Internship report

Ethogram and analysis of social structures of four captive raised black bear cubs

Executed at the

Cochrane Ecological Institute,

Cochrane, Canada

09. Aug- 19 Sept. 2009

by Anne Hertel

Directory

1. The Institution:

The Cochrane Ecological Institute is an institution seated in the foothills of the Canadian Rocky Mountains, northwest of Calgary, Alberta. It´s run by Ken Weagler and Clio Smeeton, who´s parents, Beryl and Miles Smeeton, founded the institute in 1971. The main intention of the institute is the breeding and conservation of endangered indigenous species and rehabilitation and, if possible, release of orphaned or injured animals. The CEI is responsible for the outstanding success of reintroducing the once extinct swift fox (V*ulpes velox*) to the Canadian prairies. Through the years they bred and released over 800 foxes. Today the status of the swift fox in Canada is considered as endangered.
During my stay, the CEI took care of four orphaned black bear cups, two great horned owls, which where permanently injured and therefore not intended for a release, a great grey owl, a Rough- legged hawk, which was released a couple of weeks after I left, two red foxes, five swift foxes (two males, one female and two cubs), a herd of white tailed deer, buffalo, an elk, and a moose.

2. Daily tasks:

Besides the research for my project (see below) I also worked as a Volunteer at the Institute which included, that I participated in all daily tasks concerning both the wildlife and the boarded dogs at the dog kennel.

2.1. Vegetation analysis:

During my stay at the CEI, there were two more Volunteers. One was doing her Bachelor thesis about the qualities a possible release site for the bear cubs has to bring along.
Therefore she made a vegetation analysis in the new bear panel before the cubs moved into it. Two weeks after the bears moved in, she wanted to check on the change in the plant composition. I helped her to determine the different plant species, count the absolute

number, estimate the percentage of cover and measure the height of the bigger ones. For vegetationzones of shrubs, grasses and flowers we choose sample squares of 1m², in zones with higher vegetation we choose samples of 10m². Unfortunately it was hardly possible to evaluate the change because the bears squeezed down most of grasses. Further on the grasses and flowers dried out, because of a very hot and dry weather period. The cubs didn´t touch the smaller shrubs (e.g. dwarf birch, *Betula nana*) or the higher vegetations zones (mostly young quaking aspens, *Populus tremuloides*) a lot. The latter was due to the fact that the bears didn´t spend a lot of time in the part of the enclosure with this kind of vegetation. Sometimes they tried to nibble a little on the dwarf birch, but more in a playful way than for the purpose of feeding.

2.2. Pursuits on the new bear enclosure:

At the time I arrived at the CEI they where building a bigger enclosure for the four bear cubs. The current one had a size of about 100m². We maintained the fence, installed the insulators for the electric fence, and rounded the corners with puckboard so that the bears had no chance to climb up the fence or to get used to the possibility to hide in corners.

The new bear area arose on the ground of a former Swift Fox panel. Swift Foxes are masters in digging deep and long holes and tunnels, therefore it was necessary to expand the fence into the ground. Spread over the area there was a lot of wire grown half into the ground, we had to cut it out or to cover it, so that the bears won´t trap into the wire and get hurt.

Furthermore it was absolutely essential to cut all trees or branches that would offer the bears a possibility to climb out of the enclosure. Additionally to the normal fence, six layers of electric fence were installed. Every two to three meters, insulators got attached to the fence and six lines got drawn all around the enclosure. The electric fence is the most efficient way to keep the bears inside the enclosure. After two or three touches of the fence with the following shock they have big respect and don´t try it again. This may sound cruel but it´s the most important thing for an institution working with wildlife to guarantee that the animals are kept safely away from humans. Bears can be very dangerous, especially when they grow up. People at the CEI took safety precautions pretty seriously.


2.3. Pursuits on the lynx enclosure:

The last two weeks of my stay we started building a complete new enclosure for two young lynx which where supposed to arrive in mid October. The enclosure should be build around a little hill with a spruce tree in the middle. Lynx can jump up to 5 meters wide, which we had to consider in our planning. Every 5 meters we digged in and concreted plots, which sticked 2.50m out of the earth. Around those plots we stretched wire mesh fence. On top of the fence we attached an overhang. After I left the others continued to finish the panel. On the one end of the enclosure they replaced the wire with a glass wall.


2.4. Feeding the animals:

Feeding the animals in the custody of the CEI was one of the routine tasks. There is a big supermarket in the town of Cochrane which is donating left over fruits and vegetables. Every two days somebody went to pick up this stuff. Further on the University of Calgary donates all it´s disused rats and mice to the institute. The Great horned owls (*Bubo virginianussusintior*), the Great Grey owl (*Strix nebulosa*) and the Rough-legged hawk (Buteo lagopus) where only fed by rats and mice, the Swift Foxes (*Vulpes velox*) and Red Foxes (*Vulpes vulpes*) got rats and additionally dog food. The white tailed deer (*Odocoileus virginianus*) got tomatoes, peppers and dog food additionally to the plants and twigs in their panel. In the beginning of my stay the bears where exclusively fed by vegetables, fruits, nuts and dry dog food. After they moved into the bigger enclosure, we started to feed them with fish and horsemeat as well. Usually the extra proteins make them stronger and wilder. For that reason we didn´t feed them with meat until they were in the bigger panel and a little bit more off hands. All animals got fed once a day in the evening around six o´clock. Only the bears got an extra portion in the morning at 7:30am.

2.5. Working at the dog kennel:

To financially support the work of the CEI, there is a dog kennel right next to the site where the wild animals are kept. At the kennel, private people can board their dogs for the duration of their holidays. We cleaned the kennels in the morning and fed the dogs. Before midday we usually left the dogs in the four community areas in groups put together by size, temper, sex and compatibility. In the afternoon we took the dogs for walks and played with them before they got fed again around 7pm. If there were dogs with special needs we also gave them their medication. Most of the times the medicine was administered in the form of pills but we also had one dog which had diabetes and needed injections of insulin two times per day. Further on we also dealt with the owners when they delivered or picked up their dogs and operated the credit card machine.

3. Ethogram and analysis of social structures of four captive raised black bear cubs at the age of six to seven months in two different sized enclosures

3.1. Introduction:

During my stay at the Cochrane Ecological Institute (CEI) I worked on behavioral research of wild born, but captive raised bear cubs.
I studied their behavior and activity patterns at the age of about six months in a smaller enclosure of one third of an acre and in a bigger enclosure of the size of two acres. I especially kept an eye on the way they were adjusted to the human day rhythm and how this developed after they moved into the bigger enclosure, where there was less sight contact and interaction with the humans.
Further on I analyzed the social structure in the group. Therefore it was very interesting, that two of the females were siblings, the third female got supposedly adopted by the mother of the siblings, the male didn´t have any relations to the females and he came from a different part of Alberta (compare description of the studied animals).

3.2. The four orphaned black bear cubs:

At my arrival the black bears which I studied where about six months old. They where approximately born in January and brought to the CEI in april. The three female cubs came from Bonnyville, 300km northeast of Edmonton, the capital of Alberta. The male cub was found by the famous bear scientist Charlie Russel in Waterton Lakes Nationalpark.
Doyle and Matt, the two cinnamon colored bears are most likely siblings. They where found together with Natty, the smaller black female. A woman first allured the mother of Natty by laying out bait in her garden and than shot the bear. Natty was probably adopted by the mother of Doyle and Matt. This behavior is not too uncommon with black bears. The same happened to the mother of Doyle and Matt. After the woman shot both bears, she took the cubs and showed them around in a shopping mall. When the police confiscicated the cubs and brought them to the Cochrane Ecological Institute, they where in a dangerously dehydrated shape.
Mike, the only male bear was left by his mother in the wild. Charlie Russel observed the young female how she took one of her cubs and crossed a river but never came back to fetch the other one. After two days he decided to take the cub and bring it to the rescue station. Probably she didn´t came back because Mike was a very nippy, cheeky cub and maybe too strenuous for a young mother so that she and her other cub had greater chances to survive without him.

