RELATIONSHIP BETWEEN STAND TYPES AND HABITAT SELECTIONS FOR BIG WILD MAMMAL SPECIES

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Abstract. Forests are among the most important wild life areas that provide shelter for various wild animals within different living areas they have. Shortly, selection of habitat which is defined as living area, by the wild animals is effected by variables such as stand types, altitude, flora, sloping direction, and soil composition. Among these factors stand type which forms the forest structure is one of the most important factors in the habitat selection. This study has been conducted on Bartin-Soku Wild Life Development Area with the aim to determine the impact of wild animals on habitat selection. For this purpose for determining the habitat selection of big mammals photo traps are placed at 78 points. The total working time of each photo traps is determined 3800 days. Although 12 pieces of big wild mammals were determined on the area, only 9 of them were considered for evaluation. As a result of study it has been determined that mixed stands were preferred more when compared with pure stands, mixed stands of fir and beech were preferred more when compared with other mixed stands, and healthy and old stands were preferred more when compared with the disrupted ones.
Keywords: *stand, wildlife, forest, roe deer, wild board, bear*

Introduction

Wild animals are an important and fundamental particular of ecosystem where they exist. However, just like all other ecosystem features, wild animals are also under the threat of mainly human originating dangers. As a result of this, different wild animal species have been influenced on local or global scale and while populations of certain species got reduced, some species were faced with the danger of getting extinct (Marrison et al., 2007).

The situation is the same in Turkey which has got a rich fauna both due to its geographical location and due to different ecosystem features it bears. According to different sources, in Turkey mammals were determined to as 418 pieces of birds, 120 reptiles, 22 amphibians (URL1), 161 pieces of mammals, 460 pieces of birds, 141 pieces of reptiles (Çagatay et al., 2012), 104 pieces of mammals, 418 pieces of birds (Çanakçıoglu and Mol, 1996), 160 pieces of mammals (Bora, 2001), 169 pieces of mammals (Özkazanç, 2012) as being the species observed. According to the recent data in Turkey there are species of 482 pieces of birds (URL2), 172 pieces of mammals (URL3), 157 pieces of amphibians and reptiles (Baran et al., 2012).

No matter what wild animal species is concerned, one of the most important factors influencing their lives is surely the habitats they are using. Protection of wild animals in natural living environments and their sustainability is based on knowing their habitat preferences well. According to Oğurlu (2001) habitat is the environment where a population exists, provides shelter, develops, reproduces, and continues its generation to exist. Wild animals can use different habitats for various purposes such as getting nourishment, reproducing, and nesting. Even if purposes of usage can be different, as wild

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animals make preferences of habitats, they consider all habitat components. For this reason, the structure of habitat components with many variables and the influence of each factor in the components should be considered (Oğurlu and Yavuz, 1999). Habitat is an integrity being composed of plants, soil structure, location, altitude of an area as well as components such as other wild animals that use that area. However in the habitat preferences of wild animals, most important one among these elements is mainly the plants.

Plants have direct and indirect influences on habitat preferences of wild animals (Suel et al., 2013). In habitat selection of wild animals, in addition to existence of plant varieties, their distribution is also very important. Because factors relating with raising environment in an area has influence on distribution of plant varieties and distribution of plants has direct impact on distribution of wild animals making use of various functions and opportunities such as sheltering, hiding and getting nourishment as being provided by these plants (Oğurlu and Aksan, 2013).

Analyzing the habitat distribution, finding correlation between habitat variables and distribution of wild animal species and their habitat preferences, are important in revealing ecology of wild animals and in managing wild life. Because information such as existence, abundance, distribution, and nourishment of animals on an area are predicted as being based on habitat situation and quality (Aksan et al., 2014). In this way, influence of changes occurring in the habitat, on the species or population of species and influence in species or population of species on the habitat can be predicted. This is effective in planning wild life.

Majority of big wild mammals are dependent on forests for survival. Because food, water, and land areas which they need for surviving exist in the forests. Besides forests also bear different wild life areas within themselves.

Besides the fact that migration routes that are used by wild animals have the richest habitat features, high sloping areas have got varieties of species. Furthermore, increase in habitat heterogeneity also increase varieties of species (Liu et al., 2017).

Stands which are defined as forest structure is described as forest section which differentiates itself from its environment with respect to at least one of the forest establishment features such as production material, age, tree species, components of tree species, layering, closeness, frequency, and specific bonitet differences and which covers an area of at least one hectare (Genç et al., 2012).

Bartin-Soku Wild Life Protection Area, which forms the study area, has been registered as per the decision of Council of Ministers being dated 13.09.2006 with no 2006/10966. Target species on this area of 17.000 hectares are specified as red deer and roe deer.

This study was conducted to determine the habitat preferences of large mammal wild animals living in the research area. Thus, in the forestry applications to be made in the field, wildlife requests can be evaluated. The destruction of wildlife areas will can be prevented with forestry practices.

