

The Sun Bear Project

Version 2.1



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The sun bear (*Helarctos malayanus*) of southeast Asia is the smallest and least-known member of the bear family, and one of the most threatened, being listed as Vulnerable by the IUCN Red List. Although I first knew about the species from reading a couple of books, it was not until visiting Belfast Zoo and seeing their sun bears that I truly fell in love with them.

This document was first written in March 2019 as a remake of a project I wrote about the sun bear while in secondary school. This version was amended in 2024.

This version is dedicated to Babu, a female sun bear at Edinburgh Zoo, who has terminal cancer as of this writing.

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Taxonomy

Bears make up the family Ursidae, within the mammal order Carnivora, which also includes cats, dogs, hyenas, weasels, raccoons, mongooses, and pinnipeds such as seals and sea lions (Wilson *et al.*, 2009). There are eight species of bear in Ursidae, which are usually split into five genera: *Ailuropoda* (giant panda), *Tremarctos* (spectacled bear), *Ursus* (brown, black and polar bears), *Melursus* (sloth bear), and *Helarctos* (sun bear; Pagès *et al.*, 2008; Wilson *et al.*, 2009). The sun bear is the only member of *Helarctos*, although some taxonomists have argued that it belongs to *Ursus* (Meijaard, 2004; Galbreath *et al.*, 2008; Crudge *et al.*, 2019).

Genetic studies indicate that the sun bear is most closely related to the sloth bear (*Melursus ursinus*), and both species are basal to the *Ursus* bears. The spectacled bear (*Tremarctos ornatus*) and giant panda (*Ailuropoda melanoleuca*) constitute more basal lineages (Pagès *et al.*, 2008; Kumar *et al.*, 2017). Sun bears have been known to hybridize with both sloth bears and Asiatic black bears (*Ursus thibetanus*) - the former's case was reported from a zoo in Tokyo (Asakura, 1969; Van Gelder, 1977), while the latter was reported from the wild in Cambodia (Galbreath *et al.*, 2008).

Two subspecies of sun bear are currently recognised:

- Malayan sun bear (*Helarctos malayanus malayanus*) - named by Raffles (1821) as *Ursus malayanus*, it is the nominate subspecies and occupies the species' range on mainland southeast Asia, as well as Sumatra. Its common name is sometimes used to refer to the species as a whole.
- Bornean sun bear (*Helarctos malayanus euryspilus*) - named by Horsfield (1825), this subspecies is smaller than the nominate subspecies, and has a smaller skull (Meijaard, 2004; Phillipps, 2016). As the name suggests, it is endemic to Borneo (Meijaard, 2004).



Figure 1: A Bornean sun bear cub at the Bornean Sun Bear Conservation Centre, Sabah, Malaysia. © Siew Te Wong, Thye Lim Tee, and Lin May Chiew, BSBCC/Wikimedia Commons

Physical Description

The sun bear is well-known for being the smallest of the eight bear species, with males being around 1/10th the weight of a male polar bear (Kemmerer, 2015). It measures 1-1.4 m in length, 70 cm high at the shoulder, and weighs between 25 and 65 kg, with males being larger on average than females (Fitzgerald and Krausman, 2002; Phillipps, 2016). Like all other bears, the sun bear has a very short tail of between 3-7 cm (Fitzgerald and Krausman, 2002). Its coat is short but thick with usually jet-black fur (the shortest of all bears), a short muzzle ranging in colour from orange to silver, and a (typically) U-shaped marking on its chest (Fitzgerald and Krausman, 2002). It is common knowledge that the sun bear got its name from this marking, which indeed resembles the rising sun (Kemmerer, 2015). However, the name actually originated from an account by Horsefield (1825) that describes a specimen from Borneo, wherein he explained that the genus name *Helarctos* (meaning 'sun bear') referred to the animal living at the equator, near the "hot sun" (Crudge *et al.*, 2019). The marking varies, not just in shape, but also in colour from buff and ochre to yellow and even white, and may even be completely absent in some individuals (Fitzgerald and Krausman, 2002), making it a useful tool in identifying particular bears. It also acts as a warning signal, as the bear stands on its hind legs and displays the marking when threatened by rivals or predators (Fitzgerald and Krausman, 2002; Phillipps, 2016). The ears are smaller, relative to body size, than other bears, but the head is comparatively larger (Kemmerer, 2015).

