

Behaviour and Environment Evidence Base

Bear Ethogram



ZooMonitor Community project code (for coordinator to use, not observer)

4Prk-9tSE

Pre-session questions in ZooMonitor

Before you start your session in ZooMonitor, you will be asked to respond to several questions. Questions 1-4 should be answered using a weather app which can be reliably accessed by all observers. The app should be consistent across observers.

1. Weather condition
 - a. Will list weather conditions commonly displayed in weather apps. Select the weather condition which is displayed in the weather app being used.
2. Temperature (Celsius)
 - a. Enter the temperature in Celsius displayed in the weather app or from a local measurement device.
3. Humidity (%)
 - a. Enter the percent humidity displayed in the weather app or from a local measurement device.
4. Wind (km/h)
 - a. Enter the wind in km/h displayed in weather app.
5. Noise level (dB)
 - a. Enter the noise level recorded from the external microphone and its related app.
6. Access
 - a. Will list whether bear has full access to all enclosures or is restricted to indoor/covered enclosure or outdoor enclosure.
7. Enrichment item
 - a. Will list the type of enrichment item present based on the definition of enrichment item interaction. You may only select one enrichment item type. If there is more than one type of enrichment item present, you can manually type in the other(s) in the “Notes” section.
8. Visitors present
 - a. Will list bins of visitor numbers. Select how many visitors are present at start of session.
9. Carcass present
 - a. Will list whether a carcass is present or absent. If your institution does not carcass feed, select N/A.

Recording method

You will do focal sampling (i.e. record data on one individual at a time). There will be a 30 second sample interval – you record all behaviours (short and long duration) on the exact “beep” of 30 seconds, and all occurrences of some short-duration “event” data during the interval (the 30 seconds between the beeps). This will be clear in ZooMonitor.

Following sections are to be filled in (if applicable) at the “beep”

Visibility

This section is left untouched if bear is fully in sight during interval. If this section is used in an interval, no options from bear ethogram can be selected.

Name	Description
Behaviour obscured	Location of bear in enclosure is known but bear’s head is not visible and/or 60% or more of bear is obscured and behaviour cannot be discerned
Out of sight	Location of bear is unknown

Location

Name	Description
Indoors/covered	The majority of the bear is in the Indoor/covered enclosure
Outdoors	The majority of the bear is in the Outdoor enclosure

Social proximity

Proximity	Description
In contact	Physically touching
Proximate	2 or less body lengths* apart but not in contact
Distant	More than 2 body lengths* apart.
Solitary	No other bear present in whole of accessible enclosure areas.

*One body length counts as the length of the focal subject from rear end to nose. This may vary between focal individuals.

Bear Ethogram

Behaviour	Description	Reference
Solitary		
Locomotion	<p>Directional travel at any speed. Only includes short bouts of travel with an intended goal or long bouts of travel with no evidence of a stereotypic or repetitive pattern. Includes climbing and terrestrial locomotion within shallow water.</p> <p>Note: This behaviour is considered passive and any other behaviour demonstrated while locomoting should take precedence for coding.</p>	Ryan (2020) Ross (2006)
Swimming	<p>Individual locomotes within the water. May include surface swimming or underwater swimming. Limbs may contact permanent surfaces, but weight is not supported. Includes the act of diving into water and gliding through the water after pushing off a solid surface.</p> <p>Note: This behaviour is considered passive and any other behaviour demonstrated while swimming should take precedence for coding.</p>	Ross (2006)
Feeding/Foraging	<p>The manipulation or eating of food provided by keepers or foraging for plants growing in enclosure or wild animals which have entered enclosure. Includes food search activity, moving around enclosure, sniffing ground or air.</p> <p>Modifiers: Presented vegetable, Presented animal (i.e. provided by keeper), Natural vegetable, Natural animal (not provided by keepers), Unknown</p>	Ryan (2020)
Drinking	Placing mouth at surface of pools or spouts and ingesting water.	
Solitary play	<p>Playful running, gymnastics, interacting with objects (paw or mouth manipulation of objects). Includes playing in water (for example splashing).</p> <p>Note: Play with enrichment objects should be scored under enrichment item interaction: play. If the object is not an enrichment item, it should be scored as solitary play.</p>	Ryan (2020)
Investigate	Bear places nose within 5 cm of inedible object and sniffs or licks the object. Or bear clearly sniffs air with	Swaigood et al. (2001).

