



Kurt

Elucidating The Cave Use Pattern Of Mediterranean Monk Seal On Exploited Habitats

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INTRODUCTION

Endangered Mediterranean monk seals use marine caves as resting places and shelter for breeding and nursing their pups. The southern coast of Turkey is one of the last remaining refuges and exposed to intense anthropogenic pressure that has a crucial importance for the survival of the species. In this study we focused on three documented populations of monk seals inhabiting the Northeastern Mediterranean to evaluate their cave use patterns in relation to anthropogenic activities. Using factorial ANOVA, we questioned whether there is any association between the caves that the seals chose for resting and the location of the cave with respect to the sources of different disturbances.

METHOD

- 19 Caves in the southern coast of Turkey monitored by camera-traps between the years 2015 and 2017.



Picture a. Marine caves located in study area.

- In total 21.417 images were controlled and among them 5.401 images were used to evaluate duration of each haul out
- Number of haul outs were used to draw seasonal cave use maps.
- Cave activities of seals were categorized as Sheltering, Resting and Nursing.
- Human activities were grouped as Tourism, Fishing, Agriculture, Industrial Infrastructure and Habitat Destructure and proximities of each activity to the caves measured. Then linear model created and values were tested with factorial ANOVA.

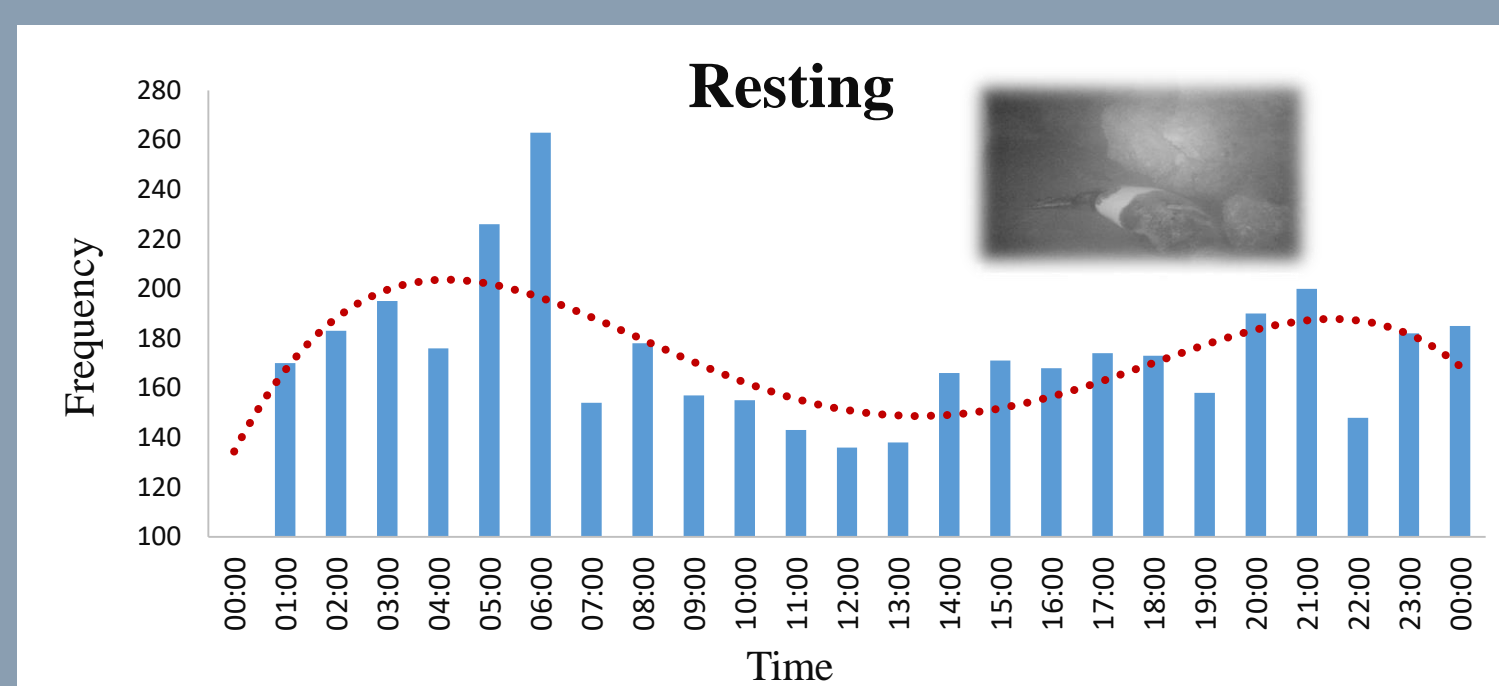


Figure 3. Total haul out distribution spent on Resting

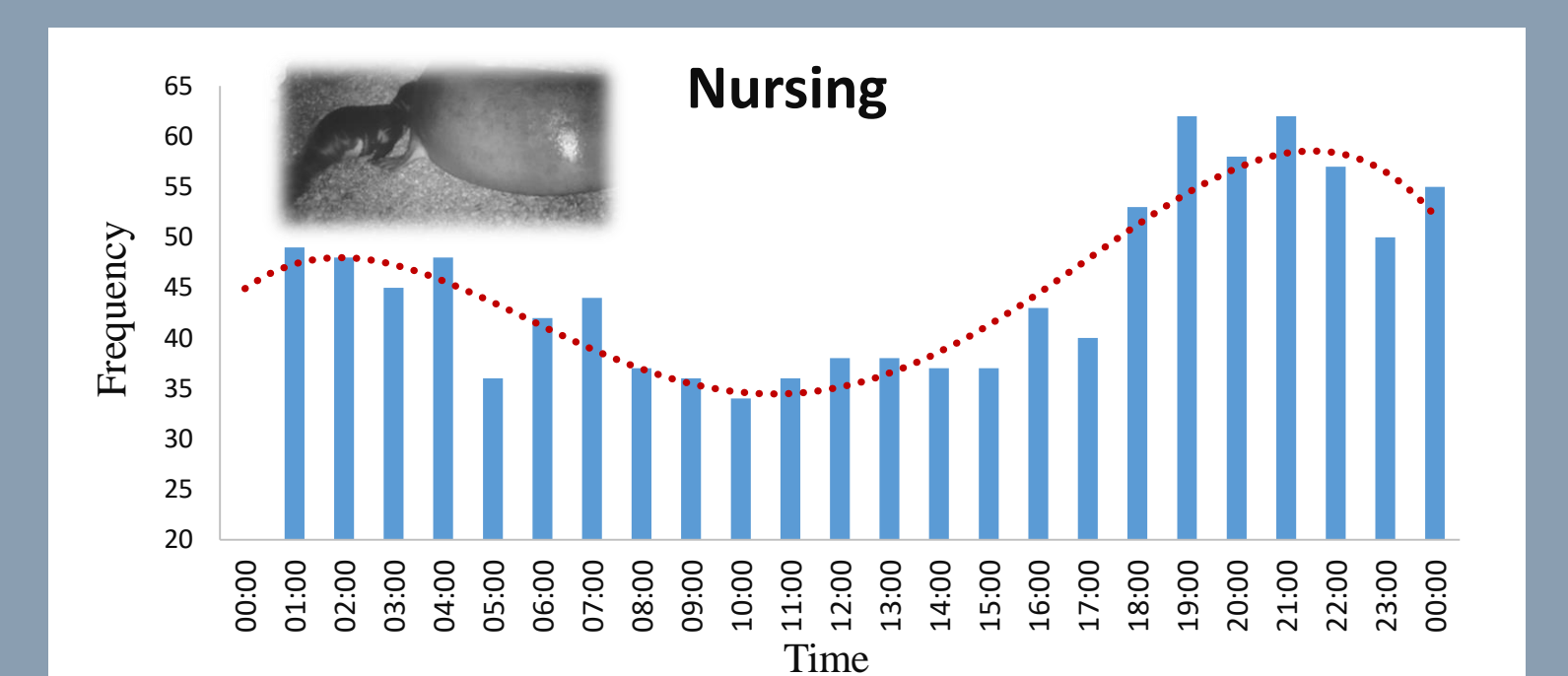


Figure 4. Total haul out distribution spent on Resting

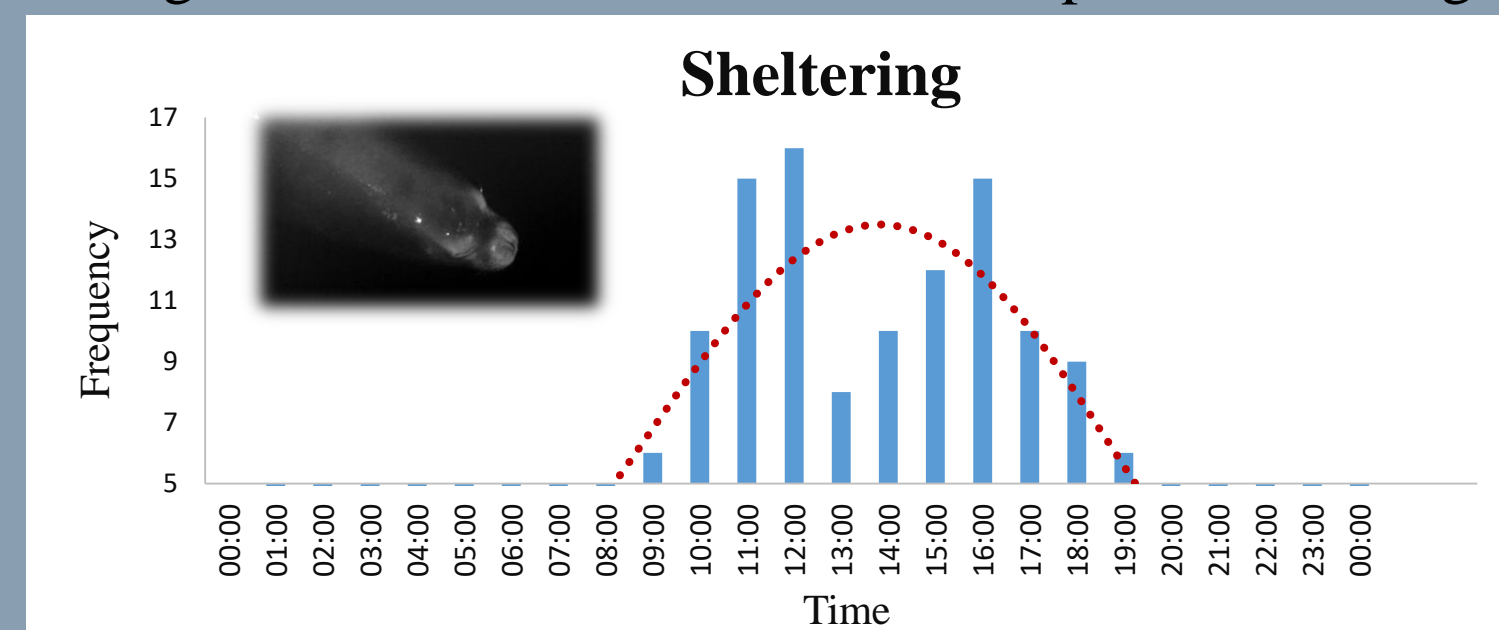


Figure 5. Total haul out distribution spent on Sheltering