The sun bear has powerful front limbs and large paws with sickle-shaped claws and hairless soles, all of which are useful adaptations for climbing trees (Kemmerer, 2015). The claws grow longer as the bear ages, so you can tell the age of an individual sun bear by looking at the length of its claws (Marshall, 2024). It also has very loose skin, so if grabbed by a predator such as a tiger, the bear can turn around and bite back at its attacker (Durbin, 2023). Perhaps the most bizarre feature of the sun bear is a 17-centimetre long, slender tongue (the longest of all bears, Figure 2), which it uses to lick up insects or honey (Pastor *et al.*, 2011; Kemmerer, 2015).



Figure 2: A sun bear displays its immensely long tongue. Taken from ARKive.

Distribution and Habitat

The sun bear is native to Southeast Asia, occupying a range that includes northeast India, Bangladesh, Myanmar, Laos, Cambodia, Vietnam, Thailand, Malaysia, and the islands of Sumatra and Borneo (Scotson *et al.*, 2017). It is also present in China, as confirmed by a camera trap recording in Yingjiang County, Yunnan Province, less than 1km from the border with Myanmar (Li *et al.*, 2017). Fossil evidence shows that the species also lived on Java during the Pleistocene epoch (Erdbrink, 1953), though it is not known to have survived into historic times there. The sun bear is sympatric with the Asiatic black bear through much of its mainland range, and the two species often occur in the same habitats, though black bears are more common in mountainous areas where invertebrate prey for sun bears is rarer (Vinitpornawan *et al.* 2006; Scotson *et al.*, 2017). To a lesser extent, they may also be sympatric with the sloth bear, which might limit the sun bear's northwestern range through competition (Steinmetz, 2011). As a result of years of habitat loss, the sun bear's range has become increasingly fragmented and it is completely absent from Singapore, which it most likely inhabited (Scotson *et al.*, 2017).

A forest-dependent species, the sun bear favours interior mature and/or diverse primary forest. On the mainland, the species tends to occupy seasonal evergreen and deciduous forests north of the Isthmus of Kra, Thailand, while in Malaysia, Sumatra and Borneo, they prefer nonseasonal evergreen forest. They are mainly found in lowland areas, although they have been found at higher elevations in India and Borneo, most likely due to logging and deforestation in the lowlands. Although they tend to avoid human habitation, sun bears have been seen in palm plantations, orchards, and farmland, where farmers may view them as pests. The species also occurs in mangrove forests, though this likely depends on their proximity to more preferred habitats (Scotson *et al.*, 2017).



Figure 3: Where sun bears are found in southeast Asia; brown indicates current range, black historical range, and dark grey uncertain range. © Chermundy/Wikimedia Commons

Feeding and Social Life

Like all bears, sun bears are omnivores, feeding on insects such as ants, termites and bees and their larvae, as well as honey and fruits, particularly figs when in season (McConkey and Galetti, 1999; Fredriksson *et al.*, 2006; Scotson *et al.*, 2017). They will also eat lizards, birds and rodents, if they can catch them (Kemmerer, 2015). Their powerful jaws, large canines and sharp claws enable them to break into hollow tree trunks for bees' nests, and also to excavate termite mounds, which they quickly lick while also sucking up the resident insects with their long tongues (Nowak, 2005; Phillipps, 2016). Bears, including the sun bear, have relatively small eyes, but their sight is roughly as good as that of humans, and they also have colour vision - unlike other carnivores, which see in black and white - to help them identify ripe fruit and nuts. They also, of course, have an acute sense of smell, which helps them to locate food even when it is buried (Anon., 2010). In Borneo, fruits of the families Moraceae, Burseraceae and Myrtaceae form more than half of the sun bear's diet, with insects becoming the bear's main food source when fruit is scarce (Fredriksson *et al.*, 2006). They are also important seed dispersers of certain fruit species, such as *Canarium pilosum* (a member of Burseraceae; McConkey and Galetti, 1999). Living in a tropical environment with abundant food sources throughout the year, sun bears have no need to hibernate (Scotson *et al.*, 2017).