The first weeks the bears where kept in a room inside the house and fed with a special baby formula every two hours. Than an outside extension was build right beside their room. At an age of four and a half months they moved to an exclusively outside enclosure of the size of a third of an acre. At that time they where fed mostly by fruits and vegetables. This outside run was enhanced again by another three acres when the bears where about six and a half months old. They will stay in this run until the time of their release has come, which will be approximately in autumn 2010, at an age of one and a half years.

By the way, all four bears are named by soldiers, fallen in Afghanistan. This is because the Canadian Forces where a great help by building the first outside enclosure and they also set the release site for the bears, which will be the Canadian Forces base Cold Lake, northeast of Bonnyville.

Doyle

Matt

Mike

Natt

It was relatively easy to distinguish the cubs from each other. Doyle had more white fur around her muzzle than her sister which was also of a more wiry, compact shape than Doyle. In the beginning it was a little difficult to differ the two black ones from each other but Natty most of the times had wet ears or at least little curls at the ears from an earlier suckling. Also her ears stood narrower to each other and Mike had a bigger head. Later on it was absolutely obvious who was who because the male gained size way faster than the females. While observing them it got also easy to distinguish them by the way they moved and behaved.

3.3. Methods and Material:

I observed the cubs during three plots of 15 to 17 hours. The first plot took part in the old enclosure in the middle of August (Aug. 16-19. 2009), the second plot I recorded during their first days in the new enclosure (Aug. 25-28 2009), the third one after they adapted to the enclosure (Sept. 11-16. 2009). Every day I observed the bears for several hours, in shifts of two hours. In the old enclosure I used a movement- camera to record the rate of activity during the night. This wasn´t possible in the new enclosure because it was far too big and they didn´t show a preference for one sleeping- place. For observation from farther away and for identification I used a Binocular. Every three minutes I noted the kind of behavior each bear showed (see attachment 1.). Therefore I summed up all kinds of behaviors in nine categories (see table 1.). I associated four levels of activity, beginning from 1 (very low) to 4 (very high level of activity) to the different behaviors to create ethograms, showing the rate of activity of the bears during the day.

Table 1: Definition of behaviors and category of activity

Shortage	Definition	Level of activity
S	Sleeping: very low level of activity, no movement	1
R	Resting: low activity, suckling, no walking	2
RT	Rest in tree: hanging out in the tree, low level of activity	2
W	Walking and investigating the enclosure, watching people	3
T	Teasing: interaction between the bears, no running	3
IT	In tree: activity while they are in the tree, no direct interaction	3
E	Foraging and eating: all activities which are correlated with the searching and consuming of food	3
P	Playing: lots of interaction between the bears, running around, high level of activity	4
PT	Playful activity in trees, direct interaction between the cubs	4

Further on I analyzed how many hours per day the bears spend with direct interaction and with eating and foraging. Therefore I counted how many times during the 15-17 hours they

showed the certain behavior and multiplied this with three (because every note represents the main behavior a bear showed during a period of three minutes).
For analyzing the social structures within the group I also noted how often the different cubs spend time with each other. Those conclusions I charted in percentages pie diagrams.

3.4. Results and discussion:

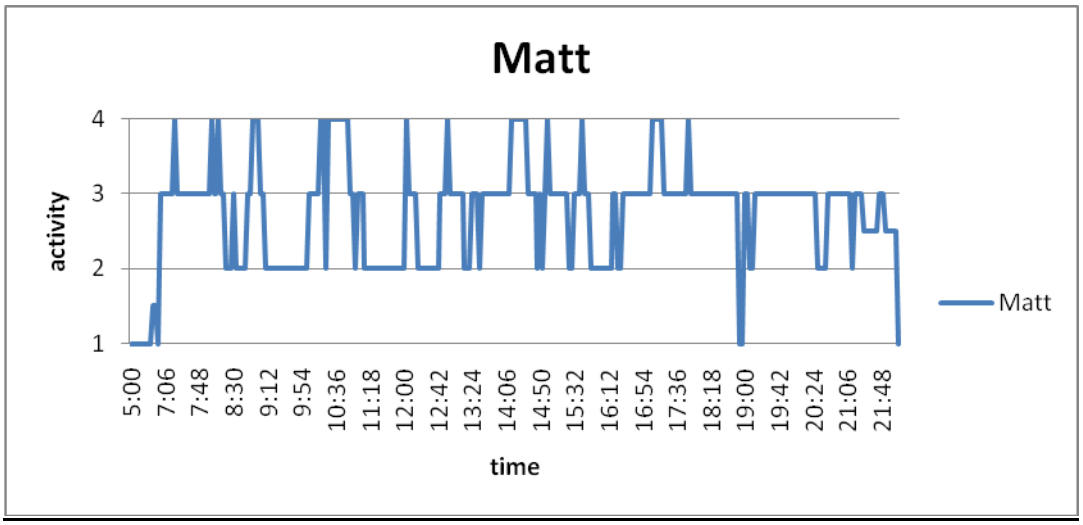
3.4.a Activity during the night

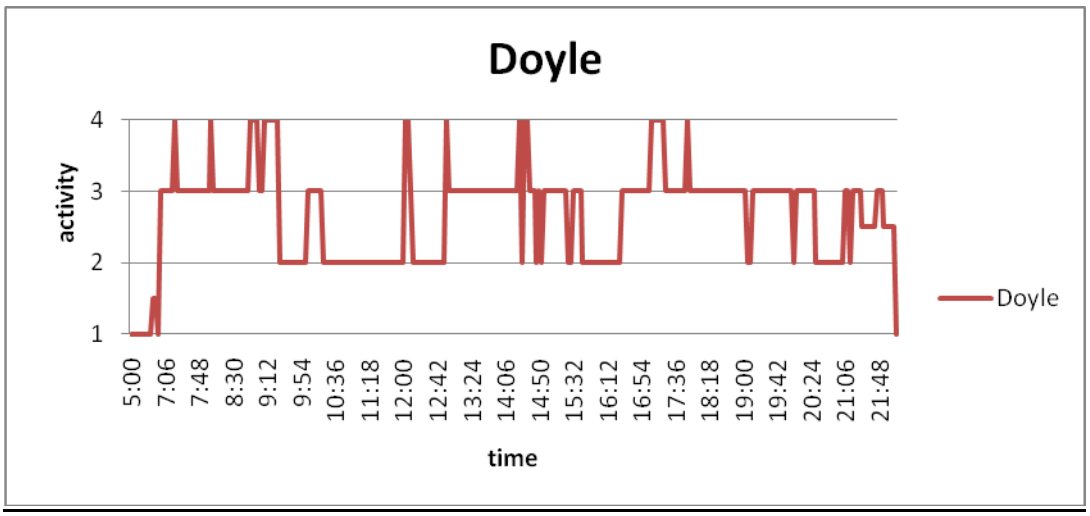
I used an infrared movement camera to find out how much activity the bears show at night. The viewfinder of the camera was targeted at the entrance of the little house where they always slept in. In the night of the 19th to 20th August the camera took pictures till twelve o´clock, the last picture shows that they went into the house. The next period of photographs was taken at 1:40 to 2:10am. They appeared to be playful and active. During the night from 24th to 25th of August they only showed activity until one o´clock and than again in the morning. No nighttime activity was recorded.