★ Nursing and Resting occurred all day, however Sheltering occurred only between sunrise and sunset hours when human activity increases.

Table 1. Total haul out duration in each cave and distances of human activities to the caves.

Cave Code	Total Haulout Duration	FishingPort	Agriculture	Tourism	Industrial Infrastructure	Habitat Destructure
P1.C1	1.928	1.41	2.6	32.3	0.7	0.7
P1.C2	8.673	16.2	3.17	16.2	53.3	3.17
P1.C3	1.967	13.8	6.85	18.8	13.3	1.14
P1.C4	4.935	6.45	6.91	12	84.1	0.2
P2.C1	0.001	30	14.78	9.96	79.6	14.4
P2.C2	1.698	41.13	25.4	4.36	65.5	4.81
P1.C4	0.286	15.5	16.3	15.5	18.4	9.23
P1.C5	0.935	10.9	11.5	16.4	88.4	0.72
P1.C6	0.227	32.7	0.05	70.4	106	2
P1.C7	0.533	13	7.13	0.8	62.9	0.44
P1.C8	1.49	10.8	11.2	16.3	88.6	0.8
P1.C9	5.437	4	2.52	4	29	2.52
P3.C1	4.661	14.2	3.69	14.2	88.9	0.54
P2.C3	1.84	18.2	5.5	5.21	49.5	3.85
P2.C4	0.714	27.14	34.4	1.42	58.33	11

Table 2. Anova results of distance of anthropogenic activities in relation to total haul out duration. There was no significant P-value