Sun bears are mainly diurnal, but in areas of human habitation, they switch to a nocturnal lifestyle (Phillipps, 2016; Guharajan *et al.*, 2018). They may build nests in trees from which to feed and sleep, but these nests are poorly constructed and closer to the trunk than those of orangutans (Phillipps, 2016). As with all bears, they are mainly solitary, apart from females with cubs (Nowak, 2005; Phillipps, 2016). However, they have sometimes been seen in pairs, and multiple bears may congregate at large fruiting trees (Scotson *et al.*, 2017). Sun bears have been known to produce grunts and snuffles while foraging, but they also produce roars when breeding, similar to that of a male orangutan, and a short bark when startled, like a rhinoceros or muntjac deer (Fitzgerald and Krausman, 2002; Phillipps, 2016). Although they are the most arboreal of all bears, they are also good swimmers (Fitzgerald and Krausman, 2002; Kemmerer, 2015).

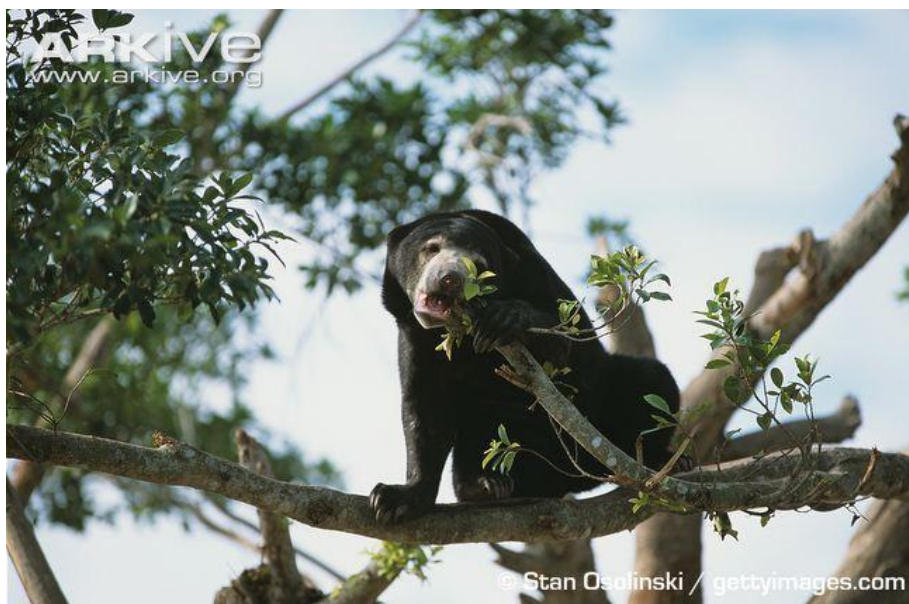


Figure 4: A sun bear chews on a tree branch. Taken from ARKive.

Reproduction

Sun bears reach sexual maturity at 3-4 years of age, and because they live in a tropical habitat with food available throughout the year, they can breed in any month, making them nonseasonal breeders (Schwarzenberger *et al.*, 2004; Phillipps, 2016). Oestrus generally ranges from 1-2 days, but can last up to 5-7 days. The gestation period of the sun bear has been reported to range between 95-240 days, with the prolonged period indicating they use delayed implantation (Fitzgerald and Krausman, 2002). Mothers give birth in a hollow tree cavity, bearing 1-2 hairless, blind and deaf cubs weighing around 325g each (Fitzgerald and Krausman, 2002; Nowak, 2005; Scotson *et al.*, 2017). Although their eyes open at 25 days of age, the cubs remain blind until around 50 days old. Their hearing also improves over the first 50 days of life (Fitzgerald and Krausman, 2002). As to be expected, mothers are fiercely protective of their offspring (Phillipps, 2016). The cubs are sheltered between the buttress roots of large trees, and are carried by the head in their mother's mouth. They become independent at around 3 years old, and usually live to be more than 20 years of age in captivity; one individual was reported to live to around 31 years (Fitzgerald and Krausman, 2002; Nowak, 2005; Phillipps, 2016).