Material and Method

Material

Main materials in the study are wild mammals and stand types they are using. Photo traps have been used for gathering data and for obtaining coordinates of photo trap points GPS has been used. The photo traps were used in the bushnell brand, 3264 x 2448 photo

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resolution and 1920 x 1080 video resolution. The study area is Bartin-Soku Wild Life Protection Area, which is the most important wildlife areas of the western Black Sea in Turkey. The center of research area is 20 km away from the nearest settlement. Kızıllar, Uluköy, Konak and Kırıklar villages are most near. Kızıllar, Uluköy, Konak and Kırıklar villages are most near settlement to research area. But there are very low human popülations in here. Although the working area has different types of stands, its water presence, surface structure and living cover characteristics are very similar.

Method

With photo traps that are placed in appropriate places on special living areas of wild animals such as their passage points, nourishment areas and resting areas, wild animals preferring that area could be determined. This study was conducted between July 2015 and September 2016. However, it was impossible to reach the area due to snow in winter and the works were slowed during this period. While the photo traps were placed on the site, attention was paid to the habitat types and different habitats of the species targeted. By considering criteria such as season, land structure and stand type, photo traps were controlled between 15 and 30 days and the images being obtained were transferred to computer. All images taken from photo traps were examined in detail and the species were determined and each detected species was processed on the stand map. During the period of study, at 78 different points with numbers of 3800 photo trap days, 4.940 pieces of photos and video records were obtained. As a result of the study in line with the data being obtained by determining density areas of each wild mammal species, stand types of these areas were specified and analysis were made on habitat selections of species. The coordinates of the photo traps are given in *Table 1* and the distributions in the field are given in *Figure 1*.

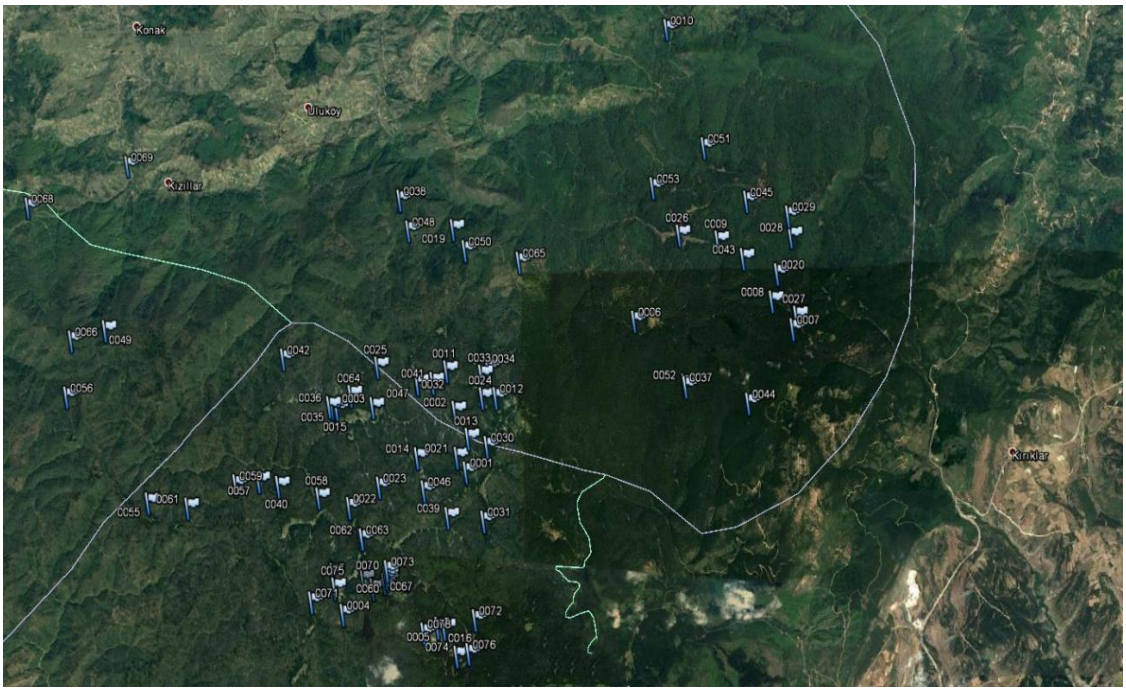

Figure 1. *Distribution map of photo traps in the field*

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Table 1. *The coordinates of the photo traps*