Variables	DF	SS	MS	F-value	P-value
Fishing Port	1	11.866	11.866	1.858	0.206
Agriculture	1	5.277	5.277	0.826	0.387
Tourism	1	10.050	10.050	1.574	0.241
Industrial Infrastructure	1	0.076	0.076	0.012	0.915
Habitat Destructure	1	0.793	0.793	0.124	0.733

From this table linear model created in R and tested with factorial Anova

RESULTS

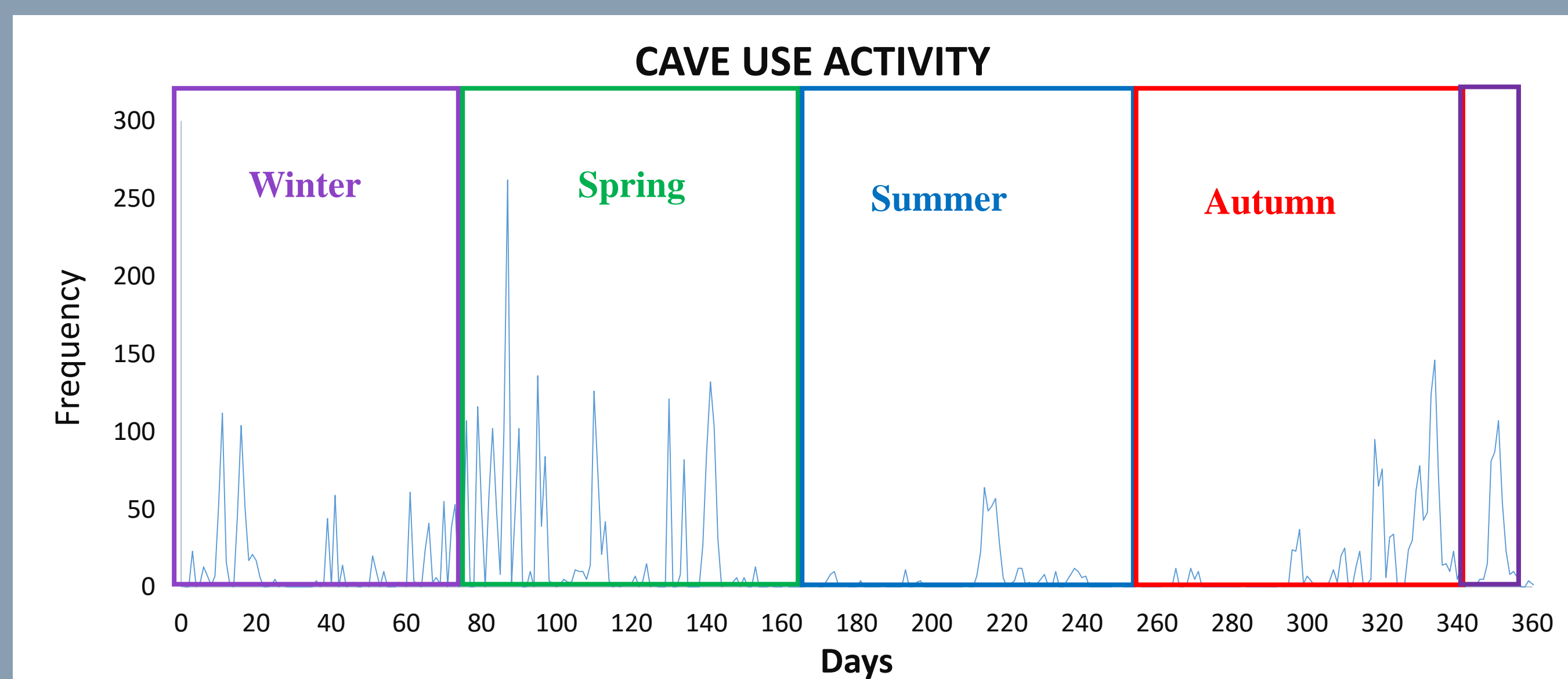


Figure 1. Seasonal cave use patterns. Purple rectangle represents Winter, green rectangle represents Spring, Blue rectangle represents Summer and Red rectangle represents Autumn.

- Caves use pattern varies seasonally.
- Spring has the highest number of cave activities, followed by Autumn and Winter respectively.