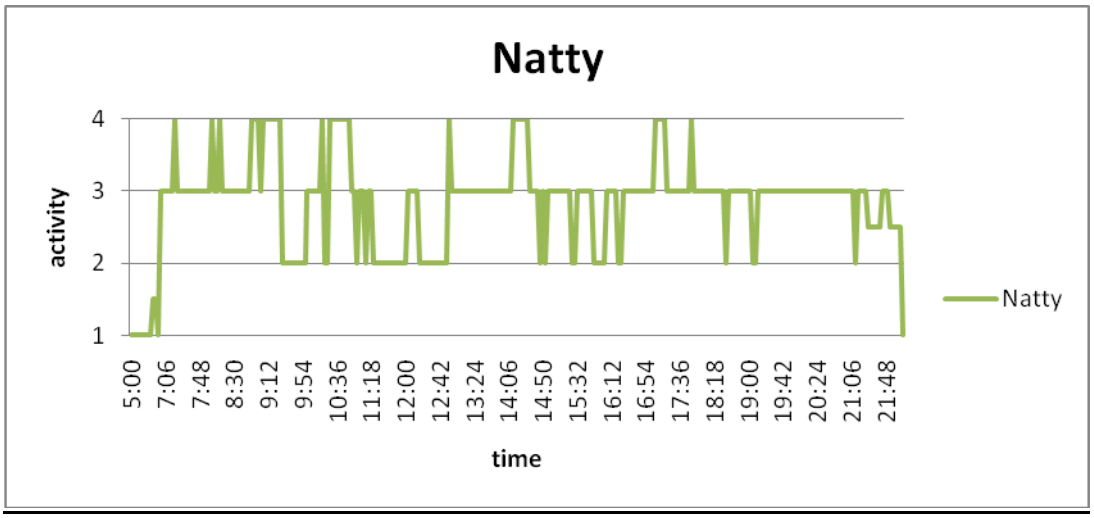
These findings support the assumption that the following results, based only on data taken during daytime, reflect one part of their actual activity. In reality they also play and feed and investigate during nighttime, I just didn´t record those activities. There is no general rule that black bears would be only nocturnal or day active, it depends on habitat conditions, food supplies and season. We don´t actually know but it seemed that the rate of nocturnal activity increased in the bigger enclosure. They also changed their sleeping habits, while in the old enclosure all bears slept together in the little house, in the knew one they spread on different trees, also not always choosing the same tree. They seemed to have a preference for two trees where they had a good view on the forward part of the enclosure but on some mornings they also slept in a completely different part.

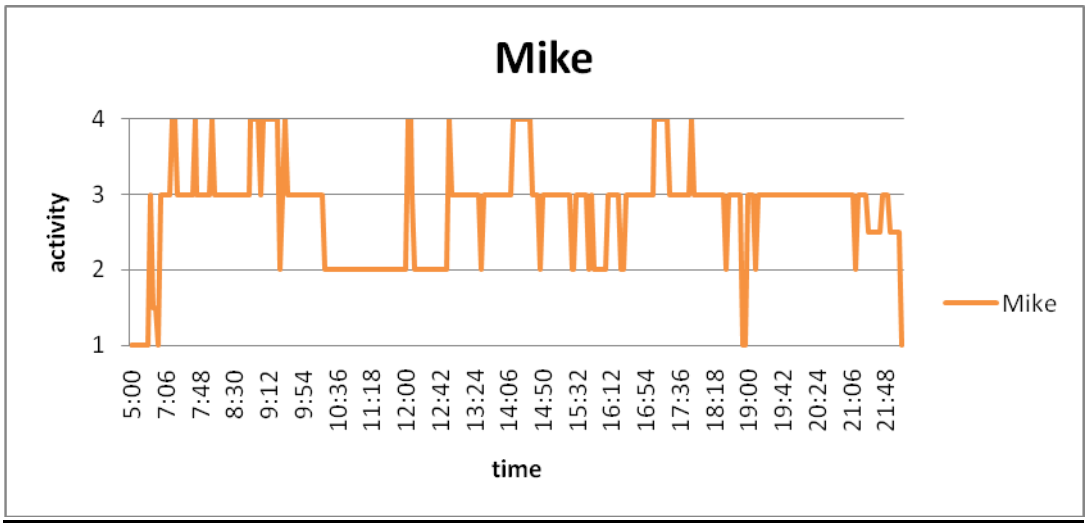
3.4.b Ethograms of the three observation periods

