and installed electrified wires.

Rehabilitation & acclimatisation

All three bears were kept in an open-topped forest enclosure (measuring 100 m × 100 m × 3 m) at the wildlife release station. The enclosure is situated approximately 200 m from the campsite which services the station and encompasses a section of forest containing large trees and natural and artificial ponds. On arrival at the release station, the bears were released from their travel cages into the bear house next to the enclosure to enable treatment, monitoring and acclimatisation before their introduction to the enclosure. We installed five strands of electric wires at vertical intervals of 0.4 m along the enclosure fence, with insulators attached to fence posts. As with the small section fenced for Tela, the electrified wires were serviced by a solar panel that fed direct current into a car battery for storage, and this in turn was connected to an

energizer (Speedrite) which converted and regulated the voltage of alternating current in the wires to ensure this would not injure the sun bears while conditioning them to avoid the fencing. The bears quickly learned to avoid the fence after one or two instances of contact.

This natural environment enabled the bears to acquire appropriate behaviour such as climbing and nest-building in the trees and foraging for roots, insects and termites. We kept human interaction to a minimum, with food either lowered into the enclosure using a remote pulley system or quickly placed inside the enclosure by staff, who then retreated behind a hide to observe the physical health of the bears. The time devoted for acclimatisation depended on the responses of each animal and continued until they were deemed to be sufficiently familiar with their new environment. This was considered the case when the bears explored and utilised the entire enclosure area without exhibiting stereotypical behaviours such as pacing or self-harming, coupled with the expression of 'natural' behaviours such as avoiding animal care staff, foraging independently within the enclosure and climbing, building nests and sleeping in the trees. The release of the bears was timed to coincide with periods when there was sufficient food (i.e. fruiting trees, frogs and termites) in the forest for them to forage. Sopheap and Sloat spent 13 months in the acclimatisation enclosure prior to their release. Tela was released after five years in the enclosure as he arrived to the release station as a four month old cub and we wanted to ensure that forest protection activities undertaken in 2013 had significantly reduced the risks posed by snares before attempting another release.

Post-release monitoring & supplementary feeding

Sopheap and Sloat were fitted with a G2110E - Iridium GPS collars (Advanced Telemetry Systems Inc., Minnesota, USA) which weighed 825 g. Tela was fitted with a Tellus Iridium GPS collar (Followit AB, Lindesburg, Sweden) which weighed 800 g. Both types of collars had VHF and GPS monitoring functions. We programmed the collars on Sopheap and Sloat to record a GPS coordinate every two hours, whereas the collar on Tela was programmed to record his position every six hours. These were attached one month before their expected release to allow the animals time to adjust and ensure the collars were working effectively without causing unnecessary discomfort such as ulcers or tick accumulation. To attach the collars, the animals were sedated by veterinary staff who administered intramuscular injections of Zoletil and Metedomide (4 mg/kg + 0.03 mg/kg) using a blow-pipe, and monitored their physiological parameters throughout sedation. Following collar attachment, the bears were revived using Atipamazol (0.4 mg/kg) which was injected intramuscularly. Sopheap and Sloat were fitted with their collars on 31 May 2012 and Sopheap adapted to her collar much faster than Sloat, who fought hers for hours. Tela was fitted with a collar at the end of January 2019, and took a few days to adjust.

Following rehabilitation and acclimatisation, we encouraged the bears to leave the release station by opening the main gate of the enclosure and a slide-door on its eastern side in the late afternoon. One camera trap was placed outside the main enclosure gate to monitor the timing of their departure and subsequent events if they returned. The doors to the enclosure remained open to allow the bears to return if they wished and were closed one month after their departure as they did not re-enter the enclosure or return for supplementary food provided during this period. The latter was placed outside the main enclosure gate in the morning and afternoon for the entire month and comprised the same diet provided to the bears during acclimatization. On departing the enclosure, the bears were tracked daily until signals were no longer received from their GPS collars. This information was supplemented by occasional reports from villagers who observed the bears in the forest.

Results

Sopheap & Sloat

On being allowed to access the outdoor enclosure at the release station (two weeks after their arrival), Sopheap and Sloat immediately began to climb trees and forage for termites and frogs. They learned how to build nests in the trees, pulling the branches inwards to form a platform. After one month in the outdoor enclosure, they consistently avoided staff, fleeing when keepers approached the enclosure.