	nose slightly lifted to air and/or nares visibly moving to sniff air.	
Rolling	(Specific to polar bears) On the ground or snow, the bear will roll. This may include rubbing head and/or neck on the ground/snow, pushing forward with hind legs while chest is in contact with the ground/snow, and rolling on its back or sides and twisting back and forth.	
Scent marking: genital rubbing	Applying pressure to the hind area below the tail by moving the hind quarters in a back and forth motion around or up and down on the surface of an object or on the wall. Can be performed in four positions: squat, reverse (backing up to a vertical surface), legcock (against a vertical surface with one leg raised), and a full handstand (both hindfeet elevated off the ground with body fully extended).	Liu et al. (2005). White et al. (2002)
Scent marking: rubbing	Rubbing on a fixed object like a tree. Can include rubbing the head, neck, and/or shoulders against the object; rubbing the flanks while remaining on all 4 legs; rubbing the nape and back against the object while on hind legs.	Filipczyková et al. (2016)
Scent marking: other	Urinating on a fixed object or wall while performing a handstand; urinating and stomping or forcing and spinning movements of extremities leaving track holes or marks (also done without urination); bark biting and scuffing; branch and trunk breaking	Liu et al. (2005) Seryodkin (2014)
Scent anointing	Rubbing face, head, neck, and/or shoulders on object in fluid movements or by rolling on it, making contact with head, neck, shoulders, and upper back. Can use paws to try and spread odour.	Charlton et al. (2020) Bian et al. (2013)
Urinating/defecating	Assuming a squat, leg-cock, or standing posture to excrete urine or faeces.	Liu et al. (2005).
Grooming	Scratching using paws or licking of the pelage.	Liu et al. (2005).
Rearing	Standing up on hind legs with stomach exposed. May seem to scan environment or investigate air.	Fernandez et al. (2020)
Resting/Sleeping	Inactivity (lying, sitting or standing on all four), either awake or asleep. Regardless of resting position, the bear should not be investigating or seem as though attention is on anything specific. Shifting between	Ryan (2020)

	resting positions still counts as resting as long as it does not involve locomotion or becoming alert.	
Den construction/maintenance	Constructing den by excavating the ground. Rubbing or gathering insulation materials with forefoot inside den or bringing materials to den. This behaviour should be scored in relation to natural and artificial dens.	Kim et al. (2020) Tietje and Ruff (1980)
Enrichment item interaction	<p>Enrichment items are considered any item which is not a permanent fixture/feature in the enclosure. These items are added to bring variety and novelty and rotated out regularly.</p> <p>Modifiers:</p> <p>Play: Animal interacting with enrichment item as solitary play.</p> <p>Feed: Animal using a non-permanent puzzle feeder to actively feed or forage (sniffing or searching for food).</p> <p>Investigate: Animal is investigating enrichment item.</p> <p>Comfort: Animal is using enrichment item for any kind of comfort behaviours (e.g. resting with a blanket).</p> <p>Negative: Animal displays an aversive and/or avoidant reaction to the item.</p> <p>Note that ignoring the item should not be scored as enrichment item interaction.</p>	
Social		
Agonistic signalling	<p>Broadside displays such as:</p> <p>Stomp walk: As a bear walks forward, with its head nearly level with its shoulders, each forearm is alternately lifted to near horizontal position; then that forepaw is slammed down against the ground, whereupon it may slide forward <1 m;</p> <p>Cowboy walk: Face-to-face display where the forearms are lifted only several centimetres before the hands are slammed against the ground, step after step, accompanied by pant-huffing. This display typically ends with a hop-slam, accompanied by an explosive woof. This is a stiff-legged gait where elbows are sometimes turned out so far that the arms resemble the legs of a bowlegged horseman.</p> <p>Sumo strut: The bear walks forward, urinating. Urine flows onto its legs and runs down the fur, presumably picking up its scent, which is then ground into the soil by a repeated twisting motion of the feet. Its arms and</p>	Stringham (2011)