Tigers (*Panthera tigris*) are perhaps the main predators of sun bears, as hairs from a sun bear have been found in tiger scats. Dholes (*Cuon alpinus*) and leopards (*Panthera pardus*) are other known predators of the species, though there are relatively few cases compared to those of tigers (Naing *et al.*, 2020). Reticulated pythons (*Malayopython reticulatus*) are also known to prey on sun bears, as one incident involved a female bear being swallowed whole by a python (Fredriksson, 2005). However, all of these predators present a fairly miniscule threat compared to what sun bears have faced from humans...



Figure 5: A female sun bear plays with her young cub. Taken from ARKive

Threats

The sun bear is listed as 'Vulnerable' on the IUCN Red List of Threatened Species, as the wild population is estimated to have declined by around 35% over 30 years. While there are very few reliable estimates on how many sun bears remain in the wild, partly due to the inaccessibility of their forest habitat, the population is evidently declining throughout the species' range. It is teetering on the edge of extinction in Bangladesh and China, while the Vietnamese population is projected to drop by 50-80% over the next three decades (Scotson *et al.*, 2017).

Deforestation is by far the greatest threat to the species, as the forests the bears depend on are being destroyed at an alarming rate (Scotson *et al.*, 2017). Southeast Asia has one of the highest rates of deforestation in the world, losing nearly 12% of its forests between 1990 and 2010, and is projected to lose three quarters of its forests and up to 42% of its biodiversity by 2100 (Sodhi *et al.*, 2004; Stibig *et al.*, 2014). Malaysia and Indonesia in particular have experienced the worst rate of deforestation, as forests are destroyed by logging, fires and conversion to plantations (such as those for cultivating palm oil, particularly in Borneo and Sumatra). Even protected areas aren't immune, as two fifths of Indonesian forest lost between 2000-2012 were in national parks and other areas where logging is prohibited (Scotson *et al.*, 2017).

The other most serious threat to the species comes from commercial hunting for the illegal wildlife trade. Along with Asiatic black bears and brown bears (*Ursus arctos*), sun bears are captured from the wild and farmed for the bile from their gall bladders, originally sold as traditional medicine but now used as a commodity in products such as shampoo and cough drops (Foley *et al.*, 2011). Snaring is another major concern throughout the species' range, as hunters set up snares that specifically target bears and threaten local populations (Scotson and Hunt, 2012). Studies have also found evidence of live bears being sold in the pet trade, and skins and meat (especially paws) being sold at markets in Sarawak, Malaysian Borneo (Krishnasamy and Shepherd, 2014; Gomez *et al.*, 2020).



Figure 6: A captive sun bear looks out from a cage, likely to be farmed for its bile. Taken from ARKive.

Conservation

Ultimately, measures to decrease habitat destruction and poaching throughout its range are key elements in sun bear conservation. In areas most affected by deforestation, urgent action is needed to protect remaining areas of forest from being converted for human use. In addition, increased scientific understanding of sun bears is needed, especially because there have been few intensive studies focused on the species (Scotson *et al.*, 2017; Crudge *et al.*, 2019).

The sun bear is listed in Appendix I of the Convention on International Trade of Endangered Species (CITES), and legally protected from poaching and trade throughout its range, except in Sarawak and Cambodia (Krishnasamy and Shepherd, 2014; Scotson *et al.*, 2017; Crudge *et al.*, 2019). Despite this, law enforcement has been insufficient in prohibiting the illegal trade of sun bears and their parts (Foley *et al.*, 2011; Scotson *et al.*, 2017). Stricter laws are needed in order to improve proper protection of the species (Krishnasamy and Shepherd, 2014).

Dedicated rescue centres have been established across the sun bear's range with the main aim of providing sanctuary for bears that have been confiscated from the wildlife trade. These centres can also aid in raising local awareness of the plight of the species and its ecosystem (Scotson *et al.*, 2017; Crudge *et al.*, 2019). One such centre is the Bornean Sun Bear Conservation Centre (BSBCC) in Sabah, Malaysian Borneo, which was founded in 2008 (BSBCC, n.d.).

Sun bears can be found in many zoos around the world, including Europe, North America, Asia, and Australia. The International Studbook (ISB) for the global captive population was established in 1990 and is currently coordinated by Perth Zoo, Australia (WAZA, 2024), while the European Endangered Species Programme is currently overseen by Colchester Zoo, England (EAZA, 2024).