We opened the enclosure gates on 11 June 2012 at 1600 hrs. Sopheap departed three days afterwards, whereas Sloat left almost four weeks later, on 4 July. The bears did not return to their enclosure, nor did they take any of the supplementary food provided outside it. However, we suspect that they may have taken food left on a separate platform for a family of previously released binturongs, when the structure was found broken in mid-July. Following this, the two bears separated and ranged widely (Fig. 1). Sopheap displayed a preference for the fragmented habitats of acacia plantations and grasslands on the fringe of the forest due east of the enclosure. After spending a brief period around the camp area and adjacent forest, Sloat ventured north into denser forest (Fig. 1). Staff and villagers entering the forest to collect non-

timber forest products reported brief sightings of the bears as both avoided humans. Sloat was more elusive and warier of humans compared to Sopheap.

Sopheap's collar stopped providing GPS positions on 2 August (49 days post-departure) and Sloat's did likewise on 15 August (42 days post-departure). Both bears were then manually tracked using the VHF function of their collars. Although it was not possible to locate them every day due to weather conditions and limited resources, both bears were found on most days and were monitored for health based on body condition which was observed from a distance with binoculars. On 11 August (58 days post-departure), Sopheap was seen to be clearly injured by a snare noose around her right front leg. As such, she was located and recaptured at the same location the following day and returned to the bear house at the release station for treatment. On 26 August (53 days post-departure), we learned that Sloat had also been snared and managed to recapture her the same day, similarly returning her to the bear house for treatment.

Sopheap recovered well from her injuries and was moved to the outdoor enclosure at the end of August (Fig. 2; present issue cover), when Sloat was recaptured and taken to the bear house. Sloat's wound was more severe; the snare had cut to the bone and she had lost all the skin and much of the muscle from her foot, such we considered amputating the injured paw. However, following treatment every five days, including sutures and bandaging, she recovered by the end of September and was released back into the outdoor enclosure. Both bears avoided each other once reunited. On 11 March 2013, Sloat was found dead among the trees in the outdoor enclosure. The subsequent necropsy did not reveal any obvious cause of death and all organs appeared to be in good health, although she was thin.

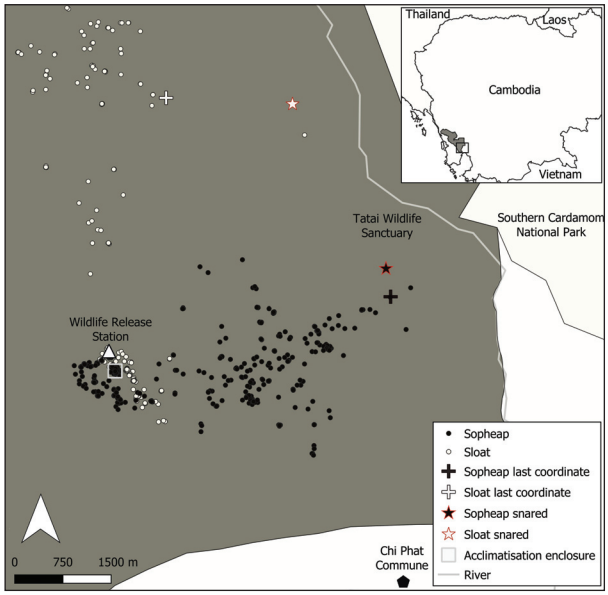

Fig. 1 Locations of female Malayan sun bears (Sopheap and Sloat) after their release in Tatai Wildlife Sanctuary, southwest Cambodia, June–August, 2012.

Fig. 2 Female sun bear (Sopheap) in open-topped enclosure at the wildlife release station, Tatai Wildlife Sanctuary, January 2019 (© Jeremy Holden/Wildlife Alliance).

Tela

Forest protection activities were intensified at the release site after Sopheap and Sloat were caught in snares in 2012. These activities included increased operations by the WRRT in the surrounding area, and in 2013, the creation of a permanent police patrol team based in Chi Phat village and establishment of a community-based anti-poaching unit.