Ethograms of the first observation period in the smaller enclosure

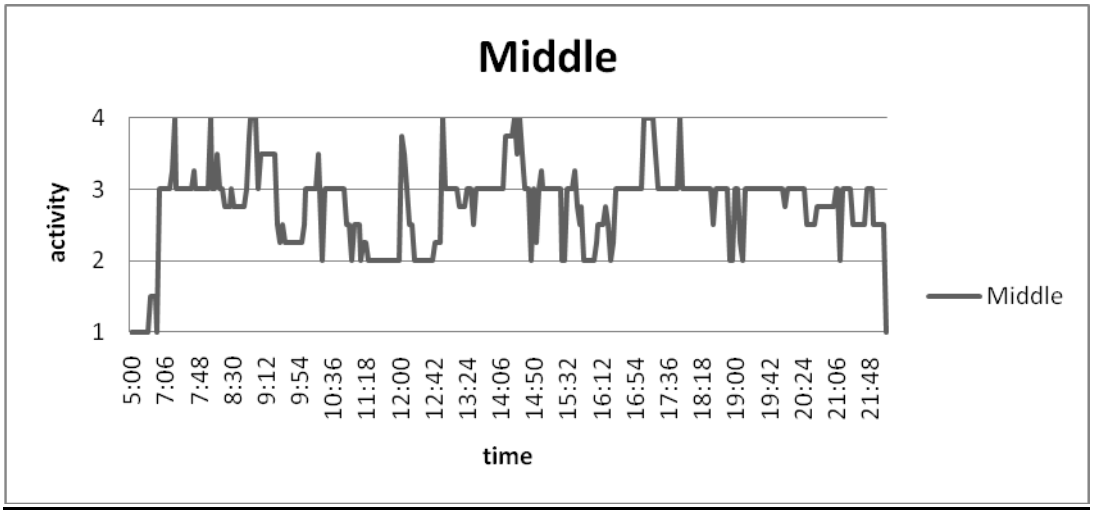








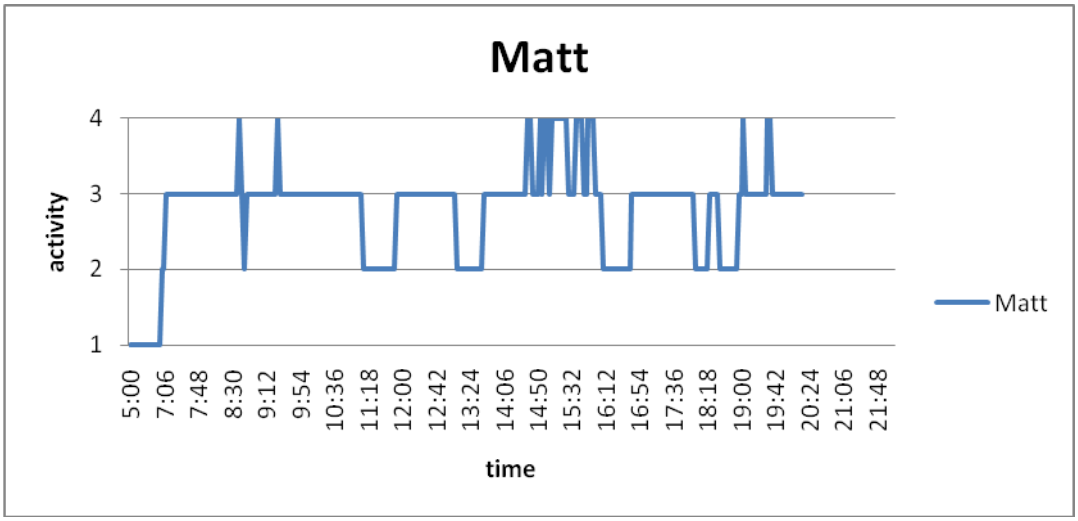
Graphs 1-4. Ethograms of the four cubs

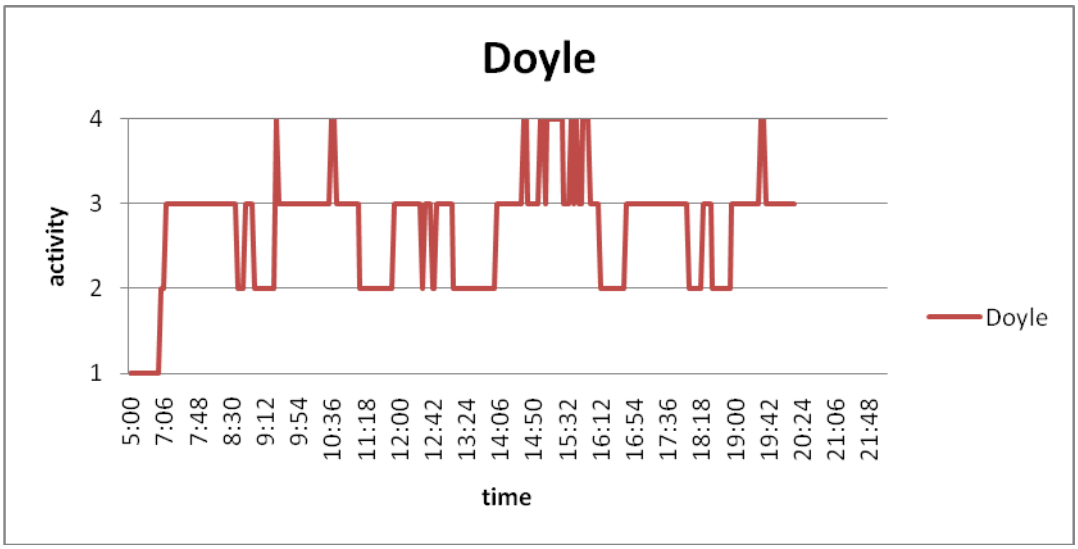


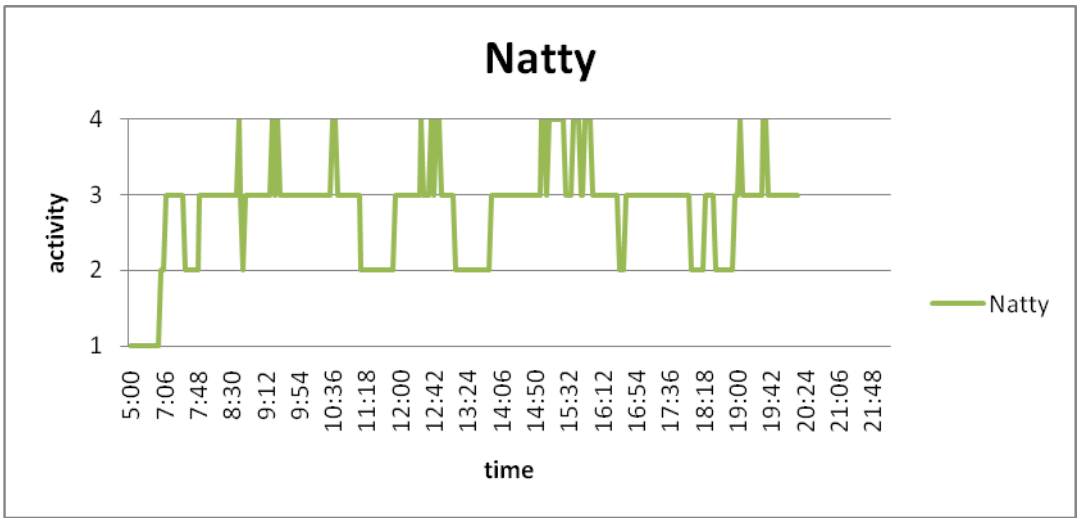
Graph 5. Ethogram of the averaged data

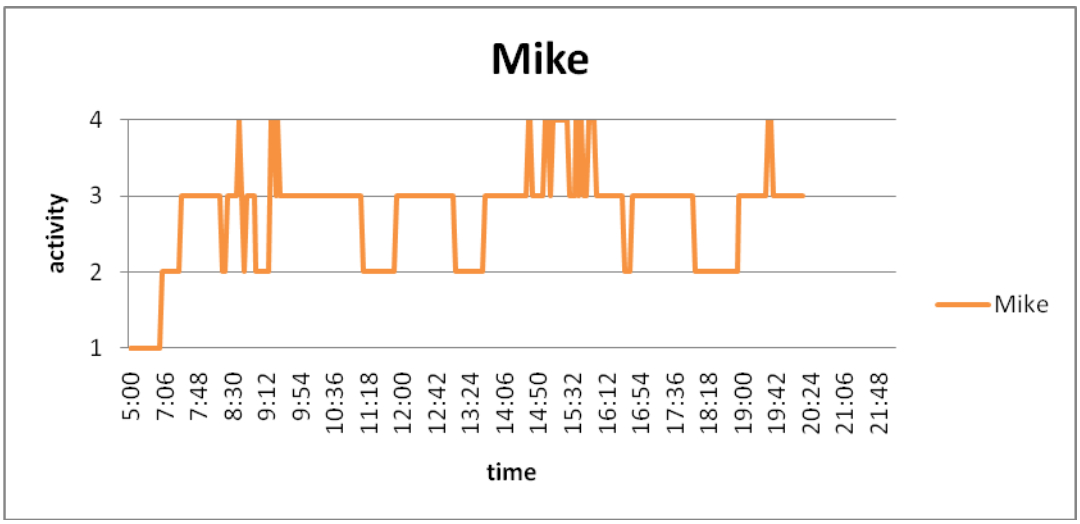
The graphs show lots of quick changes in the level of activity. Especially Matt doesn´t insert long periods of resting. Also her playing behavior does occur more often than in the graphs of the other bears. Doyle shows the most balanced behavior with longer periods of one level of activity and less peaks. Natty and Mike both show lots of changes in their rate of activity but are still not as unstable as Matt. In general there seems to be more activity in the morning and after lunchtime. This correlates with those daytimes in which we worked most at their new enclosure, right beside them. Young bears are very curious and they always observed us or tried to catch our interest by running around. Our presents definitely pushed them on a higher level of activity. The fact that they show resting behavior during lunchtime (11:30am-1:00pm), when no people where around also supports this theory.