No.	East (E)	North (N)	Height (m)	Direction	No.	East (E)	North (N)	Height (m)	Direction
1	464745.15	4577116.77	1641.2	150.99°	**40**	460690.89	4576838.31	1452.2	222.44°
2	464494.43	4579266.72	1461.7	140.59°	**41**	464029.15	4578823.45	1536.1	141.10°
3	462726.39	4578344.98	1405.5	203.82°	**42**	460794.1	4579288.86	1350.7	260.57°
4	462093.41	4574394.73	1538.2	192.85°	**43**	470710.4	4581179.05	1378.7	78.35°
5	464108.28	4574123.14	1486.4	171.78°	**44**	470760.8	4578397.48	1644.6	99.63°
6	468362.18	4579984.48	1281.1	86.44°	**45**	470788.87	4582286.71	1392.8	70.56°
7	471705.63	4579810.34	1685.8	88.93°	**46**	463835.22	4576753.11	1588.9	170.00°
8	471292.94	4580347.74	1511.5	85.04°	**47**	463697.43	4578795.12	1452.9	157.62°
9	470183.21	4581530.14	1260.9	74.73°	**48**	463468.28	4581771.63	1169	3.48°
10	469147.31	4585785.11	814.3	43,40°	**49**	456860.78	4579861.21	1236.3	271.16°
11	464327.68	4579044.01	1499.9	122.95°	**50**	464701.16	4581378.6	1253.5	38.87°
12	465385.59	4578529.85	1590.6	119.31°	**51**	469881.24	4583329.13	1353.2	60.70°
13	764780.85	4577749.97	1490.4	143.05°	**52**	469410.73	4578767.31	1559.6	98.40°
14	463682.97	4577378.25	1455.7	171.09°	**53**	468776.23	4582560.34	1360.4	61.97°
15	461943.1	4578318.85	1398.8	224.92°	**54**	457846.84	4576521.44	1332.5	239.64°
16	464252.15	4574105.11	1500.3	170.36°	**55**	456046.04	4578572.7	1215.8	260.94°
17	461856.49	4575164.67	1402.5	197.74°	**56**	460240.98	4576926.24	1307.2	227.83°
18	462716.35	4574861.45	1441.8	186.96°	**57**	461531.61	4576600.1	1313.9	209.87°
19	464432.98	4581800.8	1105.9	27.35°	**58**	459779.58	4576873.83	1476.4	231.23°
20	471409.32	4580870.62	1552.5	81.44°	**59**	463031.77	4575053.9	1533	183.40°
21	464552.16	4577396.82	1641	151.76°	**60**	458715.65	4576422.63	1397.6	234.36°
22	462202.96	4576415.5	1356.6	198.69°	**61**	462450.92	4575808.49	1384	192.47°
23	462870.58	4576820.71	1473.8	188.81°	**62**	462479.65	4575812.89	1361	192.08°
24	465090.46	4578529.05	1548.8	123.29°	**63**	462258.15	4578578.77	1402.8	233.54°
25	462837.22	4579124.44	1380.7	220.51°	**64**	465872.56	4581148.5	1230.4	59.97°
26	469347.08	4581652.53	1234.5	71.70°	**65**	456112.88	4579665.42	1190.2	269.46°
27	471796.14	4580050.89	1504.1	87.32°	**66**	463009.23	4575098.42	1529.8	183.72°
28	471718.94	4581589.37	1483.6	77.00°	**67**	454884.5	4582340.39	680.3	287.09°
29	471665.97	4581985.25	1418.2	74.36°	**68**	456995.89	4583205.39	1357.7	298.69°
30	465193.07	4577599.1	1612.1	138.12°	**69**	463034.26	4575149.95	1572	183.45°
31	465113.36	4576176.54	1625.2	152.86°	**70**	461424.28	4574637.95	1556.1	200.37°
32	463697.43	4578795.12	1452.9	157.62°	**71**	464914.37	4574272.85	1514.3	163.44°
33	465078.58	4578960.64	1595.3	112.56°	**72**	463035.46	4575220.3	1581.5	183.49°
34	465219.94	4579099.96	1598.3	107.25°	**73**	464516.66	4573575.81	1500	168.75°
35	461837.41	4578344.28	1386.4	227.55°	**74**	461894.83	4574897.48	1431	196.32°
36	461785.48	4578364.54	1389.7	228.95°	**75**	464773.79	4573623.96	1499.1	166.35°
37	469434.29	4578720.92	1574.8	98.80°	**76**	462972.7	4574976.04	1498.3	184.06°
38	463280.28	4582373.87	1179	358.61°	**77**	463811.81	4574023.03	1546.5	174.87
39	464331.9	4576227.53	1443.1	163.63°	**78**	462499.48	4575035.53	1352.7	189.83°

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Findings

As a result of studies, on the area 12 different wild mammal species were determined. But since among these species, Eurasian otter (*Lutra lutra* L. 1758), golden jackal (*Canis aureus* L. 1758) and European hare (*Lepus europaeus* L. 1758) were determined at a single point, habitat selection of remaining 9 species of wild mammals were evaluated as per stand types. The some informations of wild animals identified in the study area was provide in *Table 2*.

These species were determined at 12 different stand types having different sizes and densities on the area of study (*Table 3*).