The Sun Bear Conservation Action Plan was published in 2019 to outline a strategy for priorities up to 2028, that would lay the foundation for achieving the following long-term goals: 1) eliminate illegal exploitation of sun bears; 2) protect and restore sun bear habitats and populations across the species' range; 3) devise and employ methods to reliably monitor trends in sun bear populations; 4) maximise the contribution of *ex situ* sun bear populations to conservation; and 5) increase cross-sectoral support and collaboration for sun bear conservation (Crudge *et al.*, 2019)



Figure 7: Kyra, born at Chester Zoo in 2018 and now living at Hertfordshire Zoo. © Chester Zoo

Fun Facts

- As discussed in the BBC series *Ingenious Animals* (2016), sun bears have the largest brains in proportion to their body size of any land carnivore; one captive individual was reported to have observed sugar being placed in a cupboard with a lock, which it opened by using its claw like a key (Nowak, 2005). This level of intelligence is an important survival skill in an environment as dangerous as the rainforest (*Ingenious Animals*, 2016).
- One study even found that sun bears are able to mimic one another's facial expressions, just like humans and gorillas, which is unexpected considering the bears' solitary lifestyle (Taylor *et al.*, 2019; Buehler, 2019).
- In the Malaysian language, the sun bear is known as 'Basindo nan Tenggil', meaning "he who likes to sit high", a reference to their arboreal nature (Belfast Zoo, n.d.).
- While filming *Zoo Quest for a Dragon* (1956), a young David Attenborough was given a sun bear cub by a local Dyak, who referred to the animal as a "beruang", which means 'bear' in Malay. The bear was named 'Benjamin', and he was taken back by Attenborough to London Zoo (Attenborough, 2017).
- The sun bear's habit of feeding on honey has earned it the nickname 'honey bear', or *Beruang Madu* in Malay (Lai and Olesen, 2016). However, this nickname has also been used to refer to the kinkajou of Central and South America, which is a member of the raccoon family (de la Rosa and Nocke, 2000).
- Sun bears have been known to attack humans on occasion, particularly if injured or accompanied by offspring (Fitzgerald and Krausman, 2002). In one October 2017 incident, a couple were attacked by a sun bear in Riau Province, Sumatra. The wife was killed, while the husband was severely injured and hospitalized following the attack, but survived (AFP, 2017).
- Sun bears made even bigger headlines in 2023 when a viral video was posted online showing a sun bear at the Hangzhou Zoo, China, standing upright and waving its paw at visitors, which led to a conspiracy theory that the bear was nothing more than a person in a suit. However, the zoo has denied this, saying that people "don't understand [the species] very well" (Durbin, 2023).



Figure 8: It seems he also likes to sleep high! Taken from ARKive.

The Bear Family



Figures 9-16: All eight of the world's bear species. Clockwise from top left: Giant panda (*Ailuropoda melanoleuca*, 9); Spectacled bear (*Tremarctos ornatus*, 10); Polar bear (*Ursus maritimus*, 11); Asian black bear (*Ursus thibetanus*, 12); Sun bear (*Helarctos malayanus*, 13); Sloth bear (*Melursus ursinus*, 14); American black bear (*Ursus americanus*, 15); and Brown bear (*Ursus arctos*, 16). All photos taken from ARKive.

Sun Bears at Belfast Zoo

At the age of 11, I learned of the existence of Belfast Zoo, and from reading the zoo's website, I learned they had species my family had never seen before, with the most exciting of all being not one but two species of bear - spectacled bears and, of course, sun bears - which at the time were the only bears in an Irish zoo. The sun bear enclosure is located at the very top of the zoo, which is situated on the slope of Cave Hill, just north of Belfast City.

The female bear, Bora, was born at Ústí nad Labem Zoo in the Czech Republic in 1993. She lived at Frankfurt Zoo before moving to Belfast in 1997 (see Appendix), along with Victor, a wild-born male rescued from a village where he was horrifically beaten up and prepared to be eaten while chained to a tree for a year, as discussed in a *Belfast Zoo* TV series from the BBC. Victor died in 2011 (Pers. Comm., 2013), and was replaced in September of that year by Indera, a then 19-month old male from the Rare Species Conservation Centre in Kent, England (Live Science, 2011). He was born on 3rd February 2010 at Singapore Zoo (see Appendix), making him a genetically important addition to the European sun bear population. I instantly fell in love with the sun bears, as well as the spectacled bears, from the first time I visited, and I started visiting the zoo at least once every year since.