Tela was brought directly to the acclimatization enclosure at WRS following his confiscation in 2014. The section of the main enclosure we had separated with fencing to gradually introduce Tela to Sopheap proved ineffective, as Tela promptly broke through this on his release from the bear house. After an initial period of mistrust, the two bears became tolerant of each other and Sopheap adopted the cub as her own within weeks, allowing Tela to suckle for comfort and calling to him when they were separated. The pair were frequently found resting in the branches of large trees in the more open, southern end of the enclosure in the mornings. Sopheap became less afraid of people in the acclimatization enclosure over the years compared to her behaviour

in the forest after her release. In contrast, Tela remained extremely nervous and always avoided humans, fleeing whenever staff approached the enclosure. As a result, we constructed a hide to allow us to observe his physical health during feeding times.

Despite their friendship, we decided not to re-release Sopheap with Tela due to her increasing age and preferences she showed for the open areas and acacia plantation in the direction of the village during her first release (rather than the dense forests in the opposite direction). On 23 February 2019, we confined Sopheap to the bear house and opened the outside enclosure door during the afternoon. Tela exited the enclosure on 25 February and initially ventured into dense forests to the north, after which he subsequently preferred areas to the southwest. He also travelled close to our forest patrol station bordering the river in Stung Proat (Fig. 3) and sometimes moved long distances (up to 5 km) in a single night.

Following his release, we were not able to observe Tela in the forest due to his wary disposition. Because the coordinates provided by his GPS collar indicated he was travelling large distances however, we assumed he was alive and in good health. On occasion, local people gathering non-timber forest products in the forest reported sightings of Tela, which were typically of him rapidly retreating into the forest. Tela's collar ceased transmitting coordinates on 19 June 2019 (114 days post-departure), after which we continued to track him manually, using the VHF transmitter.

On 9 July, Tela's position southwest of the release station was located and his intact body was found near this area the following day (134 days post-departure). The surrounding area was flattened and his collar had been bitten through. We conclude he was most likely killed in a fight with a wild bear for several reasons: i) no other large carnivores that could overcome a bear occur in this forest area to our knowledge; ii) the signs of struggle and that nothing had been eaten or removed from his body suggest his death was not caused by a predator or a human; iii) his physical condition at the time of death was good, indicating that an inability to forage for food was unlikely to be the cause.

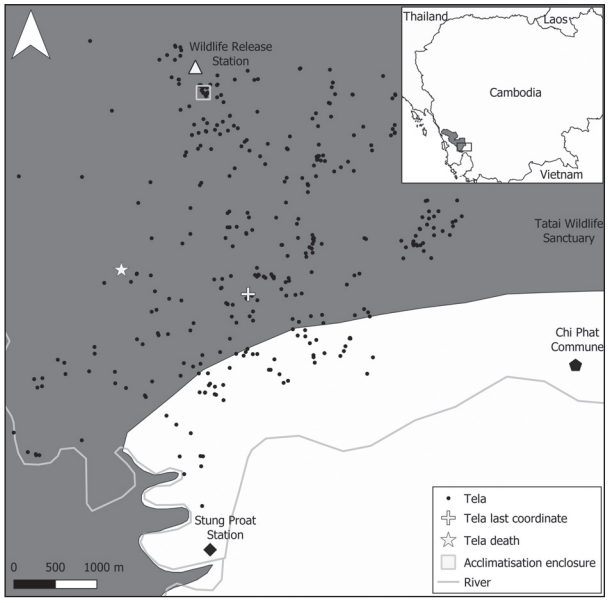

Fig. 3 Locations of male Malayan sun bear (Tela) after his release in Tatai Wildlife Sanctuary, February–July, 2019.

Discussion

Although our three sun bears displayed appropriate 'natural' behaviours in the wild (e.g., climbing, nest-building, foraging and human avoidance), their releases were unsuccessful, albeit for different reasons. The first two bears released (Sopheap and Sloat) were caught in snares and so were recaptured for treatment. Sopheap recovered from the experience and remains in captivity, whereas Sloat died seven months after her recapture. The third bear released (Tela) died less than half a year later and was probably killed by a wild male bear.

Each release provided valuable lessons for future attempts. For example, despite the work undertaken to protect and improve the safety of the forests before the first release, experiences from the release indicated that further efforts were needed to ensure the security of wildlife around the release station and Chi Phat Commune. Once the problem of snares was addressed however, the challenge of conspecifics arose. In this context, Tela's death, which was likely caused by a wild bear which previously could not survive in the area due to hunting and snares, actually suggests that our increased protection has benefitted the area and its wildlife. More specifically, we believe that our elimination of these threats has facilitated the reappearance of wild sun bears, although this in turn means the release station is no longer a suitable site for releasing captive male bears. Thus, while our release attempts failed, our wider conservation programme could be considered successful, in leading to the reappearance of previously extirpated species.