	<p>legs are widely spread and its knee and perhaps elbow joints stiffened.</p> <p>These broadside displays can be accompanied by: Head-low threats: Lowering the jaws to ground level while roaring continuously or bellowing in rapid pulses. May be made from any angle at which an opponent approaches. Head-high threats: head at 45° or higher with shoulders. Mouth can be gaped open and upper lip extends outward exposing upper canines to the opponent's view. May also include harsh vocalization. Head-high displays are usually done when nostrils of two bears are <1 m apart and virtually always made face-to-face. Modifier 1: Recipient, Signaller, Unknown (Note: both individuals may be the signaller) Modifier 2: Other individual(s) involved in encounter.</p>	
Contact aggression	<p>Animal forcefully swats with forepaws, lunges towards other individual, grapples, or bites with force. Aggression should be recorded whenever the focal individual is involved in an aggressive altercation – regardless of whether the focal individual is the aggressor or recipient. Modifier 1: Recipient, Aggressor, Unknown Modifier 2: Other individual(s) involved in encounter</p>	Owen et al. (2013).
Social play	<p>Individual shows obvious affiliative behaviour to a con-specific. May include rough-housing play, nuzzling, or chasing. Nonaggressive chasing, wrestling, inhibited biting or pawing at other individual. There should not be attempts to escape and individuals can alternate between subordinate and dominant positions. Modifier: Other individual(s) involved in encounter</p>	Ross (2006)
Courtship	<p>All premounting behaviours with consciousness of partner, patterns of behaviour by which the male follows or approach the female or express interest, and the female's response to those behaviours. These behaviours may include: Slowly approaching the partner or walking behind moving partner; Smelling the partner's body parts including genitals, or the place the partner is staying, or the excretion of the partner with nose; Softly biting, not aggressively, the body parts of the partner; Touching or tapping the partner using forepaws or muzzle; Opening the mouth</p>	Owen et al. (2013). Kim et al. (2020)

	toward the partner, but not showing upper gums; Pushing or pulling at the fence between, or swaying or locomoting back and forth with proximity to the partner.	
Mating	Note that the female must first display receptive behaviour (female presents anogenital region to male) before the male responds with mating behaviour. Mounting (getting on the female, but placing hind legs on the ground) and all behaviours during the mounting.	Owen et al. (2013) Kim et al. (2020)
Keeper interaction	Training or any interaction where keeper is intentionally trying to gain and maintain the attention of the bear. Can occur at any location in enclosure where keeper is visible to the bear. Attention: Bear clearly has attention on keeper wherever they are within their line of sight. May follow keeper with their gaze or locomote closer to where they are. Keeper may be in keeper or visitor areas. Training: Bear is actively engaged in a training session with a keeper. Direct feeding: Bear is actively eating or grabbing a food the keeper is providing directly to the bear (e.g. food being given through a mesh). This should not be scored for food that is being tossed into enclosure from a distance. Negative: Bear is avoidant or showing aggression towards keeper Note that ignoring a present/visible keeper should not be scored as keeper interaction	
Visitor interaction	Positive: Visitor gains animal’s attention without any aggressive or aversive reaction from the animal. Negative: Aggressive or aversive reaction directed toward a visitor. Positive (visitor experience): As part of a scheduled/special visitor experience, the visitor gains animal’s attention without any aggressive or aversive reaction from the animal. Negative (visitor experience): As part of a scheduled/special visitor experience, an aggressive or aversive reaction is directed toward a visitor.	
Stereotypic/Abnormal		
Look through keeper door/window	Standing on hind legs or sitting and looking through keeper door/window. Will be repetitive and seemingly	Liu et al. (2003)