Table 2. *Information relating with the species being determined*

Species	Number of observation points	Number of views
Brown bear (*Ursus arctos* L., 1758)	35	147
Roe deer (*Capreolus capreolus* L., 1758)	61	683
Red deer (*Cervus elaphus* L., 1758)	7	18
Red fox (*Vulpes vulpes* L., 1758)	44	411
Grey wolf (*Canis lupus* L., 1758)	14	59
European badger (*Meles meles* L., 1758)	9	29
Stone marten (*Martes foina* (Erxleben, 1777))	30	96
Wild boar (*Sus scrofa* L., 1758)	41	542
Wild cat (*Felis silvestris* Schreber, 1777)	21	59

Table 3. *Types of stands and their features, in area*

BKn	Broken (B) beech (Kn) stand. It could not be mentioned about any kind of closeness.
GA	Pure fir (G) selection forest. (A: Stand having more number of individuals with thick diameter stages when compared with optimal; Old selected stands)
GÇsKnD	Stand of fir (G)-scots pine (Çs)-beech (Kn) mixture with dominance of firs. (D: Stand being other than A, B and C classes or being composed of mixture; actual selection stand).
GKnA	Stand of fir (G) -beech (Kn) mixture with dominance of firs. (A: Stand having more number of individuals with thick diameter stages when compared with optimal; Old selected stands)
GKnD	Stand of fir (G) - beech (Kn) mixture with dominance of firs. (D: Stand being other than A, B and C classes or being composed of mixture; actual selection stand).
KnÇsA	Stand of beech (Kn) -scots pine (Çs) mixture with dominance of beeches. (A: Stand having more number of individuals with thick diameter stages when compared with optimal; Old selected stands).
KnÇsGD	Stand of beech (Kn)-scots pine (Çs)-fir (D) mixture with dominance of beeches (D: Stand being other than A, B and C classes or being composed of mixture; actual selection stand).
KnD	Pure beech (Kn) selection stand (D: Stand being other than A, B and C classes or being composed of mixture; actual selection stand).
KnDybc	Beech (Kn) and other leafed (Dy) mixed stand. “b (There are individuals from b:Trellis-Pole age (8-19.9 cm)) and c (c: Thin woody age (20-35.9 cm))”, Those from “b” age are in majority numbers.
KnGA	Mixed stand of beech (Kn) and firs (G) with dominance of beech. (A: Stand having more number of individuals with thick diameter stages when compared with optimal; Old selected stands).
KnGD	Mixed stand of beech (Kn) and firs (G) with dominance of beech. (Stand being other than A, B and C classes or being composed of mixture; actual selection stand).
OT	Treeless forest soil

When stand features are considered it is seen that beech and firs which are dominant tree types on the area, are present both as mixed with each other and other varieties and on certain areas there are pure cultures. In line with the data being obtained, stand preferences of wild animals on the area are given numerically in *Table 4* and total number

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of individuals being determined in different stand types have been submitted in the form of a graphic in *Figure 2*.

It is observed that on the area there are changes in habitat preferences of wild animals as per the stands. Species have mainly preferred mixed stands and secondarily they have preferred pure stands. Mixed stand types of fir and beech were preferred more when compared with other stands. Among all stand types while GKnA has been the most preferred one, KnGA has been preferred secondarily. Other mixed stands were preferred in the order of KnGD, GÇsKnD, KnÇsA, KnDybc, and KnÇsGD. In the ranking of GA, KnD, BKn pure stands were less preferred by wild animals. Nude areas (OT) have been the habitats on the area that were least preferred.

Table 4. *Number of large mammal wild animals detected compared to the stand types in the area*

Stand Types	Brown bear	Roe deer	Red deer	Red fox	Grey wolf	European badger	Stone marten	Wild boar	Wild cat	Total
BKn	1	17	8	0	0	1	3	0	1	31
GA	6	31	0	10	1	0	4	2	6	60
GÇsKnD	2	69	0	23	8	0	7	8	5	122
GKnA	48	284	2	197	22	22	27	244	14	860
GKnD	16	8	0	2	0	1	1	4	0	32
KnÇsA	16	1	0	0	2	0	0	31	4	54
KnÇsGD	1	11	0	4	0	0	5	6	6	33
KnD	2	1	0	4	2	0	17	13	1	40
KnDybc	32	0	0	0	0	0	1	0	1	34
KnGA	23	154	4	86	17	1	15	183	20	503
KnGD	0	104	4	84	7	4	16	41	1	261
OT	0	3	0	1	0	0	0	10	0	14