Ethograms of the first observation period in the bigger enclosure

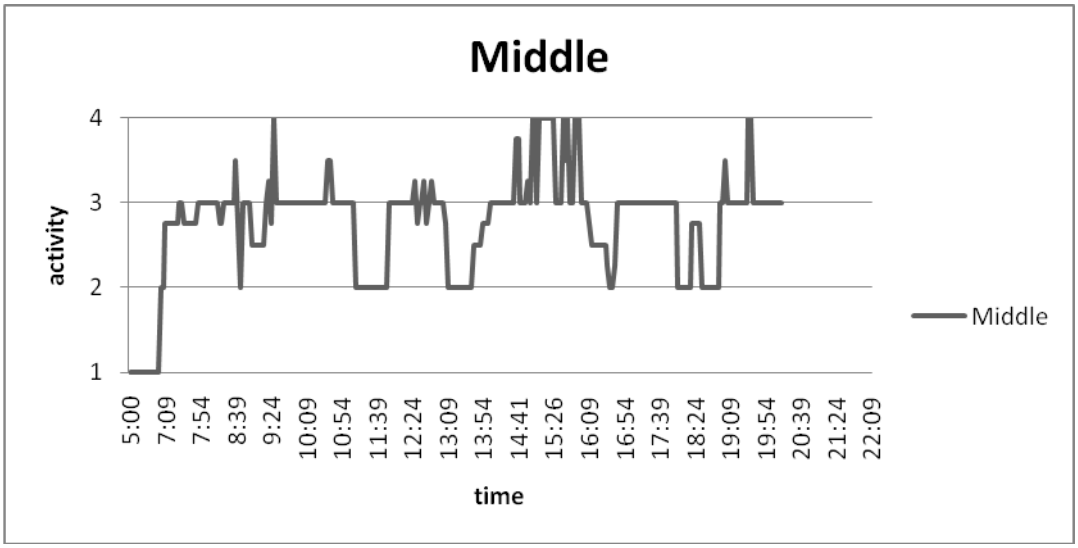








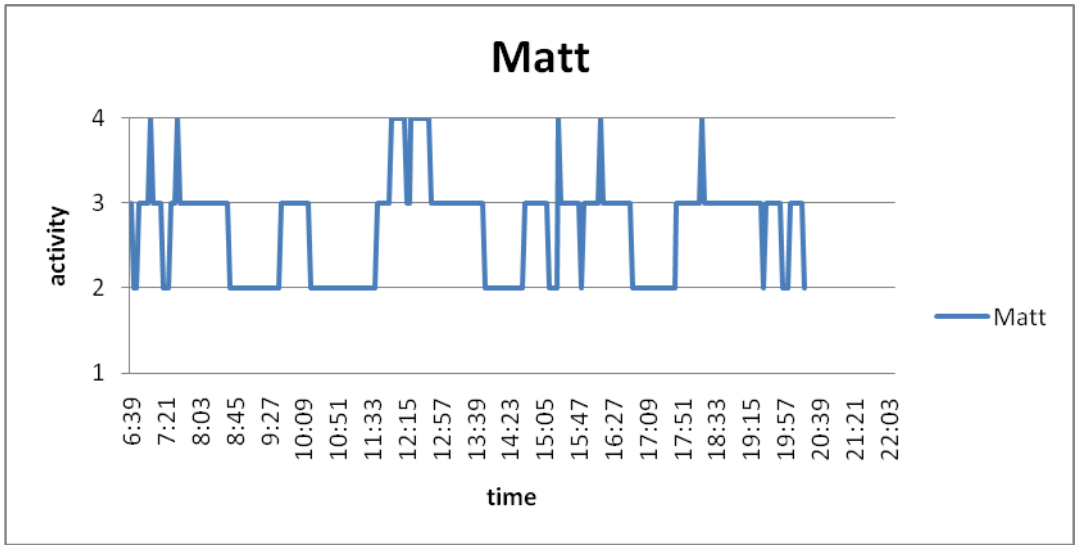
Graphs 6-9. Ethograms of the four cubs in the new enclosure

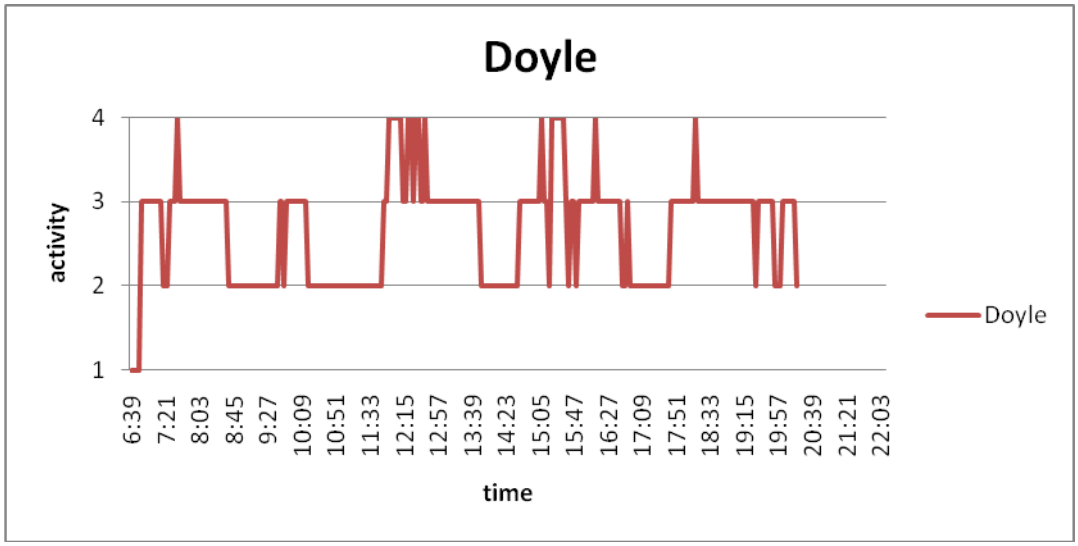


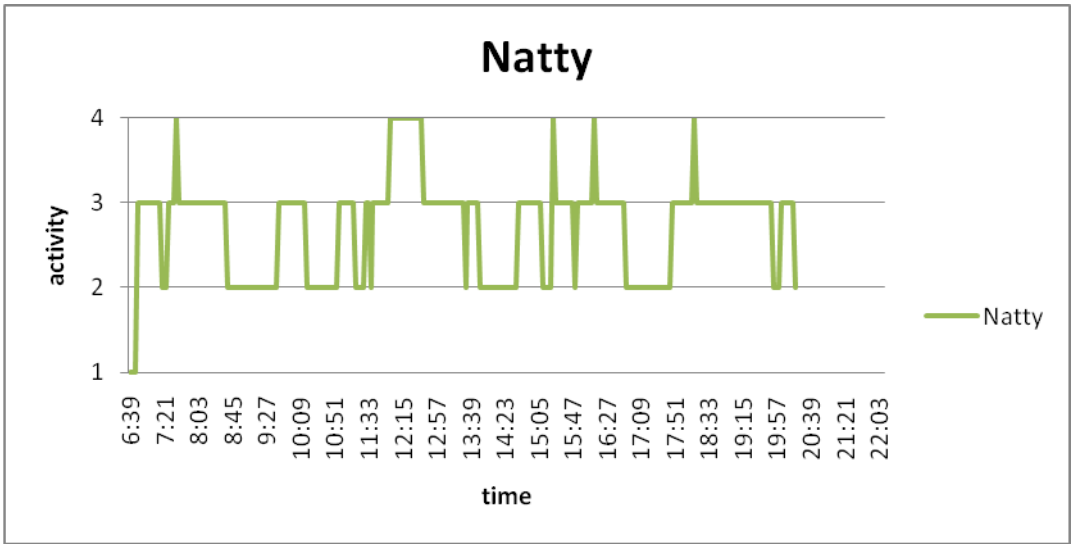
Graph 10. Ethogram of the averaged data

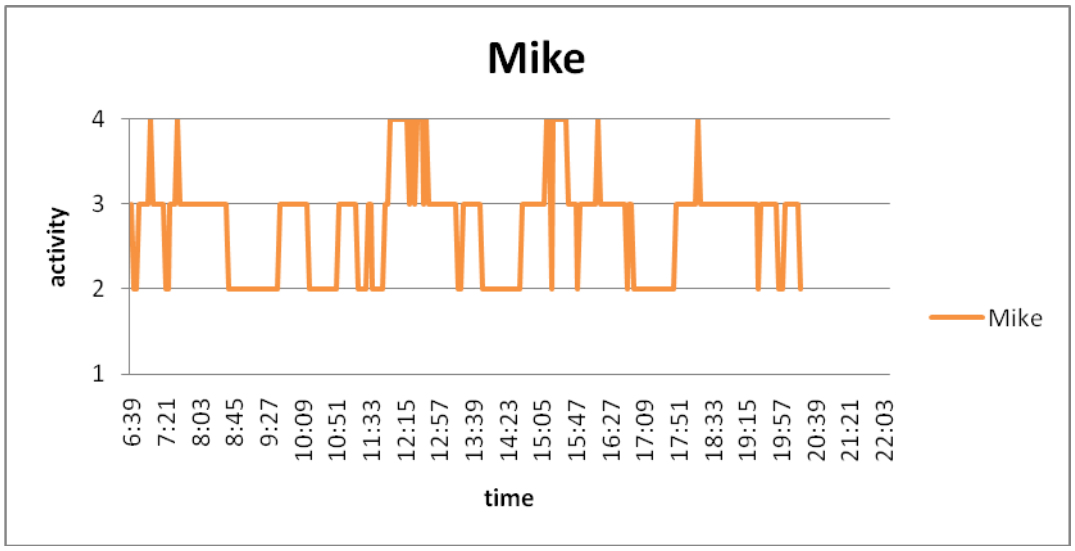
All four bears show a more balanced behavior with less peaks. They are by far less active! Especially Matt seems to be a lot calmer than during the first observation plot. Her rate of activity stagnates more on an average level. The most active is Natty, her ethogram is comparably unstable with more peaks of activity. The activity in general raises in the morning and late afternoon to early evening. I guess there are two important reasons for such a drastic change in the activity. First every day they discovered new things in the run and they had to handle all those new impressions. The new enclosure had a size seven times as big as the old one so they covered much longer distances during the day. All this tired their bodies a lot more. The second reason is that the temperatures during this period where with up to 35 degrees extremely hot. This also explains why the playing behavior peaks in the late afternoon when it gets cooler and why there are five hours in the middle of the day with few activity. By the way, during this plot they spent lots of time in the shade or in the sprucetress in their new run, where the temperatures hould have been more bearable than on the ground