The length of time the bears spent in captivity did not appear to influence their behaviour after release. At the time of recapture, or in Tela's case, death, all three bears were in good physical condition, indicating they were successfully foraging for themselves. In addition, although caught in snares, Sopheap and Sloat

avoided farmland, villages and humans. In other bear releases, animals in prolonged captivity with constant human contact have become 'nuisance bears', which has resulted in their death or recapture (Alt & Beecham, 1984; Fredriksson, 2005). Although none of our bears entered human habitation, Sopheap did travel in open areas and the disturbed acacia plantation in the direction of Chi Phat Commune. As such, we did not release her with Tela in 2019, as we believed there was a risk she might enter farms or villages.

We suspect our three sun bears exhibited behaviours similar to those of wild bears due to the rehabilitation protocols we employed, particularly the provision of a large forested enclosure which encouraged 'natural' behaviour, and minimal human contact (Stiver *et al*., 1997). Although nest-building behaviour is documented for the species, it remains unclear how much of this behaviour is learned or instinctual (Wong *et al*., 2004; Hall & Swaisgood, 2009). As Sopheap and Sloat foraged, climbed trees and built nests in the acclimatization enclosure, despite having been in captivity since they were young cubs, these may be instinctive behaviours for sun bears. Feeding and foraging behaviour have also been observed as instinctive in sun bears rehabilitated for release in Indonesia (Fredriksson, 2005). However, our protocols differed from previous sun bear releases, some of which have proven successful, where young bears were walked in the forest by carers and returned to their enclosure each evening, until the animals themselves decided not to return (Fredriksson, 2005). In contrast, our experience in rehabilitating many different animal species indicates that if kept naturally in an appropriate setting that allows captive animals to sufficiently fine tune their survival skills, 'natural' behaviour is instinctive (Marx, 2008; Marx & Bunthoeun, 2014; Leroux *et al*., 2019). Added to which, provision of food after release provides animals with the support they need as they perfect the art of survival, should this be required. The three bears we released were no exception to our experiences with other species.

Where possible, bears should not be released into areas where they will have to compete with resident conspecifics (Fredriksson, 2005; van Dijk, 2005). As such, our release station is no longer a suitable site for releasing male sun bears due to the presence of wild bears in the surrounding forests. When the release site was initially selected, the loss of sun bears and other large mammals due to heavy hunting pressure meant it was suitable for releasing many species, including bears. In the years following increased protection, we assumed the area remained well below its carrying-capacity for sun bears because sightings of scat were limited and camera-traps did not reveal any evidence of resident bears in the area. We noted however that Tela sometimes travelled long distances (up to 5 km) in a single day, compared to the average of 2 km recorded by Wong *et al*. (2004) for six wild bears. We considered the possibility that these distances, combined with Tela's preference for the acacia plantation at the forest boundary (despite reduced food availability and increased human activity), might be attempts to avoid a wild bear, but had no definite evidence that this was the case. Release of female sun bears could be considered in future, as existing populations may be more tolerant to released female bears than male competitors (Clark, 2009; Fredriksson, 2005). However, if the wild bear population is recovering in the forests surrounding the release station as a result of our protective activities there, further releases of sun bears might be unnecessary and selection of a new release site more suitable.

It is vital that practitioners disseminate the results of wildlife release efforts to ensure that past mistakes are not repeated and improve success rates. Careful consideration of a variety of relevant factors is essential prior to release, particularly the selection of release sites which should be free of pressures such as hunting and land conversion. Our release of sun bears demonstrates that with careful selection of candidate animals and thorough rehabilitation protocols, sun bears that have been in captivity since infancy can sustain themselves and revert to life in the forest without difficulty. As such, reintroduction of captive animals could be a great asset to bolster wild populations where these have declined or become extirpated, provided responsible protocols that incorporate the IUCN Reintroduction Guidelines are followed. Notwithstanding this, effective protection efforts might be all that is required in many areas to enable the return of wild animals, including sun bears.

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