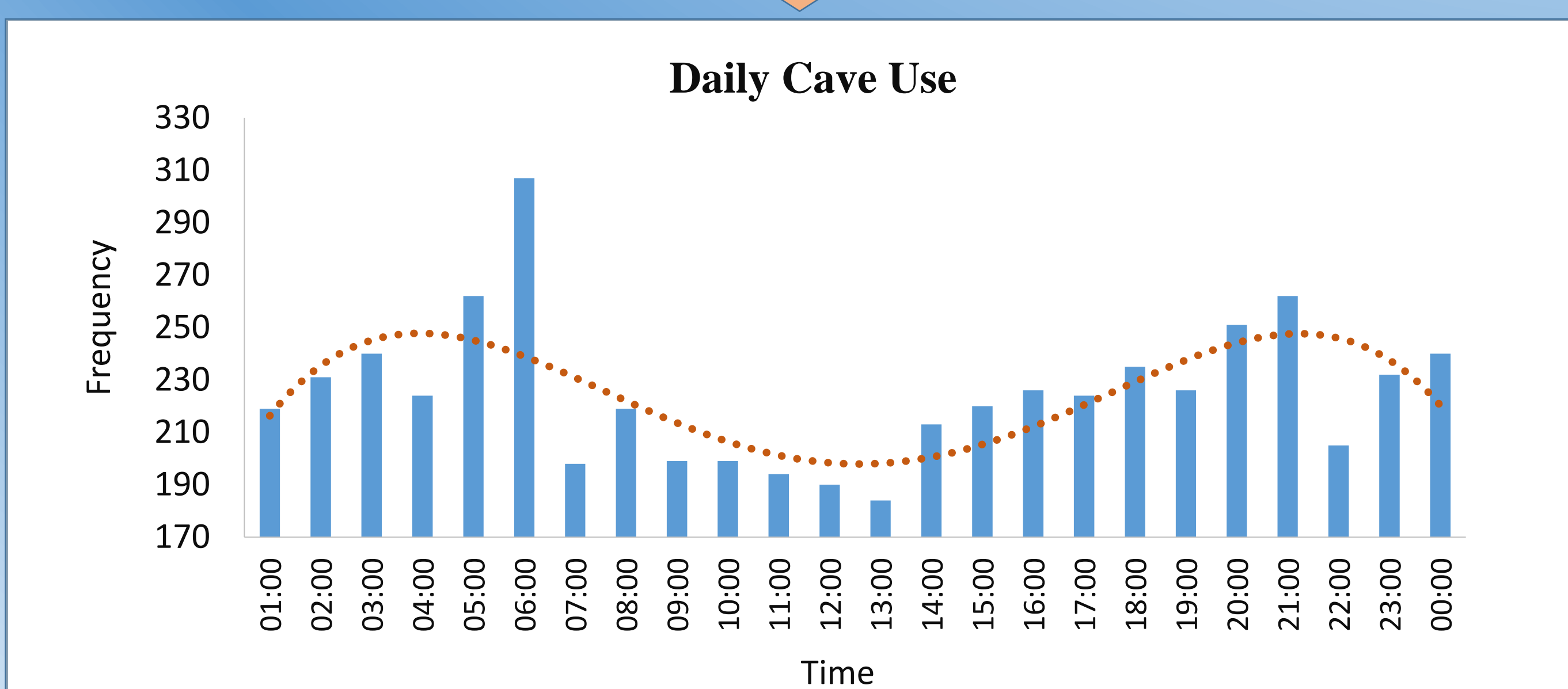


Figure 2. Daily cave use pattern.

- Caves were the most actively used at early morning hours

CONCLUSION

- The lack of relationship suggests that, regardless of how close the disturbance is, the seals were urged to use certain caves in order to meet their biological needs.
- However, if the intensity of the disturbance exceeds the tolerable level, the result may be miscarriage of pup or disruption of the mother-daughter relationship. This underlines the importance of the MPAs to keep the seals away from the human pressures.

References

Gucu, A.C., Gucu, G., Orek H., 2004. Habitat use and preliminary demographic evaluation of the critically endangered Mediterranean monk seal (*Monachus monachus*) in the Cilician Basin (eastern Mediterranean). Biological Conservation 116 (2004) 417-431. s. thesis, Middle East Technical University, Institute of Marine Sciences, Mersin, Turkey.