Ethograms of the second observation period in the bigger enclosure

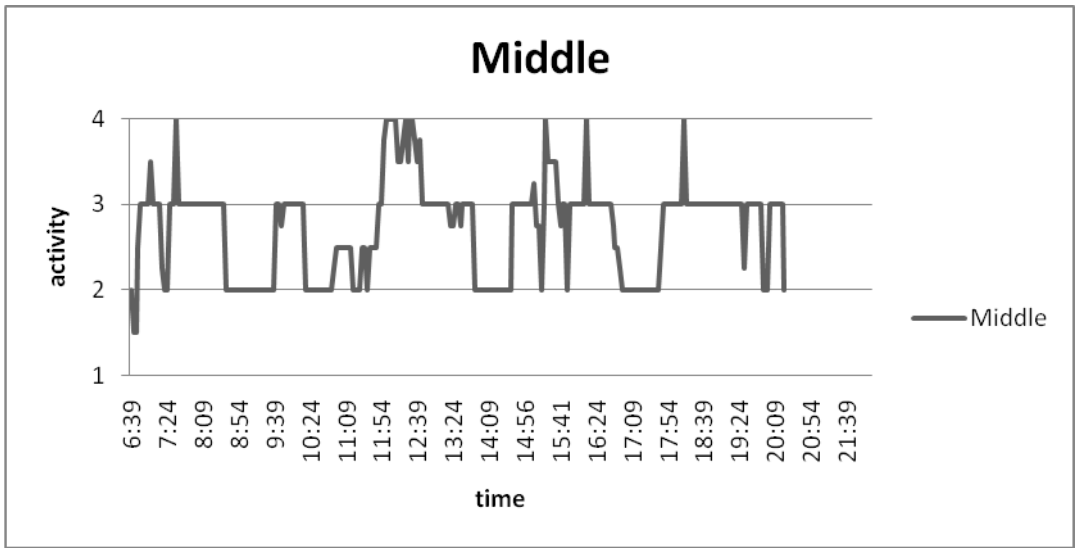








Graphs 11-14. Ethograms of the four cubs in the new enclosure



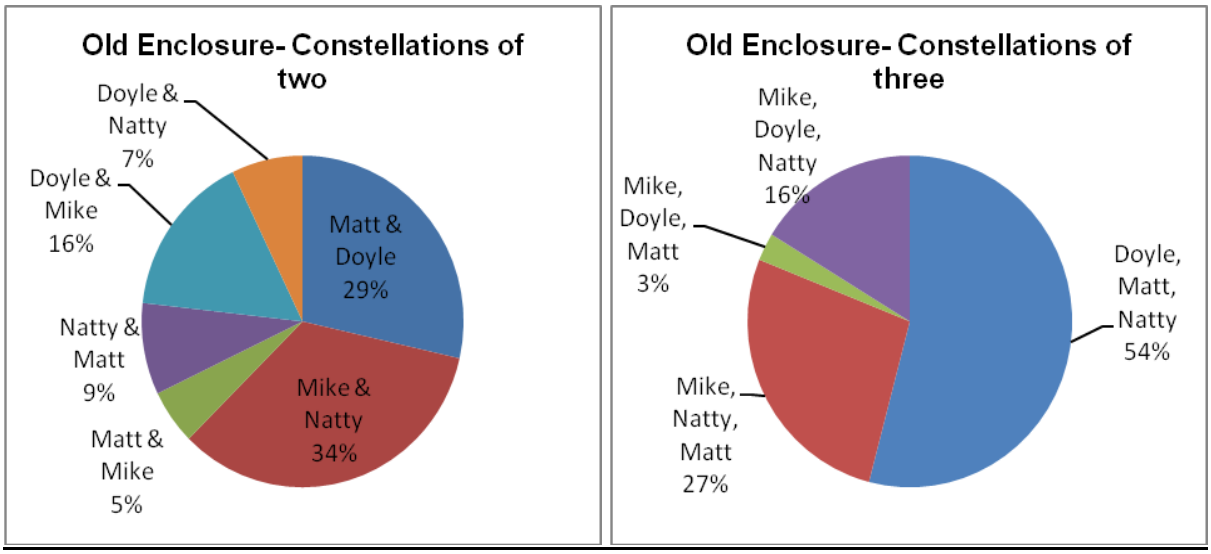
Graph 15. Ethogram of the averaged data

During the third and last observationplot the activity of the bears was spread over the whole dayspan. They didn´t seem as adjusted to the human dayrythm as during the first and second period. Especially at noon they where more active than they had been before. This supports the idea that the very low activity at midday in the second observation period was due to the high temperatures. Whereas they didn´t show lot´s of activity from 8 till 12am. Playful behavior peaked st different times of the day but occurred particularly between 12 and one pm. In general they spent nearly all day in the new part of the enclosure whereas in the first week they always came back to the old part when there was a stressfull situation or the chance to get human attention, for example in the morning or evening before feeding.

In the course of the five weeks my observation periods took place the bears seemed to change their habits and activity patterns. While some of those changes where due to changing weather conditions and therefore temporary, others where most likely caused by the expansion of space and enrichment with new natural surroundings. During the first period all bears showed a activity graph, adapted to the dayrythm of the humans surrounding them. They woke up at the time we left the house and if Mike did something else than feeding them first in the morning they kept waiting at the fence. They also showed a great general interest in everything we did, for example working at the fence and adjusted their rate of activity on our presence. After they had access to the three acre expansion, they tended to stay most of the time in the new part of the enclosure. By that time we had finished the pursuits at the bear enclosure and therefore didn´t spend much time around the bears. They quickly changed their habits and periods of one behavior got longer compared to the permanent changes in behavior the old part. They showed very little activity during midday which was most likely due to very high temperatures in those days. Compared to their behavior at the last observation period they still showed a certain dependency on the humans. In frightening situations or when Mike entered the panel for feeding they always went back into the old, familiar part. They even started whining at the fence for more than half an hour when Mike left them. During the last observation, a great difference between the four cubs at my arrival and now was recognizable and this was not only based on the enormous growth spurt they did in the three acre expansion or the dayrythm which now differed from ours. Motivated by a new, more natural surrounding they started to explore and investigate everything and thereby to develop and improve instinctive and essential behaviors. Two examples are that they completely destroyed an old trunk with insect, especially ants inside and that they fliped over stones which streched along half a meter beside the fenceline.