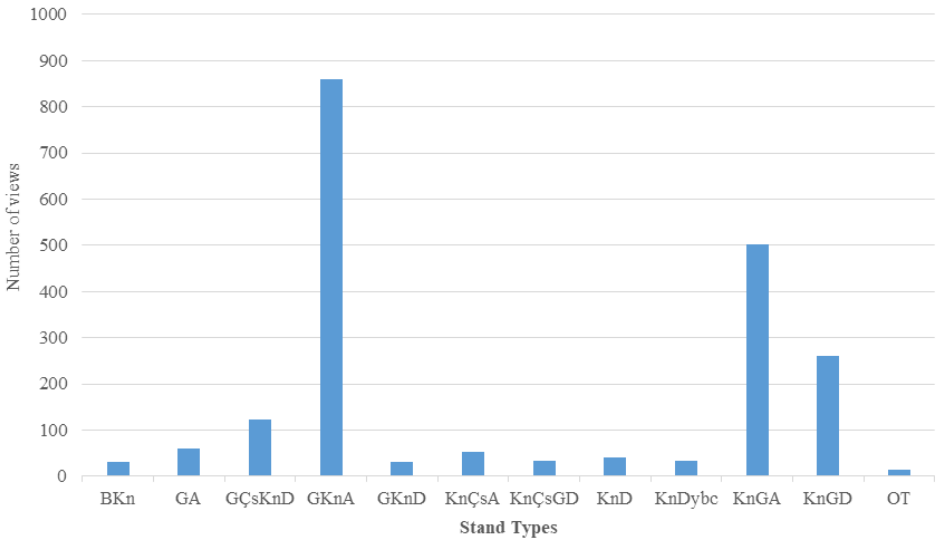

Figure 2. *Number of views to big mammals in stand types*

In habitat preferences of wild animals on the area as depending on stands, other variables that were effective have been A and D. In the stands where there are same tree mixtures, it is seen that A class of stands were significantly more preferred when

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compared with D class of stands. Hence while in GKn stand type with A class of mixtures, 860 individuals were observed, in D class of same mixture only 32 individuals were observed. Similar situation also attracts attention with KnG mixture. In this type of mixture while 503 individuals were observed in A class, 262 individuals were observed in D class. This situation reveals that regarding habitat selection of wild animals as per the stands, besides mixed type of stands, they preferred aged selection forests with more number of individuals having thick diameter stages more.

Stand preferences of wild animals on the area show parallelism with each other. However differences are observed in certain varieties. Wild boar, which is one of the dominant species on the area has preferred KnGA more when compared with other species. Again, wild boar and brown bear were seen more at KnÇsA when compared with other wild animals. A situation that is contrary to general preferences is seen with brown bear. KnDybc, which is not preferred by almost any wild animal species, has been preferred by brown bear as secondary stand type (*Figure 3*). The habitat preferences and distributions of each species is shown in *Figure 4*.

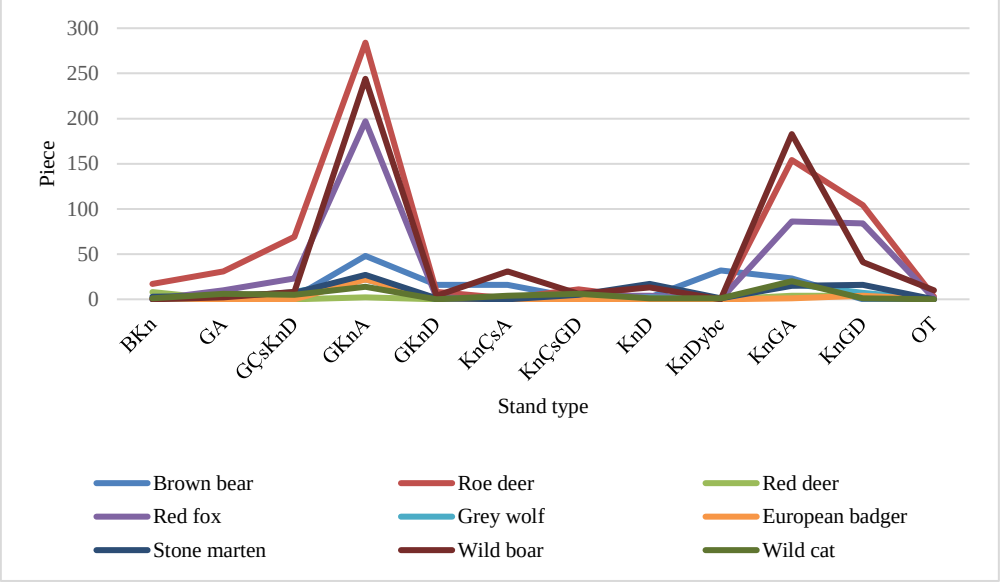

Figure 3. *Stand preferences of big mammals on the area of study*

Conclusion and Discussion

With respect to regional landscapes and sustainability of biological varieties, forest areas bear significant importance (Finch and Ruggiero, 1993). Forests are not only areas which are covered with forest trees but they are an integrity together with all ecosystem components. Among the living segments forming the forest, wild mammal species constitute one of the most important groups. Stand types are influential in different ways in habitat selection of wild mammal species. In line with the results we obtained, mixed and healthy stands are preferred more by wild animals when compared with pure and corrupt stands. Furthermore it is seen that besides stand mixture, stand class was also effective in habitat selection. Hence, A class of mixed stands have been preferred more by wild animals when compared with D class of same mixture.