	in anticipation of a resource or husbandry event. Can be incorporated into pacing behaviour.	
Stereotypic rearing	Repetitively rearing within short intervals (<30 sec). May occur in the same spot and appear as though they are investigating the air or looking somewhere.	
Pace	Stereotypic pacing (back and forth, or perimeter locomotion, in a repetitive sustained pattern, tracing the same route at least 3 times consecutively) or quasi-stereotypic pacing (same as stereotypic pacing, except animal need not take the same path 3 or more times in a row. Any pacing in which a predictable pattern emerges. There may be variations in the routine or the animal may alternate between a limited number of travel paths).	Panda project PDX Wildlife*
Stereotypic digging	Digging with forepaws in the same spot, repetitively. Should not be preceded by scent marking behaviours or as part of a scent marking bout.	
Cage climb	Stands bipedally and sways or makes climbing motions, as if attempting to escape	Swaisgood et al. (2005)
Regurgitation/Reingestion	Vomits and reingests vomit repeatedly	Swaisgood et al. (2005)
Self-mutilation	Self-inflicted physical harm, such as biting or chewing the tail or leg, or hitting the head against a wall	Liu et al. (2003)
Pirouette	Stands on hind legs and spins body at least 90 degrees	Swaisgood et al. (2005)
Head-toss	Head swings upward or to the side in a swinging movement.	Swaisgood et al. (2005)
Rocking	Moving back and forth without locomotion. Must include at least one full back-and-forth motion.	Fernandez et al. (2020)
Other stereotypic/abnormal	Any other repetitive behaviour which has no inherent purpose such as repetitive nibbling/licking, tongue flicking, somersaults, or paw tapping.	Snyder et al. (2016)
Maternal behaviours		
Nursing cub	Mother is alert or relaxed while cub suckles from her nipples. This behaviour takes precedence over all other behaviours (e.g. lick cub anogenital)	Snyder et al. (2016)

Grooming cub	Mother licks any part of cub's body other than anogenital area, and/or bites the cub lightly and repetitively, using incisors, anywhere on its body.	Snyder et al. (2016)
Lick cub anogenital	Mother licks the cub's anogenital area.	Snyder et al. (2016)
Holding cub	Mother uses any part of her body (paw, mouth, foreleg) to hold/support the cub on her body. At least 50% of the cub's body must be supported on some part of the mother's body.	Snyder et al. (2016)
Other maternal	Mother performs any other behaviour involving the cub that is not described above (e.g. olfactory investigation of cub, repositioning cub)	
Concurrent behaviour		
Vocalization	Sounds emitted by the bears to show danger, alarm, anger, or intimidation like barking and growling. Also includes affiliative vocalizations like bleating and chirping in giant pandas.	Owen (2013) Quintavalle Pastorino et al. (2017)
There will also be a habitat map to record location		

The following section is to be used within the interval at anytime

All occurrence

Name	Description
Drinking	One count is a bout of drinking. Bear may lift head from water without walking away from water source and then continue drinking in the same bout.
Urinating/Defecating	One count is each time they urinate or defecate. If the bear urinates and defecates at the same time, that only counts as one. Each time they get out of the urinating/defecating position is a separate count.
Contact aggression	Each bout of contact aggression is one count. The bears must be separated without displaying any aggressive or agonistic behaviours for at least 5 seconds to be considered different bouts of aggression.

Genital rubbing	One count is each separate surface they perform genital rubbing on. Bear approaches surface, contacts surface with anogenital area and walks away. If the bear remains at the same surface and rubs multiple times without walking away, that is still one count.
Scent-anoint	One count is any bout of scent-anointing including rubbing, rolling and using paws to rub in scent. Separate counts are bouts separated by 5 seconds.
Scent mark (rubbing or other)	One count is each separate fixed object they perform rubbing/biting/scuffing on or separate track mark/hole created. If the bear remains at the same object and rubs, bites, breaks branches, and scuffs, this is one count. Any bout of tracking/hole or mark created with extremities on the ground counts as separate from any of the interactions with the object if performed by the rubbed object.
Comments	Add a comment on anything that may seem relevant to the data entered (e.g. keeper is in exhibit for certain intervals, two bears are only separated by a mesh, etc.). Or if a correction for a previous interval needs to be made or clarified.

* <https://www.pdxwildlife.com/become-a-citizen-scientist/>

References

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