We would often sit at the Treetop Tearoom café across the path, having a bite to eat while enjoying the bears at the same time. I was even lucky enough to give the bears their food, first when I attended summer camp, and then for my 17th birthday a few years later. Four months after our first visit, we learned that Indera had destroyed the wooden climbing frames in the enclosure by chewing at the bark. The frames were restructured twice - the second time incorporated new features such as hammocks and a wobble feeder (where the bears have to wobble the pole to make food fall from the top). On one memorable visit, I spotted a native kestrel (*Falco tinnunculus*) fly into the sun bear enclosure, perching on the poles from time to time.

Indera has now left Belfast, having moved to Paradise Wildlife Park (now Hertfordshire Zoo) in March 2023 to become part of their new Sun Bear Heights exhibit. He now lives with female Kyra, born at Chester Zoo in June 2018 (pictured in 'Conservation' at four months old) and the first sun bear to be born and survive to adulthood in the UK, and the pair share their habitat with binturongs and small-clawed otters (Chester Zoo, 2018; Davies, 2023). With Bora left to live out her years, it seems unlikely that Belfast Zoo will bring in new sun bears to replace her after she passes away.



Figures 17 & 18: Belfast Zoo's sun bears, Bora (17) and Indera (18). Photos taken by me.

Sun Bear Gelato

When I was 17, my mother told me about an ice cream parlour in Dublin City, called the Sun Bear Gelato; the 'Sun Bear' part of the name was what aroused my interest. The gelato is located around where Dawson Street meets St. Stephen's Green, which is actually not far from the Natural History Museum at Merrion Square, which had a stuffed sun bear cub as one of its specimens. Above the entrance is a brown sign with the title and a white image of a sun bear next to it, while a small statue of a brown bear with a red and yellow scarf named Benny sits at the entrance holding an ice cream cone (this was later joined by the statue of an actual sun bear named Della and her cub, Chris). Inside, there is a large board telling customers about sun bears and the threats they face in the wild.

After ordering a small tub with 2 scoops of strawberry and chocolate, I loved the gelato so much, it became my new favourite ice cream parlour in Dublin. Perhaps the greatest thing about it is that all of the products are made without palm oil, which is good news for the rainforests that sun bears, orangutans and other animals call home. Some of the profits the gelato receives are donated to the Bornean Sun Bear Conservation Centre (mentioned in 'Conservation'), supporting crucial research. The products also contain less sugar and fat than your average ice cream, and are made fresh in small batches every day. Vegan-friendly options are also available, as are hot drinks. Thus, the gelato has received consistently positive reviews on Tripadvisor, except for one very negative review complaining about the owner and staff being "racist" (yes, really!).

One day, I visited the gelato with my mum and sister, who both went back later for another ice cream while I took the train home. When they went without me, Mum met the manager, who said that they were planning to have an ice cream stand in Dublin Zoo (though six years on as I write this, that never happened). She told him that they should also have a stand in Belfast Zoo, because of the sun bears that live there (although the fact that Belfast's sun bears are likely to be phased out makes this prospect vanishingly unlikely). The previous month, after our last visit, I sent an email to Alyn Cairns (manager of Belfast Zoo) to tell him about the Sun Bear Gelato. In response, he told me that the zoo was investigating its consumption of palm oil.

The gelato also had a second parlour in the Frascati centre in Blackrock, which I've been lucky enough to visit but it is now no more. On more recent trips to the city, I usually found the gelato closed, likely due to bad timing, if not poor luck. However, I managed to visit once more months before moving away from Dublin for university reasons, and that visit was in the early afternoon. The gelato was initially open from 11am until 10pm (9:30am-8:45pm on a Sunday), but the opening hours have since been reduced to 1-10pm from Thursday to Saturday, closing time at 7pm on a Sunday, and they are completely closed from Monday to Wednesday according to Google Maps.

Their FaceBook page can be found here: <https://www.facebook.com/SunBearGelato/>

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Appendix



Information signs about Belfast Zoo's sun bears, Bora and Indera.

Thank you for reading!

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