In the study they conducted at Bolu Seven Lakes Natural Park, Nabioglu and Keten (2016) have stated that oak forests were quite densely used by wild animals.

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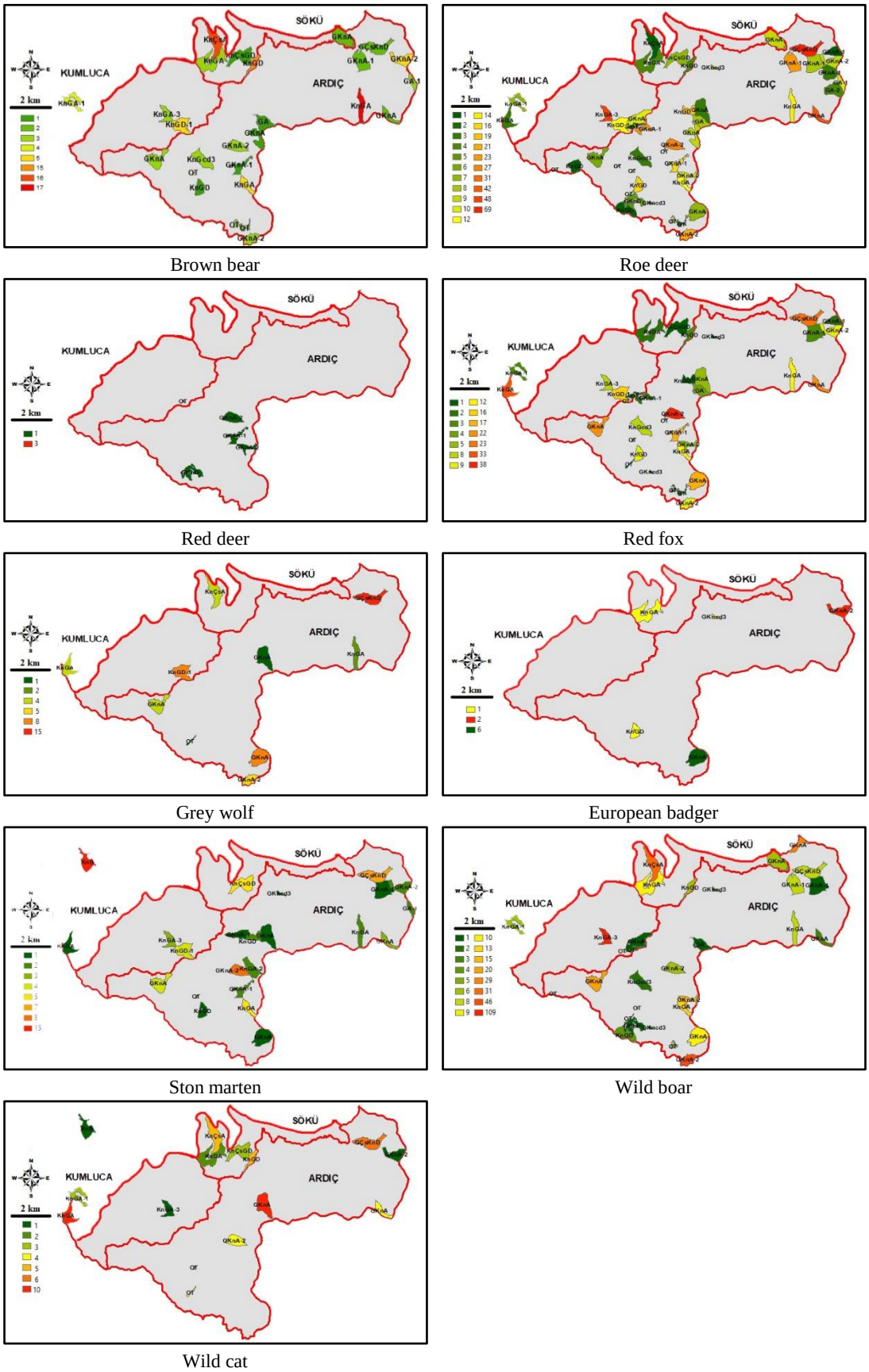

Figure 4. *Stand preferences and spatial distribution of large mammals in area*

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They have stated that as the area and near environment were suitable for wild life and as the area had protection status for the development of wild animals, these factors have been influential in this particular. At this point, with respect to habitat selection of wild animals, besides convenience of area, it is clearly revealed that area needs to be effectively protected either naturally or with human impact.