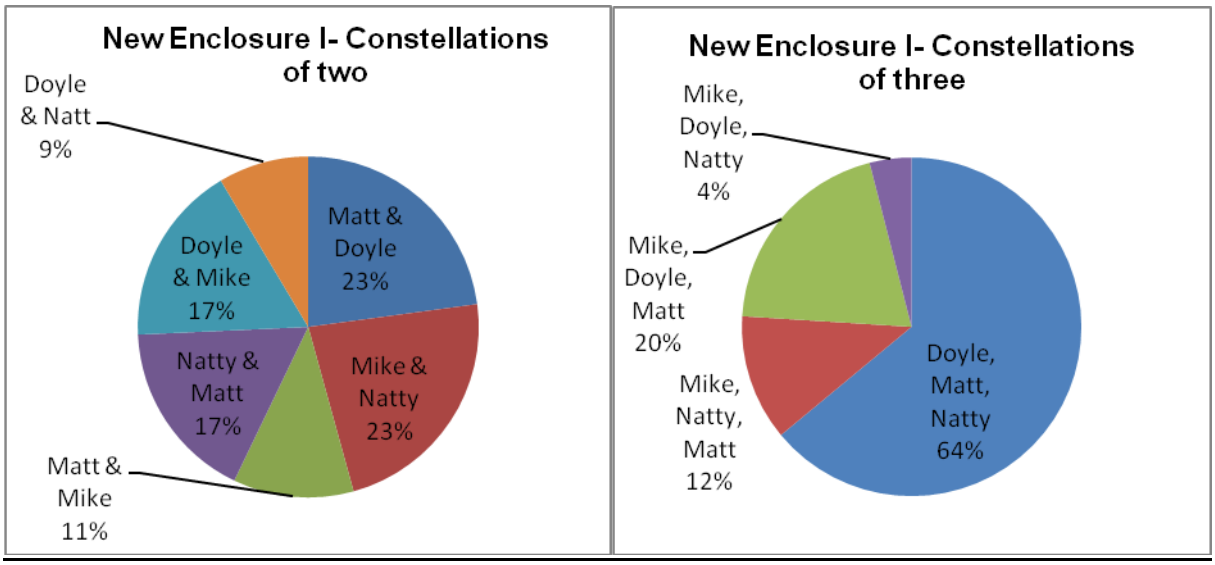
3.4.c Interaction between two or three bears:

In the smaller enclosure:



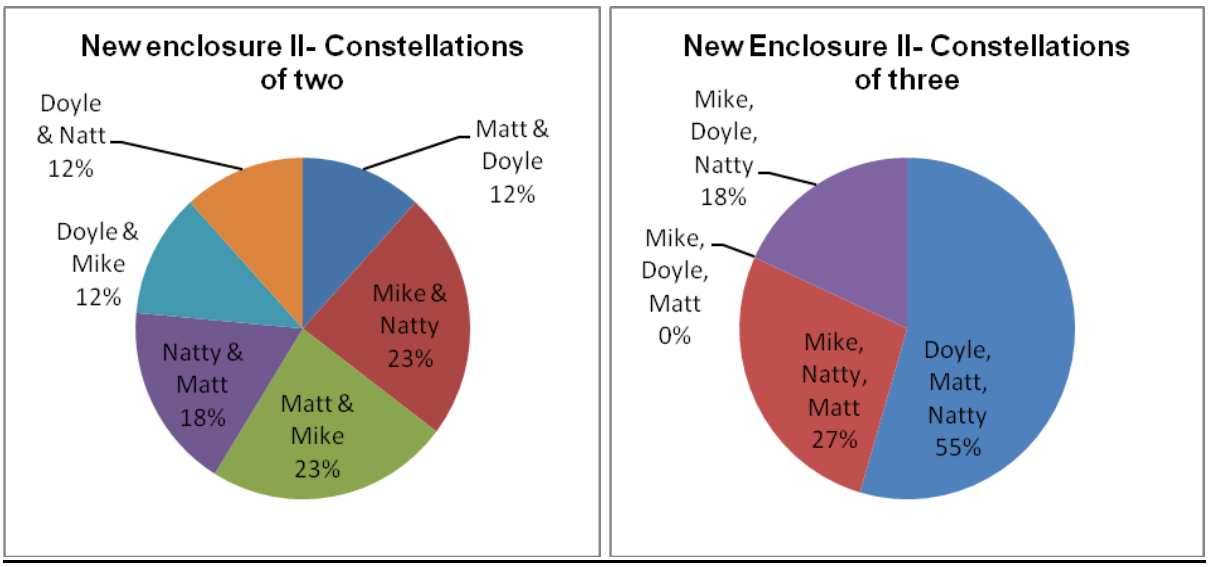
The first impressions of the social relationships betweens the bears match with the actually counted interactions. The two sisters, Doyle and Matt spend much time with each other just like Mike and Natty the two black cubs. Furtheron “Mike and Doyle”, and “Matt and Natty” did spend time with each other. The realtionship between Doyle and Matt was a gentle one. They not only played with each other but also rested together or ate side by side. Natty and Mike had a more playful relationship with lots of teasing. Mike loved to suckle on Nattys ears, while she suckled on her paw. After a while she got annoyed of him and tried to push him away but in general it was a behavior of calming down, just like babys suckle on their thumbs. Matt often joined and suckled on Nattys other ear, while Doyle nearly never showed this kind of behavior. She was definitely the most grown up, a little shyer than the others and not always looking for interaction neither with the humans, nor with the other cubs. In constellations of three the girls spent most time together. That’s probably because Mike especially when they where young had a very nippy and rough way to deal with the girls. At that point he already changed a lot but sometimes still tried to opress the girls. When they sticked together they maybe felt more comfortable. Little Natty was the baby girl of the group, sometimes a little whiny, very active and playful and always looking for interaction with one of the others. She seldomly spends time on her own, while the other stick together, that´s why a constellation of the other three cubs spending time with each other occurred in only 3% of the cases.

In the bigger enclosure:



After the bears got access to the bigger expansion they still spend the majority of time in the same constellations as during the first observation plot. “Matt and Doyle” as well as “Mike and Natty” spend 23% of the social interactions of two bears with each other. In contrast interactions between “Natty and Matt” and “Doyle and Mike” increased by 6%. Concerning the interaction between three cubs, the three females spend relatively even more time with each other than before. Interactions involving Doyle rather than Natty (green) increased whereas interactions between Mike Natty and Matt decreased. Compared to the first observation period, relationships between the bears seemed to change. Mike spent less time with the girls and started to separate from them. He often slept alone on a tree or discovered the surroundings on his own. In contrast Doyle seemes to be more unlocked with the others. Natty still showed the greates dependency from the other. When left back she started whining and running hectically to find the others.

Second observationplot in the bigger enclosure:



In the third and last observation period, after the bears had time to adjust to the new surroundings the constellations of two all homogenized more or less. The strong relationship between Doyle and Matt loosened with only 12% of all interactions between those two. More interesting than the constellations could be the absolute time they spend with interactions. Table 2 does not show the time they spend with social interaction, which also contains for example sleeping or eating close to each other but it shows how much time they spent with playing or teasing. This amount of time decreases drastically from average 160 to 66 minutes. Maybe those data are not comparable but they show that there had happened a drastic change. I think there are two possibilities; either bears are more active at night which would mean that these data are not comparable with those of the first plot because the original interaction compositions could still exist. Or bears react to the change in weather and time and prepare for hibernation, which means they are less playful because they try to save energy and spend more time with eating and foraging. Further on they probably began to grow up and consequently got less playful. An argument against this would be that we started to feed them with meat and fish which contains lot of protein and usually induces not only a growth spurt but also a higher rate of activity. However the three girls and “Mike, Natty and Matt” still spend lots of time with each other which they did during the whole observation time.