Areas where woody type of varieties are highly present, are seen as the sign of existence of wild animals. The more the woody type of varieties are, the more living areas the wild animals can find for their activities such as sheltering, hiding, having nourishment and resting and these will be areas which will be preferred more by the wild animals (Oğurlu and Aksan, 2013). Both the varieties and quantities of woody types are plenty on our study area and this is one of the most important reasons that increase richness of wild life on this area.

All of the 9 big wild mammals on the study area have mostly preferred stand type of GknA and they have secondarily preferred stand type of KnGA. All of the species have preferred mixed stand types more when compared with the pure ones. However it attracts attention that mixtures where fir is dominant are preferred more when compared with mixtures where beech is dominant.

Habitat selection of brown bears that make up the biggest specie on the area, are influenced from many variables including humans as not being solely effected by stand types (Frackowiak et al., 2014; Rigg, 2005). Brown bears that mainly prefer high altitudes keep away from settlement places (Rigg, 2005).

Even though they are seen in all stand types in our study, brown bears mostly prefer stand type of GKnA. However, as being different from other species it is seen that the stand type which they prefer secondarily has been KnDybc. This stand type is almost not preferred by other species. It is possible for brown bears that walk long distances during the day, to use different types of stands. We have frequently observed the foot prints and stools of brown bears on the forest roads which support this theory.

In Seven Lakes National Park, Beşkardeş (2016) have observed brown bears more at coniferous and other leafed mixtures where oak is seen to be dense, when compared with coniferous and other types of mixtures where beech is seen to be dense. Besides on this area closed stands are preferred more by brown bears when compared with sparse ones.

Roe deer which is the dominant specie on the area prefer closed fir and beech forests where human pressure is less but they don't want to have frequent sub-vegetation (Keten, 2017). On the research area as complying with Keten (2017), roe deers have mostly preferred stand types of GKn and KnG. However, in his study Keten (2017) has determined that roe deers used pure forests of fir, beech, oak and scots pine with similar ratios to the mixed forests. On the contrary in our study pure stands were preferred less by roe deers when compared with other mixed stands.

Mancinelli et al. (2015) have stated that roe deers went to places with dense shadow areas in order to hide from the heat in summer time and that they preferred young ash tree and hazelnut stands for this reason. Furthermore in this study it was mentioned that plant cover phenology was influential in the habitat selection of roe deers and that gemmiferous bushes, new leaves and fruits and newly growing grass were effective in habitat selection. Again it was determined that this specie preferred forests with scote pine and pyrenean oak more in Spain and that they got nourishment at places where there were blackberries, roses, shrubs and kochia in the lower flora structure (Virgos and Telleria, 2011).

Both of these studies support our study on the basis. Even if the types of trees are different, it is seen that roe deers preferred mixed stands more. Similarly, sub-flora which

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roe deers prefer for getting nourishment completely matches with sub-flora structures of GKnA and KnGA where roe deers have been mostly observed.

Red deers which are one of the target species on the area prefer forest areas which are calm and dense and where there are open areas and meadows in surrounding places. Besides preferring leafy and mixed forests, they can also prefer pure cultures. An important factor is that sub-layer is rich and it is situated close to water resources (Kumbasli, 2006). However, habitat preferences of red deers also change as depending on seasons (Zang et al., 2013).

Red deers which are among rare species prefer beech and especially pure beech stands more when compared with other species. Although they get nourishment at the small open areas within dense forests, beech forests which are on the study area provide more nourishment environment for this specie.

Red fox, which is another dominant specie has been observed densely at the stands of GKnA and KnGA as being similar to other species. But it attracts attention that red fox prefers KnGD stand as much as KnGA.

Cagnacci et al. (2004) state that habitat selections of red fox living on mountain areas could vary depending on the seasons. Red foxes prefer forest habitats more than open areas according to Etten et al. (2007). Similarly in our study it is seen that red foxes preferred mixed stands mainly having firs more when compared with other stand types. While red foxes were observed 222 times at the stands where firs were dominant, they were observed 179 times at the stands where beeches were dominating and where there were also firs.

Gresy wolf which is the most important predatory specie on our study area show harmonization with preference of general stands as being similar to other species. Another particular which attracts attention in this harmonization is that grey wolf prefers the same habitats as roe deers, being their most important hunt, with similar density ratios. For example the most preferred type GKnA is preferred by roe deer with a ratio of 41.5%, whereas it is preferred by grey wolf with a ratio of 37%, while they prefer the type of KnGA with ratios of 41.5% and 37%, respectively.

One of the best models determining the distribution of grey wolves on an area is the forest cover (Jedrzejewski et al., 2015). Wolves which generally prefer coniferous and mixed forests, do not like forests which are young and which drop leaves (Koskela et al., 2013).

European badger, which is one of the most rare species on the area mostly prefer open areas in the forests (Unal, 2011), and they are seen more on the regions where plant cover is more frequent and where human activities are rare (Özen and Uluçay, 2010). Soil's being suitable for digging is another important factor in the habitat selection of badger (Suel et al., 2013). Oğurlu and Aksan (2013) have stated that since planting areas could easily be digged and as the trunk branches of cedar tree were close to the ground and as their bottom parts provided sheltering, it was suitable for European badger to nest at these places. On the other hand since trees were dense on black pine areas and as the live cover below was weak due to their falling parts, and as the soil was tight and solid, they were not considered to be appropriate to meet the needs of European badger for hiding, finding shelter and nesting.

According the the data we have obtained, European badgers were observed more on GKnA type of stands when compared with other types of stands. This type of stand was preferred by badgers both due to its mixture and soil features. European badgers don't prefer stands with pure beech or mixtures being mainly composed of beech and it is

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thought that the reason for this is because sub-layer of this type of stands is coated with dense live or dead covers. This causes European badgers not to be able to dig the soil easily.

Stone marten which realizes less daily migrations when compared with other species prefers GknA mostly and it prefers KnD secondarily. Virgos et al. (2010) have stated that although stone marten was a predatory trees played an important role in their habitat selections. It is possible to observe marten at bushes and trees and at places where there are herbaceous plants (Suel et al., 2013). Stone marten, which we mostly observe at forest sections, sub-layers of which have developed, are not seen at open forest soils. It is found out that when stone martens left their nests inside dead tree blocks or wood blocks fallen on ground, they would hunt in the near environment and that they were returning back to their nests. Hence Bull et al. (2005) have stated that stone marten mostly preferred fir and spruce forests where there were dead trees and blocks. In the same study it was emphasized that martens rapidly left the areas where trees were cut.

Wild boar, which preferred juicy fruits in summer and dry fruits and seedy plants rich with fats in the winter season (Oğurlu and Aksan, 2013), which move around the living areas and which pile under dense plant covers and which get their nourishment on areas where there are tuber plants (Suel et al., 2013) have preferred stands having beeches as dominant tree types as they contained more water sources and as they met their food requirements better. Aksan et al. (2014) have stated that ideal places for wild boars were forest areas where soil type had characteristics of sandstone and that they did not prefer bushes and step areas. Wild boars do not use habitats randomly and mostly they act selectively among existing biotopes and in their habitat selections there are variations as per the seasons (Santos et al., 2004). In habitat selections of wild boars nourishment richness, level of hiding, sloping are the determinant factors (Xu, 2011).

In a study being conducted in Poland it was stated that wild boars preferred beech and horn beam forests and that they kept away from fir forests and that beech-horn beam forests were very important for wild animals (Fonsenca, 2008). In another study being conducted in Poland by Gorecki et al. (2009) it was determined that wild boars were mostly present within scote pines in fresh mixed wild leafed forest habitats.

In the studies we conducted it was seen that as being different from other species wild boars preferred stand types such as KnGA and KnÇsA where wide leafed trees were dominant. These stands meet the most convenient features for wild boars. As sub-flora of beech was more dense when compared with fir on the study area, a better environment was present for wild boars to rest and to hide. Again wild boar has been the only specie being observed on bare forest soil. Bare forest soils that were on the study area contained plenty of tuber plants which wild boars especially preferred as food. This situation caused for this specie to get nourishment here.

Wild cat which was the only cat specie being observed on the area was seen on all types of stands but with arc ratios. Just like other species wild cat was observed mostly at the stands of GKnA and KnGA. Wild animals being present on the area are active during the day time and they sometimes go to far distances away from their nests. Sarmento et al. (2006) have found out that for habitat usage wild cats preferred local and mainly forest areas. However besides forests shrubberies are also preferred by wild cats and even at certain places agricultural areas are also being used (Lozana, 2010).

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Recommendations

For long years forest activities and wild life activities have contradicted with each other. Especially after cuttings at wide areas, big or very small open areas have formed in the forests. As the study area is a very important production field for regional forestry, this situation has significant impact on wild life on the area. Similarly forest fires and pesticides that are used against harmful forest insects form threats for many wild animal species. However by using appropriate forest management techniques, while forest planning is made, wild life can be improved.

Formation of mixed stands, mixed types of trees, existence of individuals with different ages bear significant impact on improving varieties of types in forest ecosystem. However regarding the types to be used for afforestation, attention should be paid in preferring local types and for them to comply with local conditions. At this point while making new afforestation works, it bears significant importance to avoid pure cultures in forest administration and to establish mixed cultures and to plant fruit trees that are effective in the nourishment of wild animals. Planting apple and pear trees for brown bears and trees of bushes having grape-like fruits or berries at local points for roe deers and red deers are important for development and sustainability of wild life.

It is significantly important to realize cutting activities as being required for forestry, by paying attention not to ruin stand types and classes, not to change closeness and densities in a significant way and most importantly to realize these activities in periods other than reproduction and breeding periods of wild animals.

Mainly afforestation and production activities that will be realized by considering the requests of wild animals and all forestry applications bear significant importance for the sustainability of wild animals.

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