3.4.d Absolute number of hours with “Playful interaction” and “Foraging and eating”

The counts of playful behavior, multiplied with three because every note represents three minutes are shown in table 2. The total time spend with “playing”, “teasing” and “playing in trees” is listed for each cub and shown for all three observation plots distinctively. It´s quiet obvious that the total amount of time spend with playing decreases. In the old enclosure, two to three hours of the seventeen observation hours where spend with playing. Further on Doyle showed by far less playful activity than the others. This matches to my overall impression that Doyle didn´t look for social interaction with the others as much as they did or at least didn´t emphasize on playful, childish behavior. During the first days in the new enclosure, playful behavior decreased rapidly by almost an hour. This could be due to all the new impressions. Bears had enough entertainment by just exploring their new habitat. It´s also likely, that they hadn´t had enough energy left to play as much as before because now they had to walk much longer distances than in the small panel. In general every action was connected to more activity because of the size of the enclosure. Additionally I suppose that the high temperatures during these days kept them from extra heating their bodies by playing. It´s an interesting fact that the playing behavior decreased furthermore, even after the temperatures got cooler and after they should have adjusted to the new size of their

panel. By that time all four bears had quickly gained a lot of size and weight. A plausible explanation for the reduced playful behavior could be that they know prepared their bodies for hibernation which means that they concentrated on eating as much as possible and not to waste any energy. It´s also possible that their characters changed step by step from the childish little cubs to more grown up bears with instincts. However it´s interesting that the gap in “time spent with playing”, between Doyle and the others know closed. All four spent an average of 1.05 hours with playing.

Table 2. Absolute time which each bear cub spent with playful behavior

	Old enclosure	New enclosure I	New enclosure II
Natty	168min/2.48hrs	105min/1.45hrs	66min/1.06hrs
Matt	156min/2.36hrs	105min/1.45hrs	66min/1.06hrs
Mike	171min/2.51hrs	105min/1.45hrs	68min/1.08hrs
Doyle	126min/2.06hrs	84min/1.24hrs	66min/1.06hrs

In contrast to the playing behavior, eating and foraging increased from the first to the third observation period, whereas during the second period it diminished. Again the rise in temperature could be a good explanation for this phenomenon. The hours spent with this behavior differ more between the four cubs than the playing behavior. This is because there is no social interaction involved in eating. Nonetheless there seems to be a kind of group pressure because hours of feeding resemble within one observation period. It´s also possible that there is a social aspect behind the behavior of “feeding and foraging”. Another possibility could be that all four bears feed independently from each other and somehow all four always spent the same amount of time with eating due to a certain necessity which is similar in all four bears. Actually I think the last explanation is too speculative. It´s obvious that all bears rise the amount of time they spend with eating in the last observation plot. This also supports the idea, that during this time they already began to prepare for winter time and tried to gain weight.

Table 3. Time which every bear cub spent with foraging and eating

	Old enclosure	New enclosure I	New enclosure II
Natty	219min/3.39hrs	153min/2.33hrs	264min/4.24hrs
Matt	186min/3.06hrs	159min/2.39hrs	276min/4.36hrs
Mike	204min/3.24hrs	138min/2.18hrs	255min/4.15hrs
Doyle	210min/3.30hrs	138min/2.18hrs	252min/4.12hrs

4. Conclusion

During my stay at the Cochrane Ecological Institute I learned lots of important and interesting skills, how to care for certain animals, which aspects are important to consider when planning and building a new enclosure and especially I gained first experiences in behavioral studies. I think from my experiences how to develop a study design, and that you have to be flexible during the whole research is one of the most important things I learned. In the beginning I had some more ideas what to observe which didn´t work out in practical. For example I wanted to study the positions of the bears in the tree, if they had a certain order or places where chosen randomly. In reality it was not possible to determine the order in the new enclosure because you couldn´t actually see the bears in the spruce trees, you just knew that they where in the trees. In the beginning I also wanted to expand my observations into nighttime. I didn´t realize that it´s no use to sit in front of the enclosure when it´s dark and you can´t see anything, I also hadn´t access to a night scope. During my evaluation I recognized that there are some things I should have noted additionally or defined more precisely, this would have made my results more expressive. I also know that this study is not in the least representative because I don´t have replica or anything. I think for my personal progress this internship was extremely helpful because now I´m more than ever convinced in which direction my further education will lead. I also know that behavioral research indeed is extremely interesting and I really want to work in this department later on. On the other hand I think I also want to do field studies or do some physical work outside I really enjoyed building the enclosures and stuff like this. With this internship I proved if the idea of my professional future agrees with the real tasks and working conditions. Further on my stay in Canada also improved my English skills a lot, which is in my opinion essential for a biologist because English is the scientific language. I am very thankful for all experiences I collected at the CEI. Most of all I have to thank Clio Smeeton, the director of the CEI, Ken Weagler, my supervisor for the bear project and Mike Curtis with whom I worked every day, who taught me all those practical things and who shared his knowledge about the four cubs with me, without which I would have missed lots of characterical attributes. All people at the CEI I have to thank for the great working atmosphere and friendly being together. I really hope that organizations like the Cochrane Ecological Institute will be able to survive in future, when support by the government gets fewer and fewer. They not only try to enhance and maintain the biodiversity (swift fox project) but also care for those animals abused by humans and try to give them a new chance, either in freedom or as a resident on their area. Today everybody working for this attributes has my greatest respect, later on I hope to work for this commission myself.

5. Attachments

Attachment 1. Form to note the behavior of the bears

Date:	16.08.2009	Enclosure:	OLD	
Time	**Natty**	**Matt**	**Mike**	**Doyle**
14:00	E	E	E	E
14:03	E	E	E	E
14:06	E	E	E	E
14:09	E	E	E	E
14:12	P	P	P	E
14:15	P	P	P	E
14:20	P	P	P	E
14:23	P	P	P	W
14:26	P	P	P	P
14:29	P	P	P	RT
14:32	P	P	P	P
14:35	E	E	P	P
14:38	E	E	W	E
14:41	W	W	W	W
14:44	W	W	W	W
14:47	R	R	R	R
14:50	W	W	W	W
14:53	R	R	W	R
14:56	E	E	E	E
14:59	E	P	W	E
15:02	E	E	W	E
15:05	E	E	E	E
15:08	E	E	E	E
15:11	E	E	E	E
15:14	E	E	E	E
15:17	W	W	W	W
15:20	T	W	T	W
15:23	W	W	W	W
15:26	R	R	R	R
15:29	R	R	R	R
15:32	T	T	T	T
15:35	W	W	W	W
15:38	W	W	W	W
15:41	W	P	W	W
15:44	W	W	W	RT
15:47	W	W	R	RT
15:50	W	W	W	RT
15:53	R	R	R	RT
15:56	R	R	R	RT
15:59	R	R	R	RT

Attachment 2. Conversion of the shown behaviors to the level of activity

Time	Natty	Matt	Mike	Doyle		Middle
14:00	3	3	3	3		3
14:03	3	3	3	3		3
14:06	3	3	3	3		3
14:09	3	3	3	3		3
14:12	4	4	4	3		3,75
14:15	4	4	4	3		3,75
14:20	4	4	4	3		3,75
14:23	4	4	4	3		3,75
14:26	4	4	4	4		4
14:29	4	4	4	2		3,5
14:32	4	4	4	4		4
14:35	3	3	4	4		3,5
14:38	3	3	3	3		3
14:41	3	3	3	3		3
14:44	3	3	3	3		3
14:47	2	2	2	2		2
14:50	3	3	3	3		3
14:53	2	2	3	2		2,25
14:56	3	3	3	3		3
14:59	3	4	3	3		3,25
15:02	3	3	3	3		3
15:05	3	3	3	3		3
15:08	3	3	3	3		3
15:11	3	3	3	3		3
15:14	3	3	3	3		3
15:17	3	3	3	3		3
15:20	3	3	3	3		3
15:23	3	3	3	3		3
15:26	2	2	2	2		2
15:29	2	2	2	2		2
15:32	3	3	3	3		3
15:35	3	3	3	3		3
15:38	3	3	3	3		3
15:41	3	4	3	3		3,25
15:44	3	3	3	2		2,75
15:47	3	3	2	2		2,5
15:50	3	3	3	2		2,75
15:53	2	2	2	2		2
15:56	2	2	2	2		2
15:59	2	2	